OECONOMIA
COPERNICANA

VOLUME 9 ISSUE 2 JUNE 2018

p-ISSN 2083-1277, e-ISSN 2353-1827
www.oeconomia.pl

ORIGINAL PAPER

Citation: Szczepaniak, I. (2018). Comparative advantages in Polish export to the European Union — food products vs selected groups of non-food products. *Oeconomia Copernicana*, *9*(2), 287–308. doi: 10.24136/oc.2018.015

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Received: 13 May 2017; Revised: 21 January 2018; Accepted: 9 February 2018

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Comparative advantages in Polish export to the European Union — food products vs selected groups of non-food products

JEL Classification: *F14; L66; Q17*

Keywords: *foreign trade; comparative advantages; competitiveness; food*

Abstract
Research background: Globalisation and economic integration are the reasons for which the competitiveness of economic entities is analysed more and more often in the context of their relations with the international market. One of the ways to assess the competitiveness of the Polish food sector is an analysis of comparative (relative) advantages in the export of this sector's products.
Purpose of the article: The objective of this paper is to assess comparative advantages in Polish export of food products to the European Union against a background of selected groups of non-food products.
Methods: The study used the B. Balassa's revealed comparative advantage (RCA) index. The study is preceded by a brief review of foreign trade results. The source of data was the WITS-Comtrade commercial database. The analysis was carried out at the level of the HS sections (in commodity terms). The research period covered the years 2003–2015.
Findings & Value added: In the years 2003–2015, export of food increased nearly six times and its import — more than 4.5 times. The major partners of Poland as regards trade in food were the EU countries. The food sector was one of few sectors of the economy with the positive trade balance. Polish export to the EU was characterised by a diversified level of comparative advantages. From among 20 HS sections, in 2015 Poland had comparative advantages in export to the EU countries for products from 10 sections (2 food and 8 non-

food). Those products accounted for 11% and 70% of Polish export to the EU, respectively. The development of Polish foreign trade in food products during the Polish membership in the EU as well as fairly high comparative advantages in the export of these products to the EU indicate the competitiveness and significant importance of the Polish food sector for the national economy.

Introduction

Progressing processes of globalisation, integration and liberalisation of economies, conducive to the popularisation of the paradigm of open economic development and internationalisation of economic activity, have changed the nature, intensity and scope of competition, which has gained an international dimension consisting, on the one hand, in competing on international markets, and on the other, in the need to struggle with competitive pressure from foreign entities on regional and national markets. Due to this international dimension of competition, entities participating in the market and competing for the benefits of participating in international trade face new challenges, and the conditions in which they operate are more and more difficult. This also applies to the food sector in Poland.

One of the methods of assessing competitiveness is the analysis of comparative (relative) advantages in export, as presented by B. Balassa (in this regard, according to many economists — rather competitive advantages). The results of calculation of comparative advantages can be treated as an approximate assessment of given sector's ability to compete in international trade, and at the same time the basis for assessing its international competitive position (as it is an ex post competitiveness index, referring to its past measurement).

The objective of this article is to assess comparative advantages in Polish export of food products to the European Union compared to selected groups of non-food products. The research period covered the years 2003–2015, which is the period of Poland’s membership in the EU and the year preceding accession.

The article consists of the introduction, five chapters, as well as a discussion and conclusions. The first chapter includes a review of the literature, in which two basic approaches to comparative advantages in international trade are distinguished and characterised. The next chapter discusses the applied research method, i.e. the formula and interpretation of the revealed comparative advantage index in export according to B. Balassa. The third chapter shows the importance of trade in food products in Poland's foreign trade in general, and the fourth chapter presents Polish trade in food products and other groups of products with the European Union. The next

chapter includes the results of the analysis of Poland's comparative advantages in export of food products to the EU compared to export of non-food products, carried out on the basis of the above-mentioned RCA index. The article ends with a discussion and conclusions which includes the most important conclusions resulting from this research and suggestions for future research in this area.

Literature review

The term comparative (relative) advantage was introduced to international economics in the early 19th century by D. Ricardo. The approach, according to which the driving force of international trade is exclusively the diversification of the labour productivity on an international scale, is known in the literature of the subject as the Ricardian model. According to this model, trade between two countries may be beneficial for both if each of them exports the commodities in production of which it has comparative advantages. The country has comparative advantage in production of a given commodity when the alternative production cost in terms of other commodities in this country is lower than in other countries. International trade results in increasing global production, because it allows the countries to specialise in manufacturing commodities in which they have comparative advantages (Krugman & Obstfeld, 2003, pp. 10–37). In this situation, each country participating in international trade gains benefits, i.e. the production volumes in each of these countries are higher than if there was no trade between them.

Pursuant to this theory, a given country may benefit by trade even if it does not have absolute advantage in production of any commodity. It is enough for it to have a relative advantage in the production of a selected commodity in order for it to be able to export it. Thus, in this theory we do not compare the level of unit costs of manufacturing the same commodity in two countries, but we compare a ratio of unit costs of manufacturing two selected products in two countries.

The theory of comparative advantage has been repeatedly verified. The best known attempt to do so, based on the analysis of the export and labour productivity, was made by G.D.A MacDougall who, in 1951, carried out a detailed analysis of trade between the United States and Great Britain. The analysis confirmed the validity of the D. Ricardo's theory. Similarly, empirical studies carried out in the following years by other authors, inter alia, R. M. Stern [1962] and B. Balassa [1963], confirmed the correctness of the theory of comparative costs (Budnikowski, 2017, pp. 64–65).

