
COMPETITIVENESS OF THE SLOVAK REPUBLIC IN INTERNATIONAL TRADE

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Abstract

The paper analyses the relative competitiveness of the Slovak Republic and examines in which product groups the country has a comparative advantage compared with the rest of the world. The most commonly used method of calculating the country's comparative advantage is the indicator of revealed comparative advantage. The aim of the paper is to analyse the current comparative advantages of the Slovak Republic through the calculation of the RCA indexes. The application of the Slovak and world-wide export data to RCA index allows us to identify in which sectors Slovakia has got the comparative advantage and is competitive at global level. The analysis of these industries also allows us to identify the threats to the future economic development of Slovakia.

Key words: *URCA Index, Revealed Comparative Advantage, Export, Slovakia*

INTRODUCTION

The Slovak Republic is a small country with a very open economy that is dependent on foreign trade. The degree of country's involvement in international trade and cooperation is often the result of the country's impossibility of covering its needs with raw materials and energy resources and there are not enough resources or capacity to meet the domestic demand. By importing the needed goods, a country can use their domestic resources to produce what they are the most suitable for. That allows the economy to deal with the proper allocation and efficient use of scarce resources. Participation in international trade offers the opportunity to specialise in the production of a narrower range of goods and services with lower costs and to benefit from economies of scale even for smaller countries without natural comparative advantages. For companies of any size, this gives the potential to do business with the rest of the world. Trade creates new jobs, contributes to higher wages and better living conditions. The smaller the economy, the higher its openness is assumed.

The extent of a country's involvement in international division of labour and international trade generally depends on the following factors:

- the historical development of the economy;
- the size of the domestic market;
- production possibilities;
- natural assets;
- climatic conditions;
- the geographical location of the country;
- the political situation of the country concerned;
- socio-cultural level of society.

Slovakia's position as a former centrally planned economy has long been conditioned by many historical factors in terms of international trade. The important role was played not only by internal economic and political conditions, but also by fundamental changes in Slovakia's international position. With the accession of the Slovak Republic to the EU, the national market, and along with the integration, the pressure to continuously improve the offered goods have increased, so that they are competitive on the global market. Due to the relatively small internal market and the lack of its own energy raw materials, the Slovak economy has been highly open for a long time. The degree of openness of the Slovak economy has increased in recent decades and reached the highest level of more than 190% in 2018 (see Table 1). Such high openness of the economy means that foreign trade is of key importance for the Slovak economy and creates suitable conditions for high economic growth. On the other hand, there are permanent risks of external (positive and negative) effects on the performance of the Slovak economy.

The territorial orientation of foreign trade is influenced by a number of factors, such as natural conditions, raw materials and energy reserves, lack of domestic capital or the economic and political ambitions of the country. The transformation of the Slovak

economy from centrally planned to market one has been reflected also in foreign trade by changing the territorial structure of trade, with priority being given to a change of orientation from the Council for Mutual Economic Assistance' countries (CMEAS/ COMECON) to advanced world markets, in particular those of Western Europe and the EU countries. Following the establishment of the independent Slovak Republic, the need to focus on the EU markets increased as the existing production capacities had got no longer placement on the markets of the former CMEAS countries. Slovak exporters were increasingly focused on Western markets, but the economy's dependence on raw materials supplies from Russia still persisted.

Table 1: Slovakia's openness rate as a share of exports and imports of goods and services on GDP

Time	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Openness	121,7	120,4	125,1	139,6	147,7	164,6	166,3	162,0	136,2	154,7
Time	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Openness	169,1	176,3	181,4	178,2	180,9	184,5	188,2	190,9	184,4	170,6

Source: authors' representation based on Eurostat data (2021)

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In 1993, the Czech Republic had the largest share of Slovak foreign trade, with which the Slovak economy was linked in the field of supplier-customer relations, and this primacy lasted until 1997. In 1998, the Czech Republic was succeeded by Germany in the first place as a trading partner which still maintains its leading position. Mutual foreign trade is mainly subject to activities of automotive companies and large-scale foreign direct investments. The territorial structure of foreign trade of the Slovak Republic has gradually been transformed and the share of the OECD and the EU countries in both export and import has increased, which was also supported by Slovakia's accession to European integration structures. At present, European coun-

tries account for around 90% of Slovak exports and account for almost 70% of Slovak imports. The V4 countries remain a more important market for Slovakia's exports. Since the 1960s, Slovakia has focused mainly on the export of machinery and metal-working products. Fuels, raw materials and semi-finished products were a key component of imports. The transformation of the Slovak economy into a market economy has largely changed production in many sectors of the economy. The division of Czechoslovakia in 1993 and the inherited structure of the industry characterized by low degree of processing and high energy and material intensity resulted in problems with the initial penetration of Slovak exports into foreign markets. Slovakia had got unused production capacities mainly in the arms industry, which was built for export to the CMEAS countries. Structural changes have mainly affected the mechanical engineering sector, where many products have seen a significant drop in exports and an increase in imports.

