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Mariusz-Jan Radło
ORCID: 0000-0001-7756-1613
Warsaw School of Economics
mjradlo@sgh.waw.pl

Aleksandra Szarek-Piaskowska
ORCID: 0000-0002-9553-7761
Warsaw School of Economics
aszare@sgh.waw.pl

Competitiveness of international merchandise trade: The case of Poland

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Abstract

The aim of the article is to present the possibilities that qualitative classifications of industries and goods introduce to the analysis of structural changes in the economy, as well as to assess changes in the international competitiveness of Polish merchandise trade in the long term. The article presents a review of the literature and the results of authors' own research on the structure of Polish merchandise trade. The study uses Lall's classification of goods which is relatively innovative and rarely used in the existing literature. By using this classification and the analysis of revealed comparative advantages (RCA) we also managed to assess the competitiveness of Polish exports. The research shows that since Poland's accession to the European Union, the international competitiveness of Polish trade in terms of its technological level has changed only slightly. After the growth in the first years of Poland's EU membership, the share of high technology products in the export structure stagnated in the 2010s and was still lower than that of medium or low technology products. Throughout the researched period, the RCA for high-tech products remained on the "foreign" side.

Introduction

The internationalization of the economy and the dynamic growth of exports were one of the key factors contributing to the growth of the Polish GDP. In the last two decades, the value of Polish exports of goods and services has almost quadrupled, particularly due to the strong increases in exports of intermediate goods and services. The increase in exports was fostered by, i.a., the proximity to European markets and integration with global value chains, competitive labour costs, and significant productivity gains (OECD, 2020). As a result, currently more than 40% of domestic employment depends on international markets. Polish exports also turned out to be resistant to short-term slumps — such as those experienced during the slowdown in world trade in 2011–2016 or the COVID-19 pandemic (OECD, 2020; Radło and Sagan, 2021).

The development of exports, on the one hand, stimulates future structural changes in the economy, and on the other hand, changes observed in the composition of exports are symptoms of structural changes that have already occurred in the economy. Therefore, taking into account the enormous importance of foreign trade for the development of the Polish economy, the aim of this study is to assess changes in the competitiveness of Polish exports, and indirectly — structural changes in the Polish economy between 2005–2020. In this study, we will use Lall's (2000) qualitative classifications of goods to show the degree of technological advancement or structural advantages of Polish enterprises, together with Balassa's (1965) revealed comparative advantage indicators (RCA) to estimate competitiveness in trade of specific goods. Structural changes in the Polish economy during the examined period will be approximated by changes in the structure of trade and RCA.

Previous research in this area has shown that Polish exports are highly dynamic, but small shifts can be observed towards an increase in the importance of sales of more advanced and more sophisticated goods (Czarny and Folfas, 2020; Nazarczuk, Umiński and Gawlikowska-Hueckel, 2018; OECD, 2020; Radło, 2011; Szczepaniak, 2018). Therefore, we hypothesize that, in the period under review, Polish exports exhibited high dynamics, but they were accompanied by rather moderate structural changes. This means that during the period in question, Polish economy developed relatively well. Yet, neither breakthrough changes in the competitiveness of products offered by Polish enterprises have been observed, nor new technologically advanced industries have emerged, the scale of which would induce changes in the product structure of Polish exports.

The first section of the article discusses the theoretical framework of the research, including the concept of competitiveness in trade and qualitative classifications of industries and goods. The second part is devoted to the description of the research methodology, sources of data and their processing, as well as in-

dicators used in the analysis. The final section presents the research results. The article ends with conclusions drawn from research findings, and some proposals for future research in the studied area.