Beside the Ricardian comparative advantages, there is also another type of comparative advantage functioning in the literature, i.e. B. Balassy's advantage (1965, pp. 99–123). M. Guzek, analysing both types of advantages, states that the comparative advantage in the Ricardian sense results from the criterion of profitability of export of one field compared to other fields, and at the same time compared to abroad. However, a low comparative advantage does not mean that a given product cannot be exported. It shows low predispositions of a given country to specialisation in comparison with other countries. The comparative advantage of B. Balassa's type follows from the application of the export size criterion in comparison with other fields and at the same time with abroad (Guzek, 2004, p. 49). According to B. Balassa, high advantages can thus be revealed not only with high profitability of production and export of a given product group of the analysed country but also with low profitability. The analysis of comparative advantages according to B. Balassa can be treated as an approximation of the country's ability to compete in international trade, and at the same time a basis for assessing the current competitive position of this country and its changes in the past. For this reason, J. Misala is of the opinion that comparative advantages in this approach are rather competitive advantages (Misala, 2011, p. 166). Nowadays, the constantly developed theory of B. Balassa and the methods of studying comparative advantages proposed by him are the canon of international competitiveness research in the area of foreign trade.

Despite the unquestionable qualities of the theory of comparative costs, due to the complexity of processes occurring in the contemporary economy, it is not possible to present the directions and intensity of changes in trade flows using only one theory of international trade. When trying to answer why one country is more successful in exporting and more competitive than the other, we should search for new and new exogenous variables of trade.

Research methodology

The index commonly used to assess the sector competitiveness, based on the D. Ricardo’s model and on other models, is the revealed comparative advantage index suggested by B. Balassa. Studying revealed comparative advantages according to B. Balassa consists in determining whether the share of a given product in the export of a given country is higher (lower) than the share of this product in global export to the specific market. The extensive use of this index, as a competitiveness indicator, results from its simple formula which naturally answers the question in what commodity

groups a given country has comparative advantages (Ambroziak *et al*., 2014, pp. 55–59). Moreover, attention is drawn to the low sensitivity of the formula of this index to differences in the growth and phase of the economic cycle between the analysed countries as these phenomena affect both the numerator and denominator of the formula (Hartigan, 1981, pp. 65–109).

The B. Balassa's revealed comparative advantage (RCA) index is defined by the following formula (Balassa, 1977, pp. 327–344):

$$RCA_{ij} = \frac{X_{ij}}{\sum_{i=1}^{N} X_{ij}} : \frac{X_{iw}}{\sum_{i=1}^{N} X_{iw}} \tag{1}$$

where:
RCA_{ij} – revealed comparative advantage index in Polish export of the i^{th} commodity group to the j^{th} market,
X_{ij} – Polish export of the i^{th} commodity group to the j^{th} market,
X_{iw} – global export of the i^{th} commodity group to the j^{th} market,
N – number of commodity groups (here: entire export).

The RCA index takes on the values from zero to infinity, whereby we identify two differently interpreted intervals. When the index is higher than 1 (the share of a given commodity group in the export of the analysed country is higher than the corresponding share in global export), the analysed country has revealed comparative advantages in export to the specific market. On the contrary, when the index is lower than 1 (the share of a given commodity group in the export of the analysed country is lower than the share of this group in global export), the analysed country does not have any revealed comparative advantage in the export to the specific market. Therefore, the presence or absence of revealed comparative advantages will be determined by whether the share of a given product in the export of the analysed country to the selected market is higher or lower than the corresponding share of this product in the export of all countries of the world to this market.

Slightly different interpretation of this index was suggested by Hinloopen and Marrewijk (2001, pp. 1–35) who divided the RCA index into four classes: absence of revealed comparative advantage ($0<RCA\leq1$), weak revealed comparative advantage ($1<RCA\leq2$), average revealed comparative advantage ($2<RCA\leq4$) and strong revealed comparative advantage ($RCA>4$). This suggestion was based on the analysis of distributions of the RCA indices among the European Union countries. In further studies, however, it was not commonly used.

Although the RCA index is one of the most popular indicators of the international competitiveness, it is also one of the most often criticised indicators of this competitiveness. For example, D. Neven indicated that that the index distorts the actual level of export specialisation if trade between the countries is strongly imbalanced, and he suggested the corrected revealed comparative advantage — CRCA (Neven, 1995, pp. 622–632). The RCA index is also sensitive to the level of source data disaggregation and the choice of a baseline year (Olczyk, 2008, p. 62). Another criticised feature of this index is its asymmetric distribution and the absence of the absolute upper limit which resulted in several modifications in the formula of this index giving the symmetric distribution and closed interval [-1, 1] — RSCA (inter alia, Brasili *et al.*, 2000, pp. 233–258). This transformation of the RCA index does not bring interpretation benefits, however, it is used in some studies on international trade (Widodo, 2009, pp. 57–82).

In this study, the RCA indices have been designated in Polish export of food products to the European Union market. The analogous indices have been applied to the analysis of trade in products of other sectors of the Polish economy (by HS section) with the EU. The period covered by the study is from 2003 to 2015.

In the graphical manