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# EVALUATION OF FOREIGN TRADE SPECIALISATION AND COMPETITIVENESS OF THE SLOVAK ECONOMY

**ABSTRACT:** *This paper aims to assess the structure of foreign trade specialisation and the character of trade competitiveness of the Slovak Republic as a member state of the European Union in the period 1999–2021. We apply an industry specific classification using the concepts of the revealed comparative advantage and the revealed price elasticity. This allows us to evaluate the competitiveness and divide the product groups into price and quality sensitive. The findings confirmed that Slovak production is competitive on the European market in several industries, mainly in automotive production, electronics, and iron and steel, with external competitiveness being based on tradition and low costs resulting in lower prices. The structure of competitive exports changed over the analysed period, and we can note a slight shift from price- to quality-based competitiveness.*

**KEY WORDS:** *trade competitiveness, trade specialisation, RCA index, unit value, REVELAST method*

**JEL CLASSIFICATION:** F14, F15, O52, P45

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## 1. INTRODUCTION

A country can increase its production and wealth only if it produces in sectors that are competitive. In the case of a small economy that relies mainly on export-led growth, this means that these industries must be competitive externally vis-à-vis other countries. The elimination of trade barriers over the last 30 years has established a new system of free international trade, and the global expansion of trade has exposed domestic firms to international competition, intensifying their vulnerability and the levels of international competition.

The Slovak Republic is a small economy with a degree of openness of more than 180% (Eurostat database, 2022), with foreign trade playing a key role. The small size of the country's economy is connected with the necessity for export-oriented growth. Trade integration has facilitated economic development and the EU has played an important role in this integration. A country's participation in such an integration union requires the ability to cope with the competitive pressure of the single market. Increasing trade competitiveness thus becomes more important than ever for the country. At the beginning, the Slovak Republic was a transition country with an inadequate economic structure, a gap between supply and demand, and a significant technological lag compared to developed countries. Successful reforms at the beginning of the 21st century contributed to the accession of the Slovak Republic to the European Union on 1 May 2004, which contributed to an acceleration of economic growth and increasing openness of the Slovak economy. The adoption of the euro on 1 January 2009 and the subsequent reduction in exchange rate risk further strengthened the process of integration of Slovak foreign trade into the European market. The single European market represents an important target for Slovakia, as more than 90% of Slovak exports go to European countries (Eurostat database, 2022). With the accession of the Slovak Republic to the EU, the national market increased, and along with integration came the pressure to continuously improve the goods offered to be competitive on the international market. In an environment of increasing global competition, Slovakia, like other countries, faces the challenge of maintaining its position in international trade. It is therefore important to ensure the competitiveness of the domestic production in foreign markets.

Competitiveness of a nation was originally mainly associated with exports and international trade (McGeehan, 1968). Competitiveness can be understood as a country's ability to sell its products on the international market (OECD, 1992, p. 237). Trade competitiveness can be based on a lower price or higher quality of the country's goods compared to competing goods. Prices play an increasingly minor role in attracting and, in particular, maintaining trade competitiveness. In particular, countries lagging behind technologically specialise in sectors where price is the main factor of competitiveness. These countries, like Slovakia at the beginning and during the transition, have a competitive advantage based on low wages and intensive use of energy or environmental resources (Wolfmayr, 1998). However, trade competitiveness built solely on prices and the production of low-technology and labour-intensive products may quickly be lost. This is especially true today, when new competitors are coming onto the world market with extremely low production costs, primarily due to cheap labour. Once a low-wage advantage is exploited, it becomes crucial for a country to move into technology-intensive production. Developed industrialised countries can only compete with countries that have relatively with cheap labour if they produce sophisticated products and their competitiveness is based on quality. Quality competition is defined as "a competitive environment, in which upgrading quality, and increasing the willingness to pay is important relative to competing at low prices" (Aiginger, 2001, p. 6). Slovakia, with its high levels of openness and foreign dependence, is reliant on maintaining and increasing the competitiveness of its exports. Therefore, the aim of this article is to reveal the areas and nature of the competitiveness of Slovak exports and its development over the past decades. We extend the existing literature with an analysis of the development over the last decade when Slovak foreign trade was affected by significant factors in the form of integration, restructuring, and FDI inflows.

A further aim of this article is to analyse the competitiveness of Slovak foreign trade under the conditions of the EU-27 market and its development in the period 1999–2021. We identify the competitive product groups by 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. Subsequently, the type of competitiveness is identified. The paper is divided into five sections. Section 2 deals with an overview of literature, which focuses on the issue of measuring and assessing the foreign trade competitiveness. Section 3 outlines the methodology and data used in the analysis, while Section 4 presents the empirical results and their description. Section 5 summarises the findings.

## 2. LITERATURE REVIEW

International competitiveness of trade in goods and services refers to a nation's trade advantage vis-à-vis the rest of the world. In this sense, trade advantage occurs whenever the economic welfare of a nation improves as a result of trade (Coldwell, 2000, p. 418). According to trade theory, economic welfare is dependent on the production of goods and services in which a country has a comparative advantage.

Traditional theories explain a country's trade competitiveness on the basis of international differences in labour productivity (Ricardo, 1817) or factor endowments (Heckscher, 1919; Ohlin, 1933) in the production of homogeneous goods. The basic factor of production in the Ricardian model is labour. Lower labour costs act as opportunity costs, moving production from one country to another, through trade (Krugman et al., 2018). In the Heckscher–Ohlin view, comparative advantages in international trade are the result of differences in the endowment of production factors. Trade specialisation and comparative advantage are explained in these models from the side of inputs into production.

Measuring comparative advantages and testing the H-O theory is not at all easy in practice. Information on production costs should be obtained from individual countries before undertaking activities in international trade, which is almost impossible in practice. On this basis, Balassa (1965) suggested that it is not necessary to define all the factors of a country´s comparative advantage and the initial relative prices, but that it is possible to define a comparative advantage based on ex-post international trade data as "revealed" on the basis of the observed existing patterns of trade. Such a comparative advantage derived from the observed data is defined as the revealed comparative advantage (RCA) and, in practice, is a generally accepted method of analysing trade data. This method does not examine the potential competitive advantages, but the resulting competitiveness of the country. That makes it possible to consider non-price factors that are not considered in the Heckscher-Ohlin theory.

Liesner was the first who contributed to the theory in 1958 and tried to measure the revealed comparative advantage of Great Britain over the Common Market, which was the first empirical study in the field of RCA (Liesner, 1958). Balassa (1965) proposed an index (also called the Balassa index), which represents an improved form of measurement of the revealed comparative advantage based on export data and is widely used in the empirical literature. After Balassa, a number of studies improved the definition of RCA. Vollrath (1991) offered alternative ways of measuring a country's comparative advantage based on RCA, namely the relative trade advantage (RTA), revealed competitiveness (RC), and the relative export advantage (REA). The advantage of these indices is that they include both the supply and demand side of trade. The problem with the implementation of these methods of measurement of 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. Greenaway and Milner (1993) removed the distortion caused by interventions and used a price-based measurement of the RCA, called an implicit revealed comparative advantage (IRCA), which also considers the possibility that the country records both simultaneous exports and imports with a certain commodity or within a certain industry. Fertö and Hubbard (2003) used the coefficients of nominal assistance estimated by the OECD for countries and commodities to filter the effect of possible distortions in measuring Hungarian agri-food sector RCAs vis-à-vis the EU.

The traditional RCA index provides a static analysis of 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 in the market through the disaggregation of RCA growth into its components. Based on the observed relative trends in the share of the commodity in a country's exports and global exports, it is possible to identify a dynamic market position and divide the exported goods into 6 groups: (i) rising stars, (ii) falling stars, (iii) lagging retreat, (iv) leading retreat, (v) lagging opportunity, and (vi) lost opportunity.

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) applied a widely used class of quantitative trade models to evaluate the usefulness of measures of revealed comparative advantage and found several common uses of RCA indices for certain tasks. Although various authors have provided alternative measures, no one has succeeded in overcoming all the drawbacks and the Balassa index is still recognised as a standard index for accessing comparative advantages in trade (Yu et al., 2009).

One of the authors who assessed the nature of foreign trade specialisation and competitiveness according to output indicators was Aiginger (1997), who, through the use of unit values of exports and imports, divided industries into those based on price competition and industries where non-price (qualitative) competition prevails. Unit value can be both an indicator of cost and quality. A low unit value can reflect low costs, but also insufficient production performance. Higher unit value means the ability of a country to sell the same product at a higher price due to the rise in production costs or, for example, due to marketing, advertising, or quality. In general, high-skill and high-tech industries achieve the highest export unit values (Aiginger, 2001). However, there are also cases when high unit values are associated neither with high-tech industries nor with the use of a highly skilled workforce and are not an indicator of quality. This may be the case when unit values are high because the weight is low. Another case is reprocessing, where a country imports semi-finished product that are further processed or assembled using cheap labour and then exported back with a slightly higher unit value. Another exception may be precious metals, where supply is lower than demand.

In order to determine the character of foreign trade competitiveness and to distinguish between price and quality competition in foreign trade, Aiginger (1998) used the idea of revealed price elasticity (REVELAST). In order to differentiate industries where unit value reflects costs and those where it is the result of differences in quality, product differentiation or market power, he applied the following principle: if unit values reflect costs (and therefore price competition) and the product is homogeneous, high-cost countries will be net importers in terms of the volume of goods. On the contrary, price competition will cause lower prices to lead to higher export volumes. On the other hand, if there is qualitative competition within trade, high unit values (higher prices) will also be associated with a high volume of exports. By applying the above criteria, it is possible to divide industries into four segments according to whether or not price or quality competition dominates. Brito et al. (2012) used the REVELAST approach to evaluate the quality-cost choice of R&D in nations´ exports. Kostoska and Mitrevski (2016) calculated unit values to signal Macedonia's quality position and performed a country-specific segmentation of markets according to the revealed price elasticity concept.

Many empirical studies have assessed the competitiveness of foreign trade. The authors focus on either a specific country or an integration union. From the studies related to Slovakia, we can conclude that the Slovak economy has been developing in a similar way to other Central European countries. Vokorokosova and Čarnický (2003), on the basis of the RCA index, found that in the early 2000s Slovakia was competitive in relatively high capital-, material-, and labour-intensive production. Slovak trade competitiveness was based on cost competition exploitation, with production and trade suffering from insufficient foreign investment, high import intensity, and low value added. According to Borbély (2006), the new and cohesion countries of the EU were competitive in middle- and low-quality products. EU integration and eastern enlargement were expected to stimulate structural adjustment and economic specialisation, which were to be the driving forces for structural change in the European economies. Bobáková and Hečková (2007) found that Slovakia´s trade was dominated by price and cost competitiveness and products dependent on raw materials and energy sources. The industry was lagging behind in its competitive ability in relation to high-tech products. Pavličková (2013) quantified the competitiveness of Slovak foreign trade using the complex range of methods including the REVELAST approach to determine the character of its competitiveness until 2011. The results confirmed that its production was competitive in the European market, although mainly in relation to prices. According to Aiginger (1998), the largest positive contribution to the Slovak Republic's trade balance comes from sectors in which the Slovak Republic is cheap and markets are price elastic. Among the transition countries, where the prices are still not set at full cost, Slovakia has the second largest sector with successful price competition and the lowest unit value of exports. Zábojník and Borovská (2021) define the key indicators of the competitiveness of the Slovak Republic in third countries' markets using the basic indicators export volumes, market share, RCA, and export gap. Their findings indicate insufficient policy in relation to export competitiveness in third country markets as determined by institutional and general economic policy.

## 3. METHODOLOGY

To assess the trade competitiveness of the Slovak economy, we used two methods that allowed us to identify and determine competitive areas of production as well as the nature of their competitiveness and development.

First, we analysed and identified product groups in which the Slovak Republic is competitive against the EU-27. To do this, we used the Balassa index of revealed comparative advantages (RCA index), which is expressed as follows:

$$\text{RCA index} = (Xij/Xit) \,/\, (Xnj/Xnt) = (Xij/Xnj) \,/\, (Xit/Xnt), \tag{1}$$

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 a 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 revealed if the RCA index is greater than one, i.e. the commodity's share of the country's exports is greater than its share of world exports. If the RCA index is less than one, the country has a comparative disadvantage in exporting the product (industry). For the purposes of our analysis, we have adjusted the index to calculate the share of exports of a certain product group in the total exports of Slovakia against the share of this group of goods in the total exports of the European Union. Considering that the aim of the present study is the position of the Slovak Republic in the conditions of the European market, we used EU-27 trade flows instead of the world market for comparison. In this sense, we measure RCAs with respect to the EU as a comparison. Moreover, the comparison with the EU market eliminates the impact of different domestic trade policy interventions, as Slovakia, as an EU member, has the same basic trade policy setting. Therefore, factors determined by domestic policies should not influence the results. Since the aim of our paper is to assess the structure of foreign trade specialisation in recent decades, not its future potential, we used a static approach based on the traditional RCA indicator, which can be used to evaluate commodity specialisation but cannot infer future comparative advantages. A dynamic approach may lead to misleading conclusions, as the development of the Slovak economy and the sustainability of determined comparative advantages in recent years have been significantly influenced by unpredictable events (e.g. the COVID-19 pandemic, war in Ukraine).

Subsequently, we determined the character of the competitiveness of identified competitive product groups. To distinguish between the price and non-price (qualitative) competitiveness of individual industries, we used the concept of revealed price elasticity (REVELAST), introduced by Aiginger (1998). This method is based on the calculation of unit values (UV), which can be defined as the ratio of the value to the quantity (Q) of export/import. For the purposes of this analysis, we calculated these as the value of exports (imports) in EUR divided by the quantity in kilograms. Based on a comparison of the quantitative balance in trade and the unit values of individual SITC items, we divided them into four segments according to the nature of competitiveness:

- The SQC segment – *successful quality competition (sector of excellence)* – includes industries where the quantity exported exceeds imports despite high unit values ($Q_{exp} > Q_{imp}$, $UV_{exp} > UV_{imp}$). This is the result of high-quality production or specialisation in the most sophisticated market segment. These sectors have the greatest prospect of technological or dynamic competitiveness.
- The SPC segment – *successful price competition* – covers price-elastic goods where the country achieves a trade surplus due to a lower domestic price ($Q_{exp} > Q_{imp}$, $UV_{exp} < UV_{imp}$).
- The UPC segment – *deficit in price competitiveness (outpriced sector)* – contains price-elastic goods whose unit value is high in the home country, for example due to high production costs, and this leads to a trade deficit ($Q_{exp} < Q_{imp}$, $UV_{exp} > UV_{imp}$).

– The UQC segment – *structural problems (unsuccessful quality competition)* – comprises sectors with trade deficits despite low prices ($Q_{exp} < Q_{imp}$, $UV_{exp} < UV_{imp}$).

We used the Eurostat database from which we obtained data on the export and import performance of the Slovak Republic and the EU-27 for the period 1999–2021. The analysed products were classified according to SITC (Standard International Trade Classification, Rev. 4), a two-digit classification, at the level of sections and divisions.