1. Theoretical framework of the research

For years, analyses of economic (or national) competitiveness have been criticized by many authors due to the vague and subjective definitions of this concept, the impossibility of applying it to entities other than enterprises, or problems arising from looking at international trade through the prism of national competitiveness (Charrass, 2016; Krugman, 1994; Rinehart, 1995). Despite the observed criticism, competitiveness has long been, and still is, the subject of many research studies. This is evidenced by the number of scientific publications devoted to it. Even a simple search among books and articles in the ScienceDirect database indicates that the term "competitiveness" has appeared in over a million publications. Less frequently, although in numbers that are not negligible, it appears in combination with other terms: "national competitiveness" search identifies 2237 publications, "industrial competitiveness" — 2466, while "trade competitiveness" — 547. As shown by Radło (2008), one of the effects of the abundant research on competitiveness is the multiplicity of often very different definitions of the concept itself. Among reasons for this diversity, one should distinguish inconsistent views on the subjective scope of competition and its sources, as well as the difference of axiological approaches represented by various authors.

Competitiveness research in international trade is usually used to carry out a comparative analysis of selected economies[1] or analyze the performance of specific industries.[2] However, from the perspective of the research presented in this article, the most interesting part of the research on trade competitiveness focuses on structural modifications in national economies manifested by changing trade patterns and relative advantages in trade.[3] This approach is relevant because, as indicated by Melitz (2003), international trade not only allows for the identification of the current comparative advantages of various industries, but in itself it also creates pressure for structural changes in the economy, resulting in the relocation of resources to more productive firms.[4]

The trade competitiveness research uses various analytical methods, ranging from simple analyses of changes in the size and structure of trade in various industries or trade in various goods and services. More sophisticated assessments

[1] See, e.g., Bojnec and Fertő (2009), Shuai et al. (2022), Zhou and Tong (2022).

[2] See, e.g., Han, Wen and Kant (2009), Riker (2012), Drobetz, Ehlert and Schröder (2021), Long (2021).

[3] See, e.g., Uchida and Cook (2005), Riker (2012), Long (2021).

[4] See also Falciola, Jansen and Rollo (2020).

of competitiveness in the context of structural change or comparative advantage make use of more complex indicators such as revealed comparative advantages (Balassa, 1965; French, 2017; Herciu, 2013; Shuai et al., 2022; Startienė and Remeikienė, 2014) together with various taxonomies which allow for a qualitative categorization of goods, services, or industries. There are many classifications that may be considered. In his review of industry taxonomies, Peneder (2003) identified 16 classifications, of which 12 related to industries and 4 to goods. In turn, Kaplinsky and Paulino (2005) analyzed 22 classifications, of which 7 related to goods, while the rest related mainly to industries.

Due to the purpose of this work, which is the analysis of competitiveness of international merchandise trade, the classifications of industries will not be discussed here. It is worth noting, however, that most of such taxonomies refer to the scale of technological advancement, innovation, or quality (Aiginger, 2001; Davies and Lyons, 1996; Evangelista, 2000; Hatzichronoglou, 1997; Marsili, 2001; Pavitt, 1984; Peneder, 1999, 2010), but there are also classifications taking into account the structure of industries and their interrelationships (Dalziel, 2007) or the approach of enterprises to environmental issues (Andersen and Bams, 2022).

Among the classifications of goods cited by Kaplinsky and Paulino (2005) or Peneder (2003), a few deserve our attention, although in practice only one of them is suitable for a broad analysis of goods traded internationally. Classification of goods proposed by McGuckin et al. (1992), Hatzichronoglou (1997), or Jaffe and Gordon (1993) bypassed much of the trade in goods and focused on the identification of only high technology or high value goods. Therefore, applicability of these taxonomies to analyses presented in this paper is limited. In turn, Mayer, Butkevicius, Kadri and Pizarro (2003) in their analysis of international trade used Lall's (2000) classification of goods, but also proposed their own one based on trade dynamics.