In the first half of the 1990s, mainly iron and steel were exported, followed by exports of machinery and equipment, as well as exports of cars, tractors and motorcycles. Since 1995, Slovak exports have gradually started to reduce the weight of iron and steel exports, which can be considered a positive trend in terms of export orientation towards products with higher added value. Motor vehicle exports have seen a strong growth rate. It was the tradition of Slovak arms production and the number of unemployed who still had experience with engineering that were one of the impulses of the establishment of the automotive industry in the Slovak Republic. Exports of machinery and transport equipment increased from 39,5% of total exports in 2002 to 64% in 2020. The growth of motor vehicle exports since 1996, and especially after 2003, has been significant due to foreign investors entering the sector. In the automotive industry, the growth of exports was also accompanied by an increase in imports, in particular imports of parts and accessories for transport equipment. Most components for the Slovak automotive industry are imported from Germany, the Czech Republic, the Republic of Korea, France and Poland. The position of commodities with a higher degree of finalisation on export is gradually strengthening, such as apparatus and equipment for telecommunications, sound and image recording and reproduction and electrical equipment, which is also linked to the entry of foreign investors into this domestic market.

At present, the goods structure of Slovak exports is concentrated on several sectors, namely the production of transport equipment (passenger cars, their parts and accessories), electrical and telecommunication equipment (shafts, bearings, pumps, fans, compressors, boilers, TVs and telephone equipment) and base metals and articles thereof (iron, steel, wires). Developments in these sectors are the main driver of the Slovak economy, but there is a high risk for the economy depending on the development of foreign demand for production of these sectors.

Slovakia imports mainly machinery and electrical equipment (computing, engines, pumps, mobile phones), raw materials (oil, gas, fuel, oils and coal) and transport

equipment (cars and their parts and accessories). The share of machinery and transport equipment in Slovak imports increased from 37.7% in 2002 to 51.5% in 2020 (Table 3) reflecting the high import intensity of this sector. A special chapter of Slovak foreign trade is food and beverages whose negative balance is constantly deepening although they hold a stable share of Slovak exports and imports.

Table 2: Export of the Slovak Republic by SITC product groups in million ECU/EURO

Time	2002	2005	2008	2011	2014	2017	2020
Total-all products	15234,1	25632,4	48369,7	57297,3	64913,1	73790,1	75748,8
Food, drinks and tobacco	477,5	1075,4	1625,3	2333,5	2300,4	2477,1	2718,0
Raw materials	471,1	802,9	1299,4	1693,5	1421,7	1435,6	1470,7
Mineral fuels, lubricants and related materials	915,0	1511,8	2435,4	3613,8	2903,3	2411,9	1823,8
Chemicals and related products, n.e.s.	1011,7	1474,8	2280,7	2826,2	3136,7	3255,8	3105,2
Other manufactured goods	6210,7	9006,1	14234,6	16533,5	17614,9	19884,2	17989,2
Machinery and transport equipment	6014,6	11315,3	26073,1	30192,6	37360,0	44156,6	48513,1
Commodities and transactions not classified elsewhere in the SITC	133,5	446,1	421,3	104,2	176,0	169,0	128,8

Source: authors' representation based on Eurostat data (2021)

The development of foreign trade and export performance illustrates the long-term import intensity of the Slovak economy and, as a result, emerging trade deficits. The Slovak economy is highly dependent on the import of strategic raw materials, especially oil and gas from Russia. This dependence, together with the unstable development of world prices, has often led to negative balance of payments developments, with the largest negative balances recorded under mineral fuels, lubricants and chemicals. Conversely, the largest and ever-increasing surpluses are under machinery and transport equipment.

As Slovakia is a member of the EU, it is constantly subject to international competition, so it must permanently innovate and modernise. The 2018 Global Competitiveness Report of the World Economic Forum [WEF, 2018] highlighted the existing problems of the Slovak Republic that hinder or limit the development of the competitiveness of the Slovak Republic. Based on the Report, the Slovak Republic has an advantage mainly in macroeconomic stability in the form of low inflation rates and low debt ratios compared to other countries. In an environment of globally increasing competition, Slovakia, like other countries and trade groups, faces the challenge of maintaining its position in international trade. It is therefore important to recognise in which sectors and commodities the competitive advantages of the Slovak Republic lie compared to the rest of the world. Their identification and analysis will allow us to define the potential threats arising from current developments, which may threaten the further economic development of the Slovak Republic. OECD [2001] defines competitiveness as „a measure of a country’s advantage or disadvantage in selling its products in international markets “. The competitiveness can be understood as the ability to be present at a market and meet the competition. It represents the success of a certain subject in relation to other subjects, which it meets and competes with at the market. A country’s export competitiveness is usually based on the use of comparative advantages, which mean that a country can produce certain goods more efficiently than other countries. The objective of this article is therefore to analyse the so-called comparative advantages through calculating the RCA indices for individual product groups. The products (sectors) with the highest values of this index represent the main source of economic growth and employment in the Slovak Republic. For this reason, we pay closer attention to them.