## 4. RESULTS

Slovakia's position as a former centrally planned economy has long been subject to many historical factors in terms of international trade. An important role was played not only by internal economic and political conditions, but also by fundamental changes in Slovakia's international position. The transformation of the Slovak economy from a centrally planned economy to a market economy was also reflected in foreign trade by the changing 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 an independent Slovak Republic, there was a need to increasingly target EU markets as the existing production capacities were no longer geared towards the markets of the former CMEAS countries. Slovak exporters were increasingly focused on Western markets, but the economy's dependence on raw material supplies from Russia persisted. At the beginning, the Czech Republic, with which the Slovak economy was linked in supplier-customer relations, had the largest share of Slovakia's foreign trade and this primacy lasted until 1997. In 1998, the Czech Republic was replaced by Germany, which still retains its leading position as first trading partner. Mutual foreign trade is mainly the subject of 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 OECD and EU countries in both exports and imports has increased, which was also supported by Slovakia's accession to the European integration structures. At present, European countries account for around 90% of Slovak exports and almost 70% of Slovak imports

(Eurostat database, 2022). The V4 countries remain an important market for Slovakia's exports.

Since the 1960s, Slovakia has focused mainly on the export of machinery and metalworking 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. Slovakia had 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 saw a significant drop in exports and an increase in imports.

**Table 1**. Shares of product groups in total exports/imports (%)

| Product | Exports | | | | | Imports | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2005 | 2010 | 2015 | 2021 | 1999 | 2005 | 2010 | 2015 | 2021 |
| 0 Food and live animals | 3,00 | 3,94 | 3,62 | 3,38 | 3,28 | 5,05 | 4,79 | 5,17 | 4,68 | 4,88 |
| 1 Beverages and tobacco | 0,51 | 0,25 | 0,15 | 0,15 | 0,26 | 1,11 | 0,98 | 0,73 | 0,68 | 0,79 |
| 2 Crude materials, inedible, except fuels | 3,73 | 2,97 | 2,80 | 1,80 | 2,20 | 3,75 | 3,51 | 3,66 | 2,36 | 3,15 |
| 3 Mineral fuels, lubricants and related materials | 4,69 | 5,90 | 5,30 | 3,56 | 2,82 | 12,99 | 13,17 | 12,92 | 7,37 | 6,83 |
| 4 Animal and vegetable oils, fats and waxes | 0,12 | 0,16 | 0,16 | 0,19 | 0,17 | 0,18 | 0,18 | 0,31 | 0,28 | 0,23 |
| 5 Chemicals and related products, n.e.s. | 7,06 | 5,75 | 4,58 | 4,76 | 4,56 | 11,26 | 9,69 | 8,34 | 8,82 | 8,94 |
| 6 Manufactured goods classified chiefly by material | 27,30 | 24,55 | 18,93 | 16,74 | 17,17 | 18,22 | 18,00 | 15,22 | 15,09 | 15,08 |
| 7 Machinery and transport equipment | 39,10 | 44,14 | 54,05 | 59,06 | 60,51 | 36,98 | 38,15 | 42,73 | 47,41 | 49,01 |
| 8 Miscellaneous manufactured articles | 12,44 | 10,58 | 10,10 | 10,13 | 8,90 | 9,43 | 11,03 | 10,57 | 13,07 | 10,29 |
| 9 Commodities and transactions not classified elsewhere in the SITC | 1,47 | 1,74 | 0,29 | 0,21 | 0,12 | 1,00 | 0,52 | 0,36 | 0,23 | 0,81 |

**Source:** Author´s calculations, Eurostat data

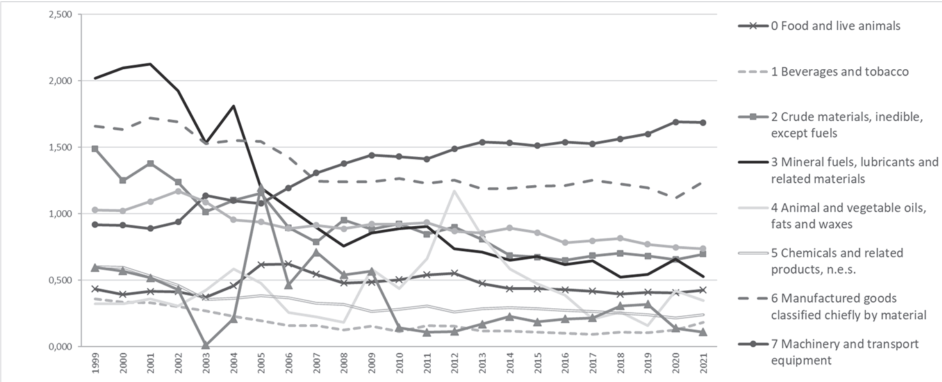
From 1995, the share of iron and steel exports in Slovak exports gradually started to decline, which can be considered a positive trend in terms of export orientation towards products with higher added value. Road vehicle exports experienced a strong growth rate. The tradition of Slovak arms production and the number of unemployed workers who still had experience in engineering were among the driving forces behind the establishment of the automotive industry in the Slovak Republic. Exports of machinery and transport equipment increased from 39.1% of total exports in 1999 to 60.5% in 2021. The growth of road vehicle exports was 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 in exports, such as telecommunications, sound and image recording and reproduction apparatus and equipment and electrical equipment, gradually strengthened, which is also linked to the entry of foreign investors in this domestic market.

At present, the commodity structure of Slovak exports is concentrated in several sectors, mainly the production of transport equipment (passenger cars, their parts and accessories), electrical and telecommunications equipment (shafts, bearings, pumps, fans, compressors, boilers, televisions, and telephone equipment), and base metals and articles made from these (iron, steel, wires). The development of these sectors is the main driver of the Slovak economy. Slovakia imports predominantly 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% in 1999 to 49% in 2021, reflecting the high import intensity of this sector.

Applying export data of the Slovak Republic and the EU-27 to the RCA index enabled us to identify in which product groups Slovakia has a comparative advantage and which product groups are competitive at European Union level. Figure 1 shows the development of the RCA index over the period under review in wider product groups (sections of SITC). More detailed RCA values for the SITC divisions in which Slovakia achieved a revealed comparative advantage and RCA greater than one for at least a few years are set out in Appendix 1.

We then classified the product groups in which Slovakia achieves a comparative advantage according to the criterion of whether the unit values of their export were higher or lower compared to imports and according to the criterion whether the exported or imported volume of a given product group was higher (REVELAST method). This allowed us to categorise the traded product groups into four segments and determine what type of competitiveness a given export was based on. The character of competitiveness for more broad product groups is shown in Table 2, and more detailed values for items with comparative advantages can be found in Appendix 2.

**Figure 1.** Revealed Comparative Advantage (RCA index) in the Slovak Republic in period 1999–2021 (SITC Sections)




**Source:** Author´s calculations, Eurostat data

At the beginning of the analysed period, the Slovak Republic achieved a comparative advantage (RCA greater than one) in traditional labour- and capital-intensive industries (Wolfmayr-Schnitzer, 1998; Peneder, 1999; Yilmaz & Ergun, 2003) such as iron and steel production, machinery, paper and related products, clothes, and some chemical products. At this time, the Slovak Republic achieved the lowest export unit values among transition economies (Aiginger, 1998). Sectors with successful price competition were particularly dominant, mainly due to low labour costs. In a sector with successful qualitative competition, apparel and footwear industries prevailed at the beginning of the reporting period, where imports were re-exported after low value-added processing. The Slovak economy in this period was characterised by technological backwardness, an insufficiently restructured economy, an imbalance between domestic supply and demand, and a high need for imports of energy and minerals. However, Slovak export specialisation as well as the nature of its competitiveness changed due to transformation, European integration, and FDI inflows.

**Table 2**. Level and character of Slovak foreign trade competitiveness in selected years (SITC Sections)

| Product | RCA index | | | | | REVELAST | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2005 | 2010 | 2015 | 2021 | 1999 | 2005 | 2010 | 2015 | 2021 |
| 0 Food and live animals | 0,44 | 0,62 | 0,50 | 0,44 | 0,43 | SPC | SPC | UQC | SPC | SPC |
| 1 Beverages and tobacco | 0,36 | 0,20 | 0,12 | 0,11 | 0,18 | UQC | UQC | UQC | UQC | UQC |
| 2 Crude materials, inedible, except fuels | 1,49 | 1,16 | 0,92 | 0,67 | 0,70 | UPC | UPC | UPC | UPC | UQC |
| 3 Mineral fuels, lubricants and related materials | 2,02 | 1,20 | 0,89 | 0,68 | 0,53 | UPC | UPC | UPC | UPC | UPC |
| 4 Animal and vegetable oils, fats and waxes | 0,32 | 0,48 | 0,44 | 0,47 | 0,35 | UQC | UPC | UPC | UPC | UPC |
| 5 Chemicals and related products, n.e.s. | 0,60 | 0,39 | 0,28 | 0,28 | 0,24 | SPC | SPC | UQC | UQC | UQC |
| 6 Manufactured goods classified chiefly by material | 1,66 | 1,55 | 1,26 | 1,21 | 1,24 | SPC | SPC | SPC | SPC | SPC |
| 7 Machinery and transport equipment | 0,92 | 1,08 | 1,43 | 1,51 | 1,69 | SPC | SPC | SQC | UPC | SQC |
| 8 Miscellaneous manufactured articles | 1,03 | 0,94 | 0,92 | 0,86 | 0,74 | SPC | UQC | SPC | SPC | UPC |
| 9 Commodities and transactions not classified elsewhere in the SITC | 0,60 | 1,20 | 0,14 | 0,19 | 0,11 | SPC | SPC | SPC | SPC | SPC |

**Source:** Author´s calculations, Eurostat data

Throughout the period under review, Slovakia remained competitive in manufacturing goods (6), although the comparative advantage decreased slightly. The biggest decreases can be seen in paper production (64), textile yarn and fabrics (65), and various metals and mineral manufactures. A revealed comparative advantage was achieved by Slovakia in the production of iron and steel (67). Historically, steel production was, is, and will remain one of the main pillars of the development of Slovak industry, although it accounts only for just over 5% of total exports. However, the Slovak comparative advantage in steel production has declined in recent decades (see Appendix 1), mainly due to increasing competitiveness from cheap Asian steel. For most of the above items, with a few exceptions, price competitiveness prevailed over the whole period.

Higher values of the RCA index can also be found in some items of the miscellaneous manufactured articles (8), such as prefabricated buildings etc. (81), furniture (82), and footwear (85), but as a whole these traditional sectors of the Slovak economy were in decline and did not account for a large share of the exports. Footwear (85) and articles of apparel and clothing (84) initially had RCA values above 2 and their successful competitiveness was based on quality. However, within a few years, and especially after joining the EU, this success disappeared and there was a shift of production to other, cheaper areas. We can see this trend in many developed countries, with production of these items moving to areas with an abundance of cheap labour, such as India, Bangladesh or China (Fitzpatrick, 1983; Bobáková & Hečková, 2007). Nevertheless, there was still a comparative advantage in the production of footwear. On the other hand, the textile industry lost its status and many production plants closed down. In recent years, the only sector in this segment that has been able to compete in terms of quality is that of prefabricated buildings, sanitary, plumbing, heating, and lighting fixtures and fittings (81).

During the whole period, Slovakia experienced a comparative disadvantage in the section food and live animals (0), beverages and tobacco (1), chemicals (5), and other goods (9). Products in these taxonomic classes faced a lack of competitiveness or structural problems. The only exceptions are sugar production (06), fertilisers (27 and 56), and, in particular, the export of coins (96) due to the company Kremnica Mint, which was founded in 1328 and has been continuously producing coinage products for many centuries. The success of these items was based on low prices, but their share in exports was very small.

The largest decrease in competitiveness based on the RCA index occurred in the section of mineral fuels, lubricants, etc. (3), in particular the production of petroleum and petroleum products (33). Products in this segment did not have the ability to compete on the market due to their prices. At the beginning of the period, the RCA value for this group was 2.67 and this gradually decreased to values just above 0.5. The opposite development can be seen in the export of electric current (35), the production of which became increasingly competitive, thanks to the growth of production and investment in atomic energy.

The production of crude materials (2) also suffered a loss of competitiveness in all items. The comparative advantage in exports of oil-seeds (22), cork and wood manufactures (24), and crude fertilisers (27) decreased most significantly, with Slovakia being relatively competitive at the beginning of the period (RCA > 2.5), but underinvestment (Darmo, 2019) and increasing competition from other EU member states after integration caused it to decline. Despite this, Slovakia still maintained a certain comparative advantage in these items, based mainly on the abundance of natural resources in the form of forests and lower prices. In the case of cork and wood manufactures (24), we can see a shift from price to quality competitiveness.

The Slovak Republic achieved the most significant competitiveness on the basis of the RCA index in the category of machinery and transport equipment (7), in which Slovakia still has the highest competitive advantage, also among the V4 countries (Brinčíková, 2022). The competitiveness of this sector, the main component of which is production in the automotive industry, has grown in recent decades and this growth has been strengthened by joining the EU. If we look at a closer specification, we can see that the RCA index achieved long-term high values in exports of road vehicles (78) and telecommunications and sound-recording and reproducing apparatus and equipment (76). In these sectors, Slovakia showed high comparative advantages vis-à-vis the EU-27.

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. The share of the road vehicles group in exports increased from 18.8% in 1999 to 31.7% in 2021. In 2021, more than one million vehicles were produced in Slovakia, according to the Automotive Industry Association of the Slovak Republic (ZAP SR), and the country is the world leader in the production of cars per capita. There are four automobile companies operating in Slovakia (Volkswagen, Kia Motors, Stellantis, Jaguar Land Rover) and in July 2022 the fifth (Volvo) announced its arrival. The automotive industry's share of the total industry reached 47.7% in 2021, 13% of GDP, and the share of exports was 42 %. One of the incentives for the creation of the strong automotive industry in the Slovak Republic and the growth of its competitiveness took the form of the tradition of Slovak engineering and arms production and the amount of unemployed skilled labour with engineering experience during the period of transformation (Brinčíková, 2020). Furthermore, the advantageous geographical location of the Slovak Republic in the middle of Europe encouraged investors from other countries to invest in Slovakia because the distribution of cars to other countries is easier thanks to this. Foreign investors brought in new technologies and built more modern plants than in their home countries, which, together with low labour costs, formed the basis for competitive production. At the same time, the growth of this sector supported the development of other downstream sectors. A good example is the production of tyres and other rubber components (62), in which Slovakia reached the RCA value 2.54 and thus a revealed comparative advantage.

The production and export of road vehicles compete on quality, although the success in quality competition is based on assembling components, whereby the value added is quite low. The high inflow of FDI into the sector (Darmo, 2019; Brinčíková, 2020) has created the conditions for restructuring and changing the nature of their competitiveness. Foreign ownership supports the export orientation of the economy, as foreign affiliates trade more on average than domestically owned firms. Foreign-owned companies have higher productivity than local producers since foreign ownership makes it possible to exploit knowledge and innovations that are not locally available (Kostoska & Mitrevski, 2016). By importing technologies from parent companies, they ensure transfer of technology. FDI bring positive effects on the productivity of domestic companies through knowledge spill overs and linkage effects. They also increase the quality and efficiency of domestic suppliers by demanding higher standards, thereby increasing the quality of deliveries in the country. This can be seen in the example of rubber manufactures (62), where, in addition to price competitiveness, qualitative competitiveness was also revealed over several years.

The high values of the RCA index can be seen in the production of telecommunications etc. (76). The strongest sector of Slovak electrical engineering was the production of televisions, screens, printed circuit boards, and other electrotechnical components for televisions, which accounted for almost half of the entire electrical industry. 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 EU, cheap labour, and quality suppliers of plastics and packaging materials contribute to the growth of production of this industry, what is also confirmed by the increasing share of this industry in total exports (from 1.5% in 1999 to more than 10% in 2021). All these factors are the basis for the successful price competitiveness of the sector, which was observed in most of the years under review.

Although the competitiveness structure of Slovak exports has changed, its character has been preserved in most cases. Most of the competitive exports were and are based on low prices (the SPC segment – see Appendix 2), that is the result of low labour costs which represent only half of average EU labour costs (14.2 euro/hour in Slovakia as compared to 29.1 euro/hour in the EU-27 in 2021). These sectors include, in particular, labour-intensive industries such as manufactured goods (6) and various machinery equipment, some agricultural products (live animals – 00, cereals – 04, sugar – 06, oil-seeds – 22) and fertilisers (27; 56), which were price competitive during most of the period analysed. The gradual rise in labour costs[1] followed by the rise in prices during the transition caused a loss of price competitiveness in some sectors. This can be seen in the production of chemicals, in particular plastics (57; 58), dairy products and eggs (02), non-ferrous metals (68) and manufactures of metals (69), power-generating (71), metalworking (73) and electrical machinery (77), office machines (75), and furniture (82). On the other hand, an increase in price competitiveness can be seen in the case of pulp and waste paper (25). However, even though some product groups in this segment have a price advantage, they can only be sold more cheaply in nearby markets due to high unit transport costs (agricultural products).

The SQC segment, in which export unit values and export quantities are high, includes industries in which quality is important and Slovakia is able to compete in the foreign market. In this segment, we can find industries whose export is strongly associated with import for further processing. These are road vehicles (78) and other transport equipment (79) sectors and the downstream rubber industry (62). It is characteristic of the production of these items that Slovakia imports semi-finished goods, which are processed by cheap labour in new factories and re-exported, which is confirmed by the high import values in this group (more than 15% of total imports for road vehicles). This means that the simplest and most labour-intensive stage of production, which takes place in Slovakia as a low-wage country, is excluded from the main production process. This segment also includes several product groups with very few imports, or their qualitative advantage is based on natural resources (ores, wood, etc.) such as cork and wood production (24), and prefabricated buildings, sanitary, etc. (81), where the quality of production increased. In contrast to this, a loss of non-price competitiveness can be observed mainly in the production of articles of apparel

[1] The average labour costs in Slovakia rose from 2.76 euro/hour in 1999 to 14.2 euro/hour in 2021 (Eurostat database, 2021).

and clothing accessories (84), footwear (85), and live animals (00). In the latter, successful quality was replaced by a low price while maintaining competitiveness.

The segments with insufficient price competitiveness or with structural problems (UQC and UPC sectors) include mainly beverages and tobacco production (1), crude materials (2), mineral fuels and lubricants (3), animal and vegetable oils, fats and waxes (4), and chemicals (5). This also corresponds to a great extent to the results of the RCA index, which is lower than one for these groups and represents revealed comparative disadvantage. It is characteristic of these sectors that Slovakia does not have sufficient resources for their production or their production shows a lack of investments and new technologies, which makes it expensive and inefficient. However, some of these product groups had the potential to increase their performance by increasing production efficiency and optimising transport costs.

Our results confirm the findings of other authors concerning trade in previous decades. As observed by Vokorokosová & Čarnický (2003), Bobáková & Hečková (2007), and Pavličková (2013), Slovakia´s production structure is still raw and material abundant and specialised in simpler steps of production processes benefiting from lower production costs, and this specialisation continues to persist at present. The results fit into the expectations of international trade theory that transition countries newly integrated into foreign trade compete with low wages and seek to undercut prices in standardised markets. However, we can see some changes in the specialisation and competitiveness of Slovak exports. Confirming the expectations of Borbély (2006), integration into the EU and the eurozone stimulated structural adjustment and economic specialisation and attracted capital inflows. As a result of FDI and the change in the structure of the economy, the quality of production has risen. A slight shift towards the export of more sophisticated products promotes more sustainable development. However, the present study has its limitations. The results are based on static data analysis. They nevertheless provide a basis for further investigation in the form of an analysis of the dynamics of comparative advantages or an extension of the comparison of export competitiveness from the European market to the world market.

## 5. CONCLUSION

Maintaining and increasing competitiveness is one of the fundamental conditions of a country´s economic growth and development. Applying export data to the RCA index has enabled us to identify in which product groups Slovakia achieves a comparative advantage and is competitive vis-a-vis the rest of the European Union. At present, Slovak exports are concentrated in several competitive sectors, namely the production of transport equipment (passenger cars, their parts and accessories), electrical and telecommunication equipment, and base metals and articles made from these (iron, steel, wires), the segments with a long tradition of production. Development in these sectors are the main drivers of the Slovak economy.

We can consider the following factors as the main sources of the identified Slovak comparative advantages which impact on the scope and specialisation of its foreign trade:

- *Strategic location*: The central location of Slovakia within Europe connects the markets of Eastern and Western Europe as well as the South and the North of Europe and brings production closer to the markets. Its location between the Czech Republic, Poland, and Hungary makes it possible to take advantage of external economies of scale, especially in the automotive industry, which is concentrated not only in production in these countries, but also in customer-supplier relations.
- *Industrial tradition*: A rich industrial heritage in the former arms and heavy industries underpinned the enlargement of the automotive, electrotechnical, engineering, and metal-processing sectors during and after the transition.
- *Participation in international institutions and blocs:* Membership of the EU and EMU, WTO, OECD, and NATO has removed barriers to trade with member countries, which has increased the scope of mutual trade and investment flows and accelerated the specialisation and technological improvement of production. Open borders have allowed foreign companies, mainly from the EU, to outsource part of their production process to Slovakia via FDI.
- *Low labour costs combined with relatively high labour productivity*: The low labour costs at the beginning of the reporting period attracted investments in

labour-intensive types of production, including processing operations such as car assembly or electrical engineering.

- *The availability of highly specialised professionals and a skilled workforce:* The beginning of the transformation process was accompanied by the emergence of a high level of structural unemployment, characterised by the fact that Slovakia had a large number of available workers with experience and skills from the manufacturing industry without the possibility of employment in the defunct arms industry.
- *Low operational costs*: Slovakia offers not only low labour costs, but also other operating costs for industrial production, such as maintenance, rents or supplies or shared services centres (including IT centres). Moreover, participation in the eurozone also eliminates foreign currency conversion costs for transactions with headquarters, suppliers, and purchasers.
- *Evolving infrastructure:* Slovakia has good rail connections between the East and the West and is building new highways that connect other parts, making it easier to import parts and export finished products to other countries.
- *High R&D potential:* This is represented by the presence of R&D centres and technology communities, extensive R&D and innovation networks, R&D incentives and collaborations between companies and local universities.
- *A favourable investment environment:* Slovakia´s stable market economy with high growth potential, economic reforms together with government incentives, mainly in the form of the preferential tax regime, job contributions or discounted prices for real estate, have attracted huge foreign direct investments from developed countries.

Slovakia's position as a former centrally planned economy has long been affected by many historical factors in terms of international trade. As a transition economy with low costs and prices, its trade in the early 2000s was price competitive and based on the export of labour- and capital-intensive products with low added value. Even after two decades, Slovak production is still competitive on the European market mainly through prices. However, integration into the European trading area and the gradual catching up with more advanced member states have caused a slight loss of price competitiveness. At the same time, as a result of FDI and the changing structure of the economy, the quality of its production has grown at a higher rate, compensating the increase in prices, and Slovakia has experienced an improvement in non-price competitiveness.

Based on our results, we can define the risks of the observed patterns of foreign trade. Production is import intensive with a low value added and is price elastic. The high share of foreign trade in the economy and its concentration in several industries also have drawbacks. 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 and their demand. However, the long-term development of economic performance cannot depend solely on 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. This is a problem in the automotive industry, as research and development are carried out in the FDI home countries and only assembly operations are carried out in Slovakia.

The sources of competitiveness, mainly based on lower prices, are weak in terms of sustainability. The problem arises from focusing the economy on manufacturing, which requires a considerable labour force. In recent years, the automotive and electronics sector, in particular, have been facing labour shortages and rising labour costs. This is a challenge that almost all industries in the Slovak economy are facing. Thus, labour costs, which were one of the main sources of comparative advantages, have risen, but not been accompanied by growth in productivity. This together with high inflation may cause a loss in price advantage. The emerging lack of skilled workers and rising labour costs are considered to be two of the challenges for Slovakia. Furthermore, international markets are making Slovak exports increasingly vulnerable to competition from emerging low-wage regions. Another challenge is the transition to a green economy enforced by the EU, which may significantly affect the automotive industry as the basic pillar of the Slovak economy. The response to all these threats requires investment and the development of new technologies. Maintaining the competitiveness of the Slovak economy requires a high degree of innovative ability of domestic companies. However, its exports are currently dominated by production on the basis of FDI. Their impact on the Slovak economy has been and still is significant and can be assessed positively. However, the problem is that the development of science and research with the consequent creation of industries with higher added value has not been supported in parallel with FDI. Policy makers should therefore focus on support, particularly on those foreign investments that support domestic innovation potential, diversify production, and create backward and forward linkages replacing imports, and reconsider the investment incentives that do not currently meet such criteria. Too much focus on the production of the automotive and electrical industries, goods with low added value, and weak territorial diversification should be avoided.