From the perspective of the reviewed literature, Lall's taxonomy of goods seems to be the most extensive. The author distinguishes 6 basic and 11 specific product categories depending on the factor and technology intensity, based on the Standard Classification of Foreign Trade (SITC, revision 2). The breakdown into basic product categories includes: (1) primary products (PP), (2) resource-based manufactures (RBM), (3) low-technology manufactures (LTM), (4) medium technology manufactures (MTM), (5) high-technology manufactures (HTM), and (6) other transactions (OT). Some of the basic Lall categories are split into subcategories. RBM are divided into two categories (1) agro/forest-based products and (2) other resource-based products. LTM include (1) textile/fashion cluster and (2) other low technology manufactures. MTM are broken down into three subcategories: (1) automotive products, (2) medium technology process industries, and (3) medium technology engineering industries. And finally, HTM include (1) electronics and electrical products, as well as (2) other high technology. Although

Lall's classification allows for a fairly accurate grouping of products according to their level of technological sophistication, it also has some limitations. For example: it includes products of different quality or technology (internal combustion cars and hybrid cars) within one category, and does not inform to what extent the final product consists of foreign semi-finished products (i.e. whether the entire production process of a high-tech product took place in a given country or only the assembly of a product from foreign high-tech components). Such research, however, would require a slightly different approach and examining the trade in terms of value added, which can be done based on the input-output tables, which, in turn, relate to the analyses of trade between industries, not to trade in goods.

2. Research methodology

The article reviews the literature on the classification of goods and industries regarding their technological advancement as well as analyzes Polish trade flows based on these classifications. In addition, empirical studies of the structure of Polish merchandise trade were carried out according to Lall's classification and the RCA in Polish foreign trade were calculated.

The analysis of the structure of Poland's foreign merchandise trade was carried out according to Lall's classification for 2005, 2010, 2015, and 2020. The structure of exports and imports of goods according to Lall's classification was calculated by transforming the actual data on the value of Polish goods exchanged with foreign countries taken from SAD documents and INTRASTAT declarations given according to 6-digit Harmonized System (HS) codes into data of the Standard International Trade Classification (SITC, rev. 3, according to UN Trade Statistics, 2022), to which Lall's classification categories (UNCTAD Stat, 2022) were then matched. Since the output set includes data presented according to the HS codes in force in different periods, HS codes of products that were not in use in the 2017 HS database were manually assigned to the appropriate Lall's classification categories based on the category the product with the closest HS code belonged to in the 2017 database ('Nearest Neighbour'), and the type of product that a given HS code related to. The article analyzes the structure of Polish exports and imports of goods broken down into basic and detailed categories distinguished in Lall's classification. Moreover, the balance of Poland's merchandise trade was examined in accordance with the categories of the mentioned classification.

Apart from the structure of Poland's foreign merchandise trade, an analysis of the RCA in Polish foreign trade was performed. The RCAs were calculated for individual categories of Lall's classification for the years 2005, 2010, 2015, and 2020 in logarithmic terms (using the natural logarithm), using the formula for the modified formula by Balassa (1965):

$$RCA = \ln\left(\frac{x_{ij}^{K}}{m_{ij}^{K}} \div \frac{X_{ij}^{K}}{M_{ij}^{K}}\right)$$

where

x_{ij}^{K} – exports of the goods group 'i' from country 'K' to the group of countries 'j,'

m_{ij}^{K} – imports of the goods group 'i' to country 'K' from the group of countries 'j,'

X_{j}^{K} – global exports from country 'K' to the group of countries 'j,'

M_{j}^{K} – global imports to country 'K' from the group of countries 'j,'

i – Lall's classification category,

K – the analyzed country, i.e., Poland,

j – other countries of the world.

The values of the indicators are interpreted in such a way that a positive value of the indicator for a given category of Lall's classification shows that there is an RCA in Polish foreign trade as well as the intensity of this advantage, while a negative value of the indicator means having no RCA in a given category of Lall's classification (Misala, 2012).