Table 3: Import of the Slovak Republic by SITC product groups in million ECU/EURO

Time	2002	2005	2008	2011	2014	2017	2020
Total- all products	17516,8	27850,9	50252,6	57601,7	61404,6	72191,9	73871,6
Food, drinks and tobacco	886,2	1607,5	2533,2	3293	3407,1	3930,5	4489,3
Raw materials	650,6	1025,1	1618,6	2248,4	1945,1	2093,9	1899
Mineral fuels, lubricants and related materials	2349,7	3668,1	6301,1	8443,7	5959	4879,7	3794,3
Chemicals and related products, n.e.s.	1867,2	2697,6	4279,7	5015,5	5438,1	6432,5	6539,7

Other manufactured goods	5035,4	8084,2	13595,1	15189,2	17325,7	19745,6	18232,6
Machinery and transport equipment	6600,3	10624,9	21761,5	23214,3	27214,1	34853,1	38063,4
Commodities and transactions not classified elsewhere in the SITC	127,3	143,7	163,3	197,6	115,5	256,8	853,5

Source: authors' representation based on Eurostat data (2021)

This paper is divided into three parts. The first part deals with an overview of literature, which focuses on the issue of measuring foreign trade competitiveness through comparative advantages. The second part approximates the methodology and data used in the analysis. The third part presents empirical results and their description.

1. LITERATURE REVIEW

Several indicators are used to measure the country's competitive advantages in international trade in various modifications, with indices based on the classic theory of international trade being the most widely used. The classic theories of international trade are based on the principle of comparative advantages, which arise from the determination of relative prices, in particular from the differences in the initial relative prices between countries, which are given by the supply and demand for production factors. There are two basic theories of international trade, which are based on the existence of comparative advantage - Ricardo and Heckscher-Ohlin theory (H-O theory). Ricardo assumed that comparative advantage arises because of differences in technology across countries, while the H-O theory assumes the same technology in the countries. Instead, H-O theory considers the basis of the comparative advantage in differences in costs arising from differences in the prices of production factors. According to this theory, the comparative advantage of the country is based on the relative abundance of production factors (specifically the ratio of factor ownership relatively to the rest of the world or group of countries). However, it is generally known that the measure of comparative advantage and the testing of the H-O theory are problematic, whereas, for example, it is not possible to track the relative prices in the case of autarky. On this basis, Balassa [1965] suggested that there is no need to define all the elements influencing the comparative advantage of the country and the initial relative prices, but it is possible to define comparative advantage as a "revealed" on the basis of the observed current structure of trade. Such comparative advantage derived from observed data is referred to as revealed comparative advantage and, in practice; it is a generally accepted method of analysis of data on trade. This method

as opposed to the Ricardo approach does not analyse the potential competitive advantages but the resulting competitiveness of the country.

The most commonly used tool for analysing data on trade and comparative advantages is the indicator Revealed Comparative Advantage - RCA. Definition and empirical adaptation are being discussed and several alternative ways of measuring the comparative advantage and competitiveness of countries arises. Liesner [1958] was the first, who contributed to the empirical RCA theory and tried to measure the comparative advantage of the Great Britain against the Common market. Balassa [1965] suggested the index (also called Balassa index), which is an advanced form of measurement of the revealed comparative advantage of the country and is generally used in the empirical literature. Weakness of this index is the omission of information about imports. Vollrath [1991] has offered alternative ways to measure the comparative advantage of the country and to prevent double-counting. These alternative methods that have been modified from RCA are relative trade advantage, logarithm of relative export advantage and revealed competitiveness. Greenaway and Milner [1993] suggested an alternative index, which considered the possibility that the country recorded simultaneous export and import within a commodity, or within a certain sector. The benefit of these indexes is the inclusion of both, the supply and demand side. The above indicators suggest that a company in one country compete only with domestic companies within groups of countries (e.g. the EU) and not all firms exporting to that market. That is why Utkulu and Seymen [2004] modified the original index, which measures the proportion of domestic export commodities to its total export in relation to export all over the world on a given market (e.g. the single market of the EU).

The problem of the implementation of these methods of measurement the RCA is that the pattern of trade can be distorted by government intervention in the form of restrictions on imports, export subsidies and other protectionist measures, which may cause misinterpretation of the comparative advantage. Fertò and Hubbard [2003] use the coefficients of nominal assistance estimated by the OECD for the countries and commodities to the filtering effect of the possible deformations. Greenaway and Milner [1993] to remove the distortion caused by the interventions used a price-based measurement of the RCA, called an implicit revealed comparative advantage.

The traditional RCA index provides a static analysis of the comparative advantages, but is unable to explain their transitional changes in time. For the identification of dynamic changes Edwards and Schoer [2002] built a dynamic RCA index, which is used for the analysis of the dynamic market position of competitors on the market, through the disaggregation of the RCA growth to its components. Another frequently used indicator of measuring competitive advantage in international trade is an index of comparative export performance, which is a modified version of the Balassa index and measures the export specialization of a country to a selected group of products. Depending on the alternative version of the indicator used, inconsistent results may

occur. For this reason, careful interpretation of the resulting indices by economic policy makers is necessary. French (2017) applies a widely-used class of quantitative trade models to evaluate the usefulness of measures of revealed comparative advantage and find several common uses of RCA indexes for certain tasks.