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## APPENDIX 1

**Table 2.** RCA indices for Slovak foreign trade (SITC Divisions, 1999–2021)

| Product/Time | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0 Food and live animals** | **0,44** | **0,39** | **0,42** | **0,41** | **0,37** | **0,46** | **0,62** | **0,62** | **0,55** | **0,48** | **0,49** | **0,50** | **0,54** | **0,55** | **0,48** | **0,44** | **0,44** | **0,43** | **0,42** | **0,40** | **0,41** | **0,41** | **0,43** |
| 00 Live animals | 0,80 | 0,73 | 0,75 | 0,91 | 0,71 | 1,08 | 1,36 | 1,34 | 1,29 | 1,07 | 1,16 | 1,26 | 1,39 | 1,48 | 1,60 | 1,46 | 1,31 | 1,23 | 1,22 | 1,03 | 0,98 | 0,95 | 0,97 |
| 06 Sugars, sugar preparations and honey | 0,65 | 0,65 | 0,81 | 1,02 | 0,64 | 1,60 | 1,90 | 2,07 | 2,35 | 1,62 | 1,78 | 2,62 | 2,65 | 3,12 | 2,24 | 1,61 | 1,40 | 1,17 | 1,28 | 1,07 | 1,26 | 1,18 | 1,31 |
| **1 Beverages and tobacco** | **0,36** | **0,34** | **0,33** | **0,30** | **0,27** | **0,23** | **0,20** | **0,16** | **0,16** | **0,13** | **0,15** | **0,12** | **0,16** | **0,16** | **0,12** | **0,12** | **0,11** | **0,10** | **0,09** | **0,11** | **0,11** | **0,13** | **0,18** |
| **2 Crude materials, inedible, except fuels** | **1,49** | **1,25** | **1,38** | **1,24** | **1,01** | **1,10** | **1,16** | **0,90** | **0,79** | **0,95** | **0,88** | **0,92** | **0,85** | **0,90** | **0,81** | **0,69** | **0,67** | **0,65** | **0,68** | **0,70** | **0,68** | **0,66** | **0,70** |
| 22 Oil-seeds and oleaginous fruits | 3,12 | 1,85 | 3,49 | 2,75 | 1,30 | 2,91 | 2,56 | 1,98 | 2,10 | 2,32 | 2,82 | 3,19 | 3,73 | 4,72 | 3,50 | 1,93 | 1,71 | 1,62 | 1,77 | 1,99 | 1,77 | 1,61 | 1,80 |
| 24 Cork and wood | 3,31 | 2,99 | 3,12 | 2,75 | 2,19 | 2,21 | 2,86 | 2,14 | 1,58 | 1,96 | 2,27 | 1,99 | 1,69 | 1,80 | 1,59 | 1,44 | 1,31 | 1,32 | 1,25 | 1,25 | 1,24 | 1,16 | 1,21 |
| 25 Pulp and waste paper | 1,27 | 1,12 | 1,07 | 1,10 | 1,00 | 0,92 | 0,94 | 0,59 | 0,66 | 0,57 | 0,69 | 0,86 | 0,72 | 0,78 | 0,81 | 0,84 | 0,95 | 0,77 | 0,86 | 0,82 | 0,79 | 0,92 | 0,89 |
| 27 Crude fertilizers and minerals | 2,59 | 2,38 | 2,40 | 1,99 | 1,77 | 1,75 | 1,72 | 1,52 | 1,53 | 1,59 | 1,38 | 1,34 | 1,41 | 1,18 | 1,05 | 1,10 | 1,12 | 0,89 | 0,97 | 1,09 | 1,09 | 1,03 | 0,98 |
| **3 Mineral fuels, lubricants and rel. materials** | **2,02** | **2,10** | **2,13** | **1,92** | **1,53** | **1,81** | **1,20** | **1,04** | **0,90** | **0,76** | **0,86** | **0,89** | **0,91** | **0,74** | **0,71** | **0,65** | **0,68** | **0,62** | **0,65** | **0,52** | **0,55** | **0,66** | **0,53** |
| 33 Petroleum, petrol. products and rel. materials | 2,67 | 2,49 | 2,65 | 2,38 | 1,88 | 2,04 | 1,68 | 1,31 | 1,16 | 0,98 | 1,11 | 0,89 | 0,98 | 0,81 | 0,84 | 0,74 | 0,78 | 0,70 | 0,69 | 0,56 | 0,54 | 0,61 | 0,56 |
| 35 Electric current | 0,59 | 1,71 | 1,88 | 2,52 | 2,51 | 3,12 | 0,04 | 0,65 | 0,20 | 0,33 | 0,24 | 1,56 | 2,40 | 2,53 | 1,93 | 2,02 | 1,90 | 1,67 | 2,07 | 1,56 | 2,16 | 2,63 | 1,25 |
| **4 Animal and vegetable oils, fats and waxes** | **0,32** | **0,32** | **0,36** | **0,31** | **0,42** | **0,58** | **0,48** | **0,26** | **0,22** | **0,18** | **0,59** | **0,44** | **0,67** | **1,17** | **0,83** | **0,58** | **0,47** | **0,39** | **0,21** | **0,26** | **0,16** | **0,42** | **0,35** |
| **5 Chemicals and related products, n.e.s.** | **0,60** | **0,60** | **0,53** | **0,46** | **0,36** | **0,36** | **0,39** | **0,37** | **0,33** | **0,32** | **0,26** | **0,28** | **0,31** | **0,26** | **0,29** | **0,29** | **0,28** | **0,28** | **0,27** | **0,25** | **0,24** | **0,22** | **0,24** |
| 56 Fertilizers (other than those of group 272) | 2,33 | 2,97 | 3,46 | 2,82 | 2,16 | 2,61 | 2,19 | 1,96 | 1,43 | 1,41 | 1,38 | 1,30 | 1,67 | 1,46 | 1,67 | 1,42 | 1,65 | 1,48 | 1,45 | 1,45 | 1,35 | 1,35 | 1,71 |
| **6 Manufactured goods classified chiefly by material** | **1,66** | **1,63** | **1,72** | **1,69** | **1,53** | **1,55** | **1,55** | **1,43** | **1,25** | **1,24** | **1,24** | **1,26** | **1,23** | **1,25** | **1,19** | **1,19** | **1,21** | **1,21** | **1,25** | **1,23** | **1,20** | **1,12** | **1,24** |
| 61 Leather, leather manufactures, dressed furskins | 1,22 | 1,10 | 1,31 | 1,38 | 1,34 | 1,14 | 1,24 | 1,14 | 1,00 | 0,82 | 1,07 | 1,09 | 1,00 | 1,09 | 0,99 | 1,04 | 1,31 | 1,63 | 1,84 | 1,68 | 1,31 | 1,32 | 1,17 |
| 62 Rubber manufactures, n.e.s. | 2,15 | 2,10 | 2,48 | 2,87 | 2,61 | 2,63 | 2,71 | 2,35 | 2,01 | 1,94 | 1,77 | 2,05 | 2,15 | 2,24 | 2,38 | 2,48 | 2,90 | 2,83 | 2,83 | 2,80 | 2,73 | 2,57 | 2,54 |
| 63 Cork and wood manufactures (excl. furniture) | 1,10 | 1,15 | 1,37 | 1,50 | 1,34 | 1,40 | 1,56 | 1,49 | 1,37 | 1,33 | 1,61 | 1,09 | 1,02 | 0,94 | 0,90 | 0,90 | 0,99 | 0,97 | 1,09 | 1,12 | 1,11 | 0,99 | 1,01 |
| 64 Paper, paperboard and articles thererof | 1,53 | 1,55 | 1,65 | 1,54 | 1,19 | 1,27 | 1,28 | 1,23 | 1,10 | 1,09 | 1,10 | 0,90 | 0,85 | 0,84 | 0,85 | 0,82 | 0,85 | 0,89 | 0,84 | 0,83 | 0,86 | 0,83 | 0,89 |
| 65 Textile yarn, fabrics, made-up articles, etc. | 1,13 | 1,11 | 1,14 | 1,18 | 1,02 | 1,06 | 1,08 | 1,01 | 1,02 | 0,95 | 0,85 | 0,77 | 0,91 | 0,83 | 0,82 | 0,86 | 0,87 | 0,81 | 0,83 | 0,80 | 0,82 | 0,73 | 0,78 |
| 66 Non-metallic mineral manufactures, n.e.s. | 1,22 | 1,08 | 1,13 | 1,09 | 0,97 | 0,91 | 0,92 | 0,80 | 0,73 | 0,77 | 0,77 | 0,70 | 0,73 | 0,80 | 0,67 | 0,63 | 0,58 | 0,64 | 0,63 | 0,68 | 0,73 | 0,75 | 0,74 |
| 67 Iron and steel | 3,26 | 3,21 | 3,29 | 3,05 | 2,85 | 2,64 | 2,50 | 2,18 | 1,77 | 1,80 | 1,88 | 2,04 | 1,77 | 1,79 | 1,83 | 1,79 | 1,68 | 1,72 | 1,82 | 1,75 | 1,60 | 1,52 | 2,02 |
| 68 Non-ferrous metals | 1,56 | 1,47 | 1,55 | 1,46 | 1,13 | 1,11 | 0,94 | 1,16 | 0,84 | 0,67 | 0,82 | 1,00 | 0,97 | 1,11 | 0,78 | 0,86 | 0,81 | 0,71 | 0,76 | 0,70 | 0,74 | 0,63 | 0,68 |
| 69 Manufactures of metals, n.e.s. | 1,23 | 1,17 | 1,28 | 1,32 | 1,26 | 1,33 | 1,39 | 1,28 | 1,26 | 1,25 | 1,27 | 1,25 | 1,24 | 1,21 | 1,17 | 1,20 | 1,23 | 1,26 | 1,25 | 1,24 | 1,24 | 1,20 | 1,20 |
| **7 Machinery and transport equipment** | **0,92** | **0,91** | **0,89** | **0,94** | **1,14** | **1,10** | **1,08** | **1,19** | **1,31** | **1,38** | **1,44** | **1,43** | **1,41** | **1,49** | **1,54** | **1,53** | **1,51** | **1,54** | **1,53** | **1,56** | **1,60** | **1,69** | **1,69** |
| 73 Metalworking machinery | 1,30 | 1,22 | 1,19 | 1,18 | 1,04 | 0,91 | 0,82 | 0,84 | 0,79 | 0,77 | 0,60 | 0,62 | 0,67 | 0,62 | 0,64 | 0,67 | 0,72 | 0,72 | 0,73 | 0,70 | 0,73 | 0,76 | 0,77 |
| 74 General industrial machinery and equipment, etc. | 0,70 | 0,80 | 0,88 | 0,86 | 0,79 | 0,84 | 0,90 | 0,86 | 0,79 | 0,76 | 0,72 | 0,89 | 0,99 | 0,93 | 0,94 | 0,96 | 1,03 | 1,07 | 1,11 | 1,07 | 1,10 | 1,08 | 1,13 |
| 76 Telecommunications and sound-recording and ... | 0,41 | 0,35 | 0,55 | 0,51 | 0,43 | 0,74 | 1,45 | 2,77 | 3,82 | 4,84 | 5,75 | 5,12 | 4,74 | 5,05 | 5,40 | 5,28 | 4,68 | 4,71 | 4,76 | 4,28 | 3,89 | 3,45 | 3,56 |
| 77 Electrical machinery, apparatus and appliances, etc. | 1,02 | 0,90 | 0,96 | 1,09 | 1,17 | 1,28 | 1,24 | 1,15 | 1,05 | 1,04 | 1,06 | 1,03 | 0,99 | 0,91 | 0,94 | 0,99 | 1,03 | 1,03 | 1,02 | 1,04 | 1,04 | 0,99 | 0,99 |
| 78 Road vehicles (including air-cushion vehicles) | 1,61 | 1,83 | 1,59 | 1,66 | 2,24 | 1,89 | 1,55 | 1,73 | 2,00 | 1,97 | 2,01 | 1,98 | 2,01 | 2,30 | 2,34 | 2,27 | 2,29 | 2,33 | 2,23 | 2,54 | 2,76 | 3,14 | 3,11 |
| **8 Miscellaneous manufactured articles** | **1,03** | **1,02** | **1,09** | **1,17** | **1,09** | **0,96** | **0,94** | **0,89** | **0,91** | **0,89** | **0,92** | **0,92** | **0,93** | **0,87** | **0,85** | **0,89** | **0,86** | **0,78** | **0,80** | **0,81** | **0,77** | **0,75** | **0,74** |
| 81 Prefabricated buildings; sanitary, plumbing, etc. | 1,31 | 1,33 | 1,67 | 2,02 | 1,74 | 1,66 | 2,23 | 2,42 | 2,88 | 2,60 | 2,57 | 2,44 | 2,30 | 2,30 | 2,40 | 2,56 | 2,48 | 2,24 | 2,15 | 2,29 | 2,40 | 2,58 | 2,42 |
| 82 Furniture and parts thereof; bedding, mattresses, etc. | 1,27 | 1,73 | 1,89 | 2,40 | 2,78 | 1,98 | 1,66 | 1,43 | 1,37 | 1,32 | 1,51 | 1,39 | 1,31 | 1,28 | 1,34 | 1,33 | 1,30 | 1,30 | 1,37 | 1,43 | 1,30 | 1,17 | 1,14 |
| 84 Articles of apparel and clothing accessories | 2,00 | 1,80 | 1,80 | 1,75 | 1,32 | 1,23 | 1,15 | 0,95 | 0,88 | 0,83 | 0,79 | 0,91 | 0,92 | 0,89 | 0,83 | 0,93 | 0,85 | 0,66 | 0,65 | 0,68 | 0,64 | 0,57 | 0,58 |
| 85 Footwear | 2,09 | 2,11 | 2,05 | 2,26 | 2,17 | 2,11 | 2,01 | 1,71 | 1,75 | 1,96 | 2,07 | 2,09 | 2,35 | 1,88 | 2,02 | 2,05 | 1,90 | 1,65 | 1,61 | 1,55 | 1,34 | 1,27 | 1,19 |
| **9 Commodities and transactions not classified elsewh** | **0,60** | **0,57** | **0,52** | **0,43** | **0,01** | **0,21** | **1,20** | **0,47** | **0,71** | **0,54** | **0,57** | **0,14** | **0,11** | **0,12** | **0,17** | **0,23** | **0,19** | **0,21** | **0,22** | **0,31** | **0,32** | **0,14** | **0,11** |
| 96 Coin (other than gold coin), not being legal tender | 0,07 | 0,03 | 4,65 | 9,73 | 2,84 | 13,43 | 19,89 | 5,20 | 8,38 | 9,14 | 11,86 | 8,07 | 2,50 | 4,83 | 9,75 | 9,06 | 14,17 | 9,87 | 10,98 | 12,16 | 21,25 | 6,22 | 2,08 |