3. Analysis of the research results

3.1. The structure of Polish exports and imports according to Lall's classification

Figure 1 shows the value of Polish exports of goods broken down into Lall's categories in 2005, 2010, 2015, and 2020. During the analyzed period, increases occurred not only in total exports of goods from Poland (by 265%), but also in exports within each category specified by Lall in his classification. Comparing the data from 2020 to those of 2005, the highest increase in the value of exports was recorded in the categories 'HTM: electronics and electrical products' (by 860%) and 'HTM: other high technology' (by 680%), which can be partially explained by a relatively low base value in 2005, and the lowest — in 'RBM: other resource-based products' (by 140%) and 'MTM: automotive products' (by 167%). Throughout the examined period, most goods exported from Poland originated from the categories 'MTM: medium technology engineering industries' and 'LTM: other low technology' according to Lall's classification. The third place in terms of the value of exports in 2005 and 2010 was occupied by the category 'MTM: automotive products,' and in 2015 and 2020 — by 'RBM: agro/forest-based products.' In all analyzed years, Poland reported the smallest exports in 'other transactions' category.

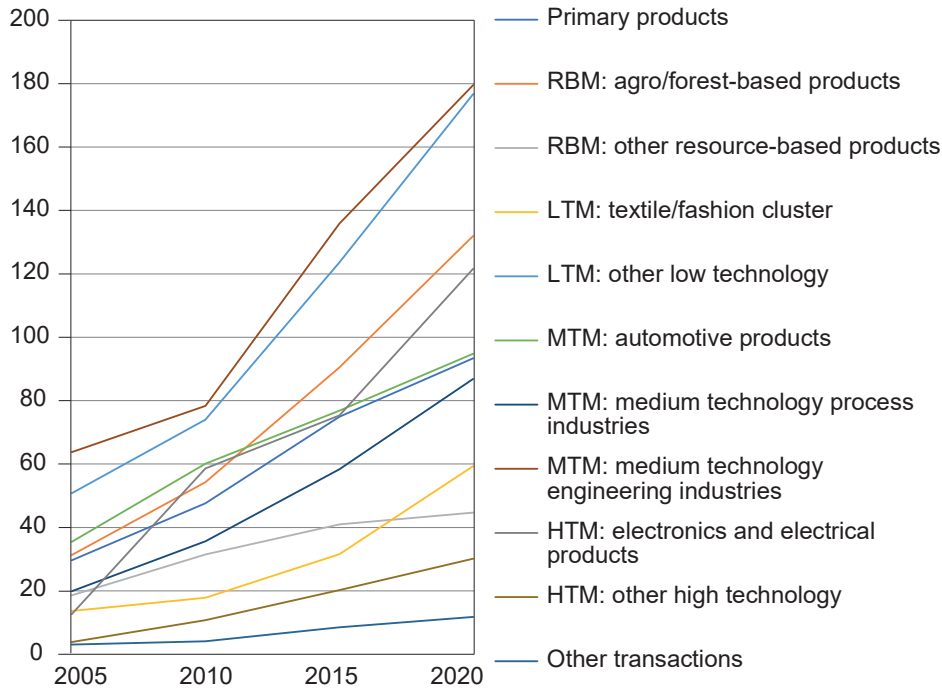

Figure 1. Exports of goods from Poland according to Lall's classification in 2005, 2010, 2015, 2020 (in billion PLN)

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

The data contained in Table 1 concerning the structure of Polish exports according to Lall's categories show that after a drop in 2010 compared to 2005, the share of the category 'MTM: medium technology engineering industries' (the largest category of exports by value) oscillated in the range of 17.4–18.4% in the subsequent analyzed years. Throughout the period covered by the analysis, 'LTM: other low technology' (the second largest category of exports in terms of value) accounted for 15.7–18% of the value of Polish exports of goods. The share of the category 'MTM: automotive products" (the third largest category of exports by value in 2005 and 2010) exceeded 12% of the value of exports in the 2000s and then dropped to 9.2% in the next decade. While the share of 'RBM: agro/forest-based products' — which has been the third category in terms of export value since 2015 — increased to almost 13% in 2020. Over the examined period, the largest increase in the share in the structure of exports of goods from Poland was recorded by 'HTM: electronics and electrical products,' which in 2005 accounted for only 4.5% of the export value, and since 2010 their share has ranged between 10% and 12.5%. Among other categories of Lall's classification, we observed growing importance of categories 'MTM: medium technology process industries,'

'LTM: textile/fashion cluster,' and 'HTM: other high technology' in Polish exports of goods. The share of the latter category in the structure of exports is still small and does not exceed 3% of the value of exports.

Table 1. The structure of exports of goods from Poland according to Lall's classification in 2005, 2010, 2015, 2020 (in %)

Product categories by Lall	2005	2010	2015	2020
primary products	10.5	10.1	10.2	9.1
RBM: agro/forest-based products	11.1	11.5	12.3	12.8
RBM: other resource-based products	6.6	6.7	5.6	4.3
LTM: textile/fashion cluster	4.8	3.8	4.3	5.8
LTM: other low technology	18.0	15.7	16.8	17.1
MTM: automotive products	12.5	12.7	10.4	9.2
MTM: medium technology process industries	7.0	7.5	7.9	8.4
MTM medium technology engineering industries	22.6	16.6	18.4	17.4
HTM: electronics and electrical products	4.5	12.4	10.2	11.8
HTM: other high technology	1.4	2.3	2.8	2.9
other transactions	1.0	0.7	1.1	1.2
Total	100.0	100.0	100.0	100.0

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

Summing up, after joining the European Union, Poland remained an exporter of mainly MTM (Table 2). Although their share in the structure of exports decreased during the analyzed period, they still accounted for over 1/3 of the value of Polish exports of goods. Almost a quarter of Polish exports concerned LTM and approx. 17–18% — RBM. Despite the fact that over the researched period, the share of HTM in the structure of exports of goods from Poland increased by several percentage points, it still did not exceed 15%. The largest increase in the share of HTM in the structure of Polish exports of goods took place in the first years after the EU accession, and since 2010, the structure of exports in the aforementioned product categories has stagnated.

Table 2. The structure of exports of goods from Poland according to the aggregated categories of Lall's classification in 2005, 2010, 2015, 2020 (in %)

Aggregated Lall's classification categories	2005	2010	2015	2020
primary products	10.5	10.1	10.2	9.1
resource-based manufactures	17.7	18.2	17.9	17.1
low-technology manufactures	22.8	19.5	21.1	22.9
medium technology manufactures	42.1	36.8	36.7	35.0

Aggregated Lall's classification categories	2005	2010	2015	2020
high-technology manufactures	5.9	14.7	13.0	14.7
other transactions	1.0	0.7	1.1	1.2
Total	100.0	100.0	100.0	100.0

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

In the analyzed years, the value of Polish imports of goods — similarly to exports — increased both in total (by 197%) and within each category distinguished by Lall (Figure 2). Comparing 2020 with 2005, the highest increase in the value of imports was recorded in the following groups: 'other transactions' (increase by 441%, low base value), 'LTM: textile/fashion cluster' (increase by 345%) and 'HTM: electronics and electrical products' (increase by 326%), and the lowest for 'primary products' (increase by 135%, high base value), 'RBM: other resource-based products' (increase by 146%), and 'MTM: medium technology engineering industries' (increase by 154%, high base value).