Many empirical studies have assessed the competitiveness of foreign trade using the RCA index. The authors focus on either a specific country or some trade area. The studies related to Slovakia state that the Slovak economy has been developing in a similar way to other Central European countries. Vokorokosova, Čarnický (2003) applying the RCA index found that in the early 2000s Slovakia was competitive in relatively higher capital, material and labour intensity production. According to Borbély (2006) new and cohesion EU countries are competitive in middle- and low-quality products. Bobáková, Hečková (2007) find that in Slovakia dominate the price and cost competitiveness. According to Aiginger (1998) Slovakia has got the second largest sector with successful price competition among the transition countries. Zábajník, Borovská (2021) define the key indicators of the competitiveness of the Slovak Republic on the third markets using the basic indicators as export volumes, market share, RCA and export gap. Pavličková (2013) quantifies the competitiveness of Slovak foreign trade and uses the RCA index and the REVELAST approach in order to determine the structure and character of the competitiveness until 2011.

2. METHODOLOGY

We decided to analyse the comparative advantages on which Slovakia's exports are based through the Balassa Index of Revealed Comparative Advantages (RCA index), which is generally used to identify foreign trade specialization and sectoral competitiveness. We do not have to consider distortions due to government interventions in international trade, given that the Slovak Republic is part of the EU and does not have its own trade policy. The Balassa index is expressed as follows:

$$\text{RCA index} = (X_{ij}/X_{it}) / (X_{nj}/X_{nt}) \text{ or } (X_{ij}/X_{nj}) / (X_{it}/X_{nt}) \quad (1)$$

where X represents exports, i is a country, j is a commodity (or industry), t is a group of commodities (or sectors or total exports) and n is a group of countries (or the world). The RCA index thus measures the share of commodity (industry) exports in the country's total exports relative to the ratio of the commodity's exports to the total exports of the selected group of countries (or worldwide). In other words, it compares a country's share of the world commodity market with that of all commodities. A comparative advantage is considered to be shown if the RCA index is higher than 1, i.e. the commodity's share of the country's exports is higher than its share of world exports. Rather, country is a competitive producer and exporter of that product relative to a country producing and exporting that good at or below the world average. And country with a comparative advantage in product j is considered to have an export

strength in that product. If the RCA index is lower than 1, the country has a comparative disadvantage in exporting the product (industry).

Moreover, Hinloopen and Marrewijk [2001] classifies the power of comparative advantage as following:

Class a: $0 < RCA \leq 1$ - no comparative advantage.

Class b: $1 < RCA \leq 2$ - a weak comparative advantage.

Class c: $2 < RCA \leq 4$ - a moderate comparative advantage.

Class d: $4 < RCA$ - a strong comparative advantage.

For the purposes of our analysis, we adjusted the index by calculating the share of exports of a certain product group in the total export of the Slovak Republic against the share of this group of goods in global exports. As a data base, we used the World Trade Organization (WTO) database from which we obtained data on the export performance of the Slovak Republic, as well as the world merchandise export by product group under SITC Revision 3 (aggregates) values for the period from 2002 to 2019. Data for 2020 were not available, moreover, we have avoided to use them due to distortions in trade flows caused by the COVID-19 pandemic.

3. EMPIRICAL RESULTS

The application of export data of the Slovak Republic and the world to the RCA index allowed us to identify in which product groups the Slovak Republic has a comparative advantage and is competitive at the global level. However, countries' ability to produce certain goods varies depending on various endogenous and exogenous factors, such as the endowment of production factors, socio-political influences or technological changes. For this reason, we calculated the RCA index for the years 2002 to 2019. It is thus possible to assess which sectors of the Slovak economy strengthen their competitiveness, contribute to export growth and have the potential for further economic development, and which, on the contrary, are declining.

The following table illustrates the results of the RCA indexes for the Slovak Republic in selected years. Data for the whole period are set out in the Annex. Those product groups in which the RCA index acquires a value higher than 1 are sectors in which the Slovak Republic has a revealed comparative advantage over the rest of the world. The higher the value of the index, the greater the comparative advantage of the Slovak Republic.