**Source:** Author´s calculations, Eurostat data

## APPENDIX 2

**Table 3.** Results of the REVELAST method for Slovak foreign trade (SITC Divisions, 1999–2021)

| Product/Time | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **0 Food and live animals** | **SPC** | **UQC** | **UPC** | **UQC** | **UQC** | **UQC** | **SPC** | **SPC** | **UQC** | **UQC** | **SPC** | **UQC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** |
| 00 Live animals | SQC | SQC | SQC | SPC | SPC | UPC | UPC | SQC | SQC | SQC | SQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 06 Sugars, sugar preparations and honey | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| **1 Beverages and tobacco** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UPC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** |
| **2 Crude materials, inedible, except fuels** | **UPC** | **UQC** | **UQC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UQC** | **UPC** | **UPC** | **UPC** | **UPC** | **UQC** | **UQC** | **UQC** |
| 22 Oil-seeds and oleaginous fruits | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 24 Cork and wood | SPC | SPC | SPC | SPC | SPC | SQC | SQC | SQC | SQC | SQC | SQC | SQC | SQC | SPC | SPC | SPC | SPC | SPC | SQC | SQC | SQC | SQC | SQC |
| 25 Pulp and waste paper | UPC | UPC | UPC | UPC | UQC | SPC | UQC | UQC | UQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 27 Crude fertilizers and minerals | SPC | SPC | SPC | SPC | SPC | SPC | SQC | SPC | SQC | SQC | SPC | SPC | SQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| **3 Mineral fuels, lubricants and rel. materials** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** |
| 33 Petroleum, petrol. products and rel. materials | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC |
| 35 Electric current | UPC | UQC | SQC | SQC | UQC | SPC | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* | *nd* |
| **4 Animal and vegetable oils, fats and waxes** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **SPC** | **UPC** | **UQC** | **UQC** | **UQC** | **UPC** | **UPC** | **UPC** | **UQC** | **UPC** | **UQC** | **UPC** | **UQC** | **UQC** | **UQC** | **UQC** | **UPC** | **UPC** |
| **5 Chemicals and related products, n.e.s.** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** | **UQC** |
| 56 Fertilizers (other than those of group 272) | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| **6 Manufactured goods classified chiefly by material** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** |
| 61 Leather, leather manufactures, dressed furskins | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 62 Rubber manufactures, n.e.s. | SPC | SPC | SPC | SPC | SPC | UPC | SPC | SPC | SPC | SQC | SPC | SPC | SPC | SPC | SPC | SQC | SQC | SQC | SPC | SPC | SPC | SPC | SPC |
| 63 Cork and wood manufactures (excl. furniture) | SPC | SPC | SPC | SPC | SPC | SQC | SQC | SQC | UPC | SPC | SQC | UPC | SQC | SPC | SQC | SQC | SPC | SPC | SPC | SPC | SPC | SQC | SPC |
| 64 Paper, paperboard and articles thererof | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SQC | SPC | SPC | SPC | SPC | SQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SQC | SPC | SPC |
| 65 Textile yarn, fabrics, made-up articles, etc. | UQC | SPC | SPC | SPC | SPC | UPC | SPC | SPC | UQC | UQC | SPC | UQC | UPC | UQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 66 Non-metallic mineral manufactures, n.e.s. | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 67 Iron and steel | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 68 Non-ferrous metals | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | UQC | UQC | UQC | UQC | UQC | UQC | UQC | UQC |
| 69 Manufactures of metals, n.e.s. | UQC | SPC | UQC | SPC | SPC | UPC | UPC | UQC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC |
| **7 Machinery and transport equipment** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **UPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SQC** | **SQC** | **SQC** | **UPC** | **UPC** | **UPC** | **UPC** | **SPC** | **SQC** | **SPC** | **SPC** | **SQC** | **SQC** |
| 73 Metalworking machinery | SPC | SPC | SPC | SPC | SPC | UQC | UQC | UQC | UPC | UPC | SPC | UQC | UQC | UPC | UQC | UQC | UQC | UQC | UPC | UQC | UQC | SPC | UPC |
| 74 General industrial machinery and equipment, etc. | UPC | SPC | SPC | SPC | SPC | UPC | SPC | SPC | UPC | SPC | SPC | UPC | UPC | UPC | UPC | UPC | SQC | SPC | SQC | SPC | SPC | SPC | SPC |
| 76 Telecommunications and sound-recording and ... | SPC | SPC | SPC | SPC | SPC | UPC | SPC | UPC | UPC | SPC | SPC | SPC | SPC | SQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC |
| 77 Electrical machinery, apparatus and appliances, etc. | SPC | SPC | UQC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | UQC | UPC | UPC | UPC | UQC | SPC | SPC | UQC | UQC | UQC |
| 78 Road vehicles (including air-cushion vehicles) | SQC | SQC | UPC | SQC | SQC | SQC | SQC | SQC | UPC | UPC | UPC | UPC | SQC | UPC | UPC | UPC | UPC | SQC | SQC | SQC | SQC | SQC | SQC |
| **8 Miscellaneous manufactured articles** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **UQC** | **SPC** | **UQC** | **UQC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **UQC** | **UPC** | **UPC** | **UPC** | **UPC** | **UPC** |
| 81 Prefabricated buildings; sanitary, plumbing, etc. | SPC | SPC | SPC | SPC | SPC | SQC | SQC | SQC | UPC | SQC | UPC | SQC | UPC | SQC | SQC | SQC | SPC | SQC | SQC | SQC | SQC | SQC | SQC |
| 82 Furniture and parts thereof; bedding, mattresses, etc. | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | SPC | UQC | UPC | UPC | UPC | UPC |
| 84 Articles of apparel and clothing accessories | SQC | SQC | UPC | SQC | SQC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UPC | UQC | UQC | UPC | UPC | UPC | UQC | UPC | UPC | UPC |
| 85 Footwear | SQC | SQC | SQC | SQC | SQC | UPC | UPC | UPC | UPC | UPC | SQC | SQC | UPC | UPC | SQC | SQC | UPC | UPC | UPC | UPC | UPC | UPC | UPC |
| **9 Commodities and transactions not classified elsewh** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** | **SPC** |
| 96 Coin (other than gold coin), not being legal tender | *nd* | *nd* | *nd* | *nd* | SPC | *nd* | *nd* | *nd* | *nd* | SPC | SPC | SPC | SPC | SPC | SPC | SQC | SQC | SPC | UPC | SPC | SPC | SPC | SQC |

**Source:** Author´s calculations, Eurostat data