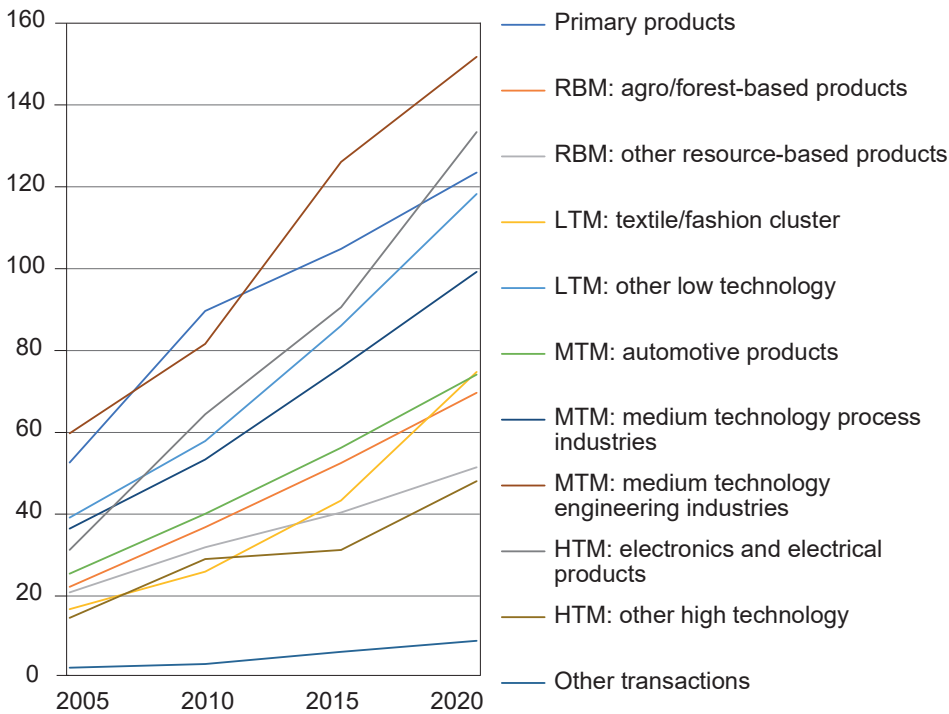

Figure 2. Imports of goods to Poland according to Lall's classification in 2005, 2010, 2015, 2020 (in billion PLN)

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

In 2005, the top three places in terms of the value of imported goods in Poland were occupied by 'MTM: medium technology engineering industries,' 'primary products,' and 'LTM: other low technology.' Fifteen years later, 'MTM: medium technology engineering industries' and 'primary products' were still in the top three major categories of Lall's classification by value of imports (1st and 3rd places, respectively), alongside 'HTM: electronics and electrical products' (2nd place). Throughout the entire analyzed period, Poland imports in the 'other transactions' category were the lowest.

The structure of the imports of goods to Poland according to Lall's classification is presented in Table 3. The share of the largest category of products by value of imports according to Lall (except for 2010) in the structure of the imports of goods — 'MTM: medium technology engineering industries' — fluctuated between 15.9% and 18.6% in the analyzed period. After an increase in the first decade of the 21st century to 17.5%, the share of 'primary products' in the import structure began to decline in the following years down to 13% in 2020. The share of 'HTM: electronics and electrical products' exhibited a constant upward trend in the structure of imports. In 2020 electronics and electrical products became the third largest category of imports in terms of value. It resulted from the increased consumer demand for high-tech products as the Polish society grew rich. The share of none of the other categories of Lall's classification in the analyzed years exceeded 12.5%.

Table 3. The structure of imports of goods to Poland according to Lall's classification in 2005, 2010, 2015, 2020 (in %)

Product categories by Lall	2005	2010	2015	2020
primary products	16.4	17.5	14.7	13.0
RBM: agro/forest-based products	6.9	7.2	7.4	7.3
RBM: other resource-based products	6.5	6.2	5.7	5.4
LTM: textile/fashion cluster	5.2	5.1	6.1	7.9
LTM: other low technology	12.2	11.3	12.1	12.4
MTM: automotive products	7.9	7.8	7.9	7.8
MTM: medium technology process industries	11.4	10.4	10.6	10.4
MTM medium technology engineering industries	18.6	15.9	17.7	15.9
HTM: electronics and electrical products	9.7	12.6	12.7	14.0
HTM: other high technology	4.6	5.7	4.4	5.0
other transactions	0.6	0.3	0.7	0.9
Total	100.0	100.0	100.0	100.0

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

In all analyzed years, Poland imported mainly MTM (Table 4). Although their share in the structure of imports fluctuated, over the entire period it exceeded 1/3

of the import value. In 2020, both LTM and HTM accounted for about 1/5 of imports. In the case of these categories — despite periodic fluctuations — a trend can be noticed, consisting in strengthening their position in the structure of imports. The share of PP in the structure of imports of goods decreased in the last ten years, while the share of RBM in the entire researched period oscillated around 13%.

Table 4. The structure of the imports of goods to Poland according to the aggregated categories of Lall's classification in 2005, 2010, 2015, 2020 (in %)

Aggregated Lall's classification categories	2005	2010	2015	2020
primary products	16.4	17.5	14.7	13.0
resource-based manufactures	13.4	13.4	13.1	12.7
low-technology manufactures	17.4	16.4	18.2	20.3
medium technology manufactures	37.9	34.1	36.2	34.1
high-technology manufactures	14.3	18.3	17.1	19.0
other transactions	0.6	0.3	0.7	0.9
Total	100.0	100.0	100.0	100.0

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

To assess the international competitiveness of Polish foreign trade, we also used data on the balance of trade in goods according to Lall's classification categories as presented in Table 5. After the deficit reported in the first decade of the 21st century, Poland generated a surplus in total trade in goods in 2015 and 2020. Throughout the analyzed period, the value of exports exceeded the value of imports in the following Lall's classification categories: 'RBM: agro/forest-based products,' 'LTM: other low technology,' 'MTM: automotive products,' 'other transactions' and 'MTM: medium technology engineering industries' (except 2010). In other categories of Lall's classification — 'primary products,' 'RBM: other resource-based products' (except 2015), 'LTM: textile/fashion cluster,' 'MTM: medium technology process industries,' 'HTM: electronics and electrical products,' and 'HTM: other high technology' — Poland recorded a constant trade deficit.

Table 5. The balance of Poland's merchandise trade according to Lall's classification categories in 2005, 2010, 2015, 2020 (in billion PLN)

Product categories by Lall	2005	2010	2015	2020
primary products	-23.0	-42.0	-29.9	-30.1
RBM: agro/forest-based products	9.1	17.5	38.0	62.3
RBM: other resource-based products	-2.3	-0.4	0.5	-6.8
LTM: textile/fashion cluster	-3.1	-8.1	-11.8	-15.4
LTM: other low technology	11.6	16.2	37.6	58.4

Product categories by Lall	2005	2010	2015	2020
MTM: automotive products	10.0	20.0	20.6	20.7
MTM: medium technology process industries	-16.6	-17.7	-17.5	-12.4
MTM medium technology engineering industries	4.0	-3.3	9.8	27.8
HTM: electronics and electrical products	-18.6	-5.8	-15.2	-11.8
HTM: other high technology	-10.8	-18.3	-11.0	-17.9
other transactions	1.6	1.6	3.1	3.6
balance of trade in goods	-38.1	-40.3	24.2	78.3

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

Despite Poland having been an EU member for several years, technological intensity of Polish exports still remains at an average level. Although after Poland's accession to the EU, exports of high-technology products from Poland increased, Polish exports continue being dominated by medium (mainly engineering industries) and low-technology (other low technologies) products. The share in the structure of exports of 'RBM: agro/forest-based products' is also high. This is reflected in the trade surplus in these categories. The stagnation in the share of HTM in the structure of Polish exports in the second decade of the 21st century is alarming. Although MTM dominate in the import structure, the share of high- and low-technology products (textile/fashion cluster) and primary products (due to the import of raw materials) is also high. In the case of the last three categories of Lall's classification, there is a surplus of imports over exports.

3.2. Revealed comparative advantages (RCAs) in Polish foreign trade according to Lall's classification categories

In order to assess the international competitiveness of Polish trade, RCAs of Poland's foreign trade for 2005, 2010, 2015, and 2020 were also calculated (Table 6). In the analyzed years, the RCAs in Polish trade were rather permanent. Throughout the researched period, Poland enjoyed an RCA in the following categories of Lall's classification: 'RBM: agro/forest-based products' (strengthening advantage), 'LTM: other low technology' (a declining advantage), 'MTM: automotive products' (the advantage decreasing since 2010), 'MTM: medium technology engineering industries' (the advantage growing since 2010) and 'other transactions' (a decreasing advantage). Over the years, Poland has lost its RCA in 'RBM: other resource-based products,' while not having any RCA in the other categories.

Table 6. RCA in Polish trade by Lall's classification categories in 2005, 2010, 2015, 2020

Product categories by Lall	2005	2010	2015	2020	2020–2005
primary products	-0.45	-0.55	-0.37	-0.36	0.09
RBM: agro/forest-based products	0.47	0.47	0.51	0.56	0.09
RBM: other resource-based products	0.01	0.07	-0.02	-0.22	-0.23
LTM: textile/fashion cluster	-0.08	-0.29	-0.35	-0.31	-0.23
LTM: other low technology	0.39	0.33	0.33	0.32	-0.06
MTM: automotive products	0.46	0.49	0.28	0.17	-0.29
MTM: medium technology process industries	-0.48	-0.32	-0.30	-0.21	0.27
MTM medium technology engineering industries	0.19	0.04	0.04	0.09	-0.10
HTM: electronics and electrical products	-0.78	-0.01	-0.22	-0.17	0.61
HTM: other high technology	-1.21	-0.91	-0.47	-0.55	0.66
other transactions	0.84	0.60	0.42	0.29	-0.55

Source: own calculations based on the actual data on the value of Polish goods exchanged with foreign countries, taken from SAD documents and INTRASTAT declarations.

However, it should be noted that in terms of high-technology manufactures, the RCA indicators for Poland were negative, which confirms the absence of RCA in trade in these products. Nevertheless, the value of RCA indicators for these product categories in 2020 was significantly higher than in 2005, which suggests a relative improvement in this regard. RCAs for medium technology products are rather low.

Conclusions

In the light of changes in the structure of Polish exports of goods according to Lall's classification, since Poland's accession to the European Union in 2004, the international competitiveness of Polish exports in terms of the level of technological advancement has changed only slightly. The most important feature of Polish exports in the period 2004–2020 was the almost constant share in the export structure of primary products, raw materials, and low technology products, and from 2010, also medium and high technology products.

A significant and systematic increase was observed in the total value of Polish exports and imports in the period in question. However, the three main categories of exports remained the medium technology engineering industries, other low technology products, and — in the 2010s — agro-/forest-based products. At the same time, main categories of imports included medium technology engineering products, primary products, and, since 2010, electronics and electrical products (HTM).

The share of high-technology products in the structure of Polish exports increased in 2005–2010. However, despite the dynamic growth in exports of this type of goods between 2010 and 2020, their share in total exports from Poland has not increased. As a result, in 2020, the exports of high-technology products were still lower than those of medium-technology products, low-technology products or resource-based products. This was reflected in the balance of Poland's merchandise trade for all Lall's categories over the entire examined period when Poland recorded a deficit in trade in high-technology products. A surplus of exports over imports occurred in the case of, i.a., selected categories of resource-based, low, and medium technology manufactures.

The type of balance of merchandise trade in different categories of Lall's classification coincided — with minor exceptions — with the absence of a revealed comparative advantage in Polish foreign trade. The RCA coincided with the surplus in the exchange of goods within a given category of Lall's classification, and the lack of the RCA coincided with trade deficit. Poland held RCAs in agro/forest-based products (RBM), other low technology products, and engineering and automotive products (MTM). The RCAs for high-technology products remained on the side of "foreign" partners. RCA indicators for high-technology products were negative, however they increased significantly over the period 2004–2020, which should be viewed as a positive structural trend.

It should be noted that the relatively stable structure of Polish exports after joining the EU, and the lack of shifting competitive advantages towards more advanced products should be a cause for concern. The reason for the lack of such changes in the structure of exports may be that the Polish economy developed competitive advantages in the categories of goods described and there were insufficient incentives for the development of high technology industries. Another factor may be the specificity of Polish export, which relies largely on the vendor–client relationship under which Polish exporters supply international companies, mainly from Germany. On the one hand, such a relationship creates opportunities for an increase in exports; on the other, the willingness of foreign recipients to relocate more advanced activities to Poland may be very low. The solution to this problem should be the subject of further research as well as of targeted public interventions.

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