Table 4: The RCA indexes for Slovak exports for selected years

Product group	2002	2005	2008	2011	2014	2017	2018	2019
AGRICULTURAL PRODUCTS	0,60	0,79	0,58	0,67	0,54	0,47	0,47	0,46
Food	0,48	0,70	0,54	0,67	0,52	0,45	0,44	0,44
FUELS AND MINING PRODUCTS	0,74	0,49	0,34	0,42	0,35	0,37	0,30	0,30
Fuels	0,63	0,43	0,28	0,35	0,29	0,30	0,23	0,23
MANUFACTURES	1,16	1,20	1,34	1,35	1,36	1,33	1,36	1,35
Iron and steel	3,72	2,96	2,06	2,18	2,04	2,16	2,07	1,84
Chemicals	0,65	0,55	0,45	0,46	0,45	0,39	0,38	0,36
Pharmaceuticals	0,27	0,29	0,21	0,23	0,23	0,14	0,16	0,16
Machinery and transport equipment	1,00	1,21	1,62	1,68	1,78	1,72	1,79	1,84
Office and telecom equipment	0,26	0,77	1,74	1,76	1,86	1,51	1,31	1,23
El. data processing and office equipment	0,14	0,70	0,54	0,58	0,86	0,46	0,40	0,48
Telecommunications equipment	0,42	1,20	3,96	4,07	3,88	3,93	3,59	3,03
Integr. circuits and electr. components	0,24	0,27	0,12	0,09	0,10	0,10	0,09	0,07
Transport equipment	1,55	1,59	2,06	2,17	2,43	2,44	2,85	3,07
Automotive products	2,03	2,07	2,83	3,16	3,52	3,43	3,98	4,30
Textiles	1,13	1,00	0,85	0,74	0,66	0,60	0,59	0,56
Clothing	1,40	0,96	0,73	0,80	0,77	0,55	0,61	0,56

Source: authors' calculations based on WTO data (2021)

Based on calculations, Slovakia achieves an RCA index value higher than 1 and thus a revealed comparative advantage over the rest of the world, only under the product group *Manufactures*. If we look at a closer specification, we can see that the RCA index acquires long-term high values in product groups *Automotive Products*, *Telecommunications Equipment* and *Iron and Steel*. In these sectors Slovakia has shown comparative advantages vis-à-vis the rest of the world and has been competitive in these product groups throughout the whole analysed period. On the other side, RCA index values decreased under the groups *Textiles* and *Clothing* over the period considered, which means a loss of global competitive advantage. It was observed that the ongoing competition advantage started to decrease in the analysed period. These traditionally strong sectors of the Slovak economy lost their relevance after the transformation and were downturned. We can see this trend in many developed countries, from where these productions move to areas with a lot of cheap labour, such as India, Bangladesh or China.

The automotive industry is the basic pillar of the Slovak economy and its foreign trade, as confirmed by the highest and increasing values of the RCA index and the strong revealed comparative advantage. In 2019, more than 1,100,000 vehicles were produced in Slovakia, according to the Automotive Industry Association of the Slovak Republic (ZAP SR), and Slovakia is the world leader in the production of cars per capita. The automotive industry's share of the total industry reached 49.5% and the share of exports was 46.6%. The automotive industry directly employs more than 177 000 people and directly and indirectly generates up to 275 000 jobs. One of the impulses for the creation of the strong automotive industry in the Slovak Republic and the growth of its competitiveness were the factor conditions in the form of the tradition of Slovak engineering and arms production and the amount of unemployed skilled labour during the period of transformation, which had experience with engineering. The advantageous geographical position of the Slovak Republic in the middle of Europe positively influenced investors from other countries to invest in Slovakia, because thanks to this localization, the distribution of cars to other countries is easier. Foreign investors have brought in new technologies and built more modern plants than in their home countries, which, together with low labour costs, has formed the basis for competitive production. The first automotive company to build a plant in Bratislava was the German automotive company Volkswagen in 1991, then in 2006 it was followed by PSA Peugeot Citroën in Trnava, KIA Motors in Žilina and in 2018 Jaguar Land Rover opened a plant in Nitra and could benefit from a developed chain of existing suppliers.

As we can see, the automotive industry and related components have a long tradition in Slovak history. The growing share of the automotive industry and downstream industries in Slovakia's foreign trade reflects the competitiveness of these sectors. In addition to historical background, comparative advantages over other countries are based on both internal and external economies of scale. Geographical proximity al-

lows companies to communicate and spread knowledge more easily, leads to higher employee specialisation, cost savings and overall productivity gains. It is beneficial for competing companies if they are located close to each other, which helps them build and use a network of suppliers and customers. This is also applicable to car producers in Slovakia whose production is concentrated in western part of Slovakia (Figure 1). The governments of the Slovak Republic tried to support the development of the automotive industry and supported the inflow of foreign investments in this sector. Through state interventions, financial support, support for upskilling of the workforce, the automotive industry has thus become the most important and competitive sector of the Slovak economy. At the same time, the growth of this sector has supported the development of other downstream sectors. A good example is the production of tyres and other rubber components. Rubber production has been a tradition in Slovakia since 1904, when the first rubber factory Matador in Bratislava was founded, in which technical rubbers or hoses and later tyres for Czechoslovak cars were produced. In 1998, a German investor joined the company and a joint venture was established for the production of Continental Matador truck tyres, which still operates in the chemical and rubber industry of the Slovak Republic.

Figure 1: Location of car producers in Slovakia



The second highest values of the RCA index (a moderate comparative advantage) can be seen in a production group Telecommunications Equipment. The strongest sector of Slovak electrical engineering is the production of televisions. The production of televisions, screens, printed circuit boards and other electrotechnical components for TV accounts for almost half of the entire electrical industry in Slovakia. This sector employs more than ten thousand people in Slovakia. After cars, it is the strongest export item. Almost one in five imported TVs in the European Union countries is made by one of the three large companies based in Slovakia. Samsung has been operating in Slovakia since 2002 and in addition to the production of consumer electronics, it also has a distribution centre for Central and Western Europe in Slovakia. It represents almost a third of the entire Slovak electrical engineering industry. Production of Sony TVs started in Slovakia as early as 1996 at the Sony Slovakia plant. Since 2010, the company has been operating under the name Foxconn Slovakia and produces mobile phones, laptops, TVs, digital cameras, game consoles, audio, video

and IT devices and many other products. Universal Media Corporation, operating in Slovakia since 2004, has been sending licensed Blaupunkt and Sharp TVs or cheaper TVs for retail networks such as Tesco and Kaufland to the market. In total, these three companies export to 73 countries around the world. Mainly to Germany (19 % of total exports), Great Britain (13 %) and the Netherlands (11%).

One of the reasons why these multinational concerns opted for production in Slovakia is that there was experience in the production of their own televisions, modern equipment, technology and experienced staff. The production of televisions has been a tradition in Slovakia since 1958. In particular, manufacturers' easier access to European markets following the enlargement of the Union, cheap labour and quality suppliers of plastics and packaging materials contribute to the growth of production of this industry.

The revealed comparative advantage, albeit a smaller and ever decreasing (a weak comparative advantage), is also achieved by Slovakia in the production group Iron and Steel. Historically, steel production has been and will remain one of the main pillars of the development of Slovak industry. In Slovakia, the sector has a share of GDP of more than 6%. The steel industry in Slovakia has a significant share of exports, employment, creating conditions for support of other industries, mainly construction, automotive, engineering or energy. It also has a significant contribution to the application of R&D results in practice, in the field of new materials and new types of steel. The largest steel producer in Slovakia is U. S. Steel Košice. In 2000, the company became the owner of Východoslovenské železiarne (VSŽ), plant which was founded already in 1959. They mainly produced sheets, steel strips and also had extensive engineering production. In the 1980s, VSŽ was the most modern metallurgical plant in Czechoslovakia. At present, the company employs almost 11,000 employees. Steel and sheets are mainly produced. The iron ore used comes mainly from Ukraine and Russia. Slovak iron ore, which was used in the past, is not currently supplied.

However, as we can see from the development of the RCA index, the Slovak comparative advantage in steel production has declined in recent decades. There are several reasons for this. Iron and steel exports from outside the EU have been steadily growing since 2012. In particular, the world is overflowed with record amounts of cheap steel from China, which also causes a reduction in its production in Slovakia. The unit price of imported steel and iron decreased until 2016, when duties were mainly imposed on cheaper Chinese steel, which was also reflected in the increase in the value of the RCA index. Slovakia's problems with metal exports are also related to weaker economic activity and lower demand from its important trading partners.

CONCLUSIONS

The most commonly used method of calculating the comparative advantage of a country is the indicator of the revealed comparative advantage. Through the calculation of the RCA index, we have found that Slovakia has the highest comparative advantages

in the production of *Automotive Products*, *Telecommunications Equipment* and *Iron and Steel*. These findings allow us to identify what these comparative advantages are based on; what risks result from them and what may potentially threaten the future economic development and employment in the Slovak Republic. According to the classic theory of international trade, the reasons for comparative advantages can be mainly differences in labour productivity, endowment of production factors, existence of economies of scale or accumulated knowledge due to the tradition of production in the sector (so called learning by doing).

Slovakia has basically the following competitive advantages, which have an impact on the scope and specialization of its foreign trade:

- strategic location - central location within Europe connects the markets of Eastern and Western Europe;
- industrial tradition - a rich industrial heritage in the automotive, electrotechnical, engineering and wood-processing sectors;
- participation in international institutions and blocs - member of the WTO, OECD, NATO, EU and EMU;
- low labour costs associated with relatively high labour productivity (the average monthly salary is lower than in the Czech Republic, Poland and Hungary);
- the availability of highly specialised professionals and a skilled workforce;
- low operational costs;
- evolving infrastructure;
- high innovation potential in R&D;
- an attractive investment site with a market economy and high growth potential.

Mainly experience in manufacturing, cheap and skilled labour and investment incentives provided, for example in the form of tax reliefs, have attracted foreign investments to these sectors, which have brought new technologies and thus strengthened their competitiveness. The role of foreign capital is irreplaceable in terms of transformation, streamlining and transition to more sophisticated and competitive production. Foreign investment brings modernization of production and assortment, and also has an impact on growth in performance, skills of the workforce and wages. The subsequent concentration of firms in a relatively small territory made it possible to benefit from external economies of scale in the form of a shared labour market, a network of suppliers or knowledge transfer. All the above factors caused Slovakia's production to concentrate on several sectors producing mainly for exports, what was confirmed by our analysis. Based on the results, we can define the risks of the observed patterns of foreign trade. The high share of foreign trade in the economy and its concentration in several industries has its negatives. Due to the high level of openness and extensive trade flows the Slovak economy is very exposed to external conditions and strongly depends on the economic development of its foreign trade partners. Their economic situation influences Slovakia's performance and export because of its high orientation on luxury goods' production with high elasticity of demand, as auto-

mobiles and electronics. The demand for these products is highly elastic and depends on foreign traders' incomes, which decreased during the crisis. The Slovak Republic has got especially in a case of a favourable world development huge growth potential; however, the negative development in the external environment causing the decrease of the foreign demand negatively influences the economy's performance.

Therefore, the global economic crisis was the main cause of the decline in Slovak foreign trade in 2009.¹ Partly positive is that vehicle exports are diversified, either geographically or by car brand. This means that exports direct to different countries in the world and are not reliant on just one country and a car brand, which mitigates the risks of these negative impacts, but not in the case of a global crisis. However, the long-term development of economic performance cannot depend solely on the development of the revenues of the main trading partners in selected sectors, but must be based primarily on an increase in the added value of export production. Which is also a problem in the automotive industry, as research and development is carried out in the home countries and only assembly operations are carried out in Slovakia. This is also reflected in the high import intensity of production.

Another problem that arises from focusing the economy on manufacturing is that it requires a lot of labour force. In recent years, the automotive and electronics sector in particular has been facing labour shortages and rising labour costs. This is a challenge that almost all industries of the Slovak economy meet. Thus, the growth of labour costs, which were one of the sources of comparative advantages of Slovakia, may threaten its competitive advantages. The insufficient skilled work force and high labour cost is considered to be one of the challenges for Slovakia also according the IMD World Competitiveness Center (2020). Others include stabilising the expenses and return to the balanced budget, strengthening of the digitalisation processes across the sectors, reform of education sector to suit the needs of employers and the need to strengthen the business environment.

Other factors, such as the tendencies towards the 4th industrial revolution and digitalisation threatening employment in manufacturing, the reduction of trade with the UK as a result of Brexit, global restrictions on international trade, as well as the current economic situation, threaten Slovakia's comparative advantages. Slovakia thus faces the key task of supporting investment and innovation, maintaining good economic relations with its main trading partners and promoting the diversification of its production into sectors with higher added value and less sensitive to developments in world trade

¹ The current COVID-19 crisis has not been as strongly signed up to the decline of the automotive industry as the previous crisis, which was due to the nature of this crisis, when household savings were increasing and this was not reflected in the decline in demand for cars. Rather, the decrease in production was due to a reduction in production supplies on the supply side of the market.

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REFERENCES

- Aiginger, K. (1998). *Unit values to signal the quality position of CEECs*. The competitiveness of transition economies, OECD proceedings.
- Balassa, B. (1965). *Trade Liberalisation and ‘Revealed’ Comparative Advantage*. The Manchester School of Economics and Social Studies, 33, pp. 99-123.
- Bobáková, V., Hečková, J. (2007). *Analýza konkurencieschopnosti slovenského spracovateľského priemyslu*. Politická ekonomie. No. 4, p. 490-507. ISSN 0032-3233.
- Borbély, D. (2006). *Trade Specialisation in the Enlarged European Union*. Heidelberg: Physica-Verlag, 215 p. ISBN 978-3-7908-1704-1.
- Dimelis, S. a Gatsios, K. (1995), *Trade with Central and Eastern Europe: The Case of Greece*. in: R. Faini a Portes, R. (eds.). *EU Trade with Eastern Europe: Adjustment and Opportunities*. London: CEPR.
- Donges, J. et al. (1982), *The Second Enlargement of the Community*, Kieler Studien 171, Kiel/Germany.
- Edwards, L. a Schoer, V. (2002), *Measures of Competitiveness: A Dynamic Approach to South Africa’s Trade Performance in the 1990s*. South African Journal of Economics, 70, 1008–1046.
- Fertő, I. a Hubbard, L.J. (2003), *Revealed Comparative Advantage and Competitiveness in Hungarian Agri-Food Sectors*. The World Economy, 26(2), pp. 247-259.
- Finger, J.M. a Kreinin, M.E. (1979), *A Measure of ‘Export Similarity’ and its possible Use*. Economic Journal, 89, pp. 905-912.
- French, S. (2017), *Revealed comparative advantage: What is it good for?*, Journal of International Economics, Volume 106, 2017, pp. 83-103.
- Greenaway, D. a Milner, C. (1993), *Trade and Industrial Policy in Developing Countries: A Manual of Policy Analysis*. The Macmillan Press, pp. 181-208.
- Hinloopen, J., Marrewijk C. van. (2001), *On the empirical distribution of the Balassa index*, Review of World Economics / Weltwirtschaftliches Archiv, pp.137: 1-35.
- IMD (2020), *IMD World Competitiveness Yearbook Talent & Digital 2020: summaries*. Available at: <https://worldcompetitiveness.imd.org/countryprofile/overview/SK>
- Liesner, H.H. (1958), *The European Common Market and British Industry*. Economic Journal, 68, 302-316.
- Pavličková, V. (2013). *The competitiveness of Slovak foreign trade in the European market*. Economic Annals, Vol. 58 (196), pp. 7-49.
- OECD (2001), *Glossary of statistical terms*. Available at: <http://stats.oecd.org/glossary/detail.asp?ID=399>
- Utkulu, U., Seymen, D. (2004), *Revealed Comparative Advantage and Competitiveness: Evidence for Turkey vis-à-vis the EU/15*. European Trade Study Group 6th Annual Conference, ETSG, Nottingham, September 2004.
- Vokorokosová, R., Čarnický, Š. (2003). *Komparatívne a konkurenčné výhody Slovenska v globálnom obchodnom prostredí*. Ekonomický časopis. Vol. 51, No.9, pp. 1065-1076. ISSN 0013-3035
- Vollrath, T.L. (1991), *A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage*. Weltwirtschaftliches Archiv, 130, 265-279.
- World Economic Forum (2018), *The Global Competitiveness Report 2018*. Switzerland, 2018. 671 s. ISBN 978-92-95044-76-0.
- Zábojník, S. et al. (2021). *Competitiveness of the Slovak Republic as a Determinant of its Success in Third Country Markets*, SHS Web of Conferences, ID: 10670/1.3nf34b

ANNEX 1. THE RCA INDEXES FOR SLOVAK EXPORTS (2002-2019)

Product group	2002	2003	2004	2005	2006	2007	2008	2009	2010
AGRICULTURAL PRODUCTS	0,60	0,51	0,61	0,79	0,72	0,61	0,58	0,61	0,61
Food	0,48	0,41	0,54	0,70	0,69	0,60	0,54	0,57	0,58
FUELS AND MINING PRODUCTS	0,74	0,59	0,65	0,49	0,49	0,39	0,34	0,36	0,38
Fuels	0,63	0,51	0,58	0,43	0,38	0,32	0,28	0,31	0,30
MANUFACTURES	1,16	1,20	1,18	1,20	1,23	1,27	1,34	1,29	1,30
Iron and steel	3,72	3,35	3,04	2,96	2,66	2,11	2,06	2,18	2,39
Chemicals	0,65	0,48	0,50	0,55	0,53	0,46	0,45	0,38	0,41
Pharmaceuticals	0,27	0,20	0,23	0,29	0,26	0,21	0,21	0,19	0,23
Machinery and transport equipment	1,00	1,22	1,20	1,21	1,33	1,49	1,62	1,63	1,60
Office and telecom equipment	0,26	0,31	0,48	0,77	1,04	1,37	1,74	1,99	1,80
El. data processing and office equipment	0,14	0,29	0,53	0,70	0,52	0,41	0,54	0,43	0,42
Telecommunications equipment	0,42	0,35	0,60	1,20	2,13	3,17	3,96	4,69	4,44
Integr. circuits and el. components	0,24	0,29	0,27	0,27	0,19	0,20	0,12	0,18	0,16
Transport equipment	1,55	2,16	1,88	1,59	1,76	2,02	2,06	1,96	1,99
Automotive products	2,03	2,86	2,46	2,07	2,35	2,71	2,83	2,96	2,86
Textiles	1,13	0,95	1,00	1,00	0,93	0,93	0,85	0,70	0,62
Clothing	1,40	1,05	1,01	0,96	0,78	0,72	0,73	0,68	0,77

Product group	2011	2012	2013	2014	2015	2016	2017	2018	2019
AGRICULTURAL PRODUCT	0,67	0,74	0,64	0,54	0,52	0,49	0,47	0,47	0,46
Food	0,67	0,76	0,64	0,52	0,49	0,47	0,45	0,44	0,44
FUELS AND MINING PRODUCTS	0,42	0,40	0,36	0,35	0,40	0,40	0,37	0,30	0,30
Fuels	0,35	0,32	0,32	0,29	0,34	0,35	0,30	0,23	0,23
MANUFACTURES	1,35	1,35	1,38	1,36	1,32	1,31	1,33	1,36	1,35
Iron and steel	2,18	2,19	2,22	2,04	1,97	2,00	2,16	2,07	1,84
Chemicals	0,46	0,40	0,44	0,45	0,43	0,41	0,39	0,38	0,36
Pharmaceuticals	0,23	0,17	0,21	0,23	0,22	0,22	0,14	0,16	0,16
Machinery and transport equipment	1,68	1,75	1,80	1,78	1,72	1,74	1,72	1,79	1,84
Office and telecom equipment	1,76	1,82	1,89	1,86	1,57	1,56	1,51	1,31	1,23
El. data processing and office equipment	0,58	0,63	0,88	0,86	0,64	0,67	0,46	0,40	0,48
Telecommunications equipment	4,07	4,11	4,07	3,88	3,29	3,27	3,93	3,59	3,03
Integr. circuits and el. components	0,09	0,11	0,12	0,10	0,15	0,14	0,10	0,09	0,07
Transport equipment	2,17	2,41	2,48	2,43	2,42	2,47	2,44	2,85	3,07
Automotive products	3,16	3,49	3,62	3,52	3,52	3,53	3,43	3,98	4,30
Textiles	0,74	0,67	0,63	0,66	0,62	0,59	0,60	0,59	0,56
Clothing	0,80	0,77	0,70	0,77	0,66	0,53	0,55	0,61	0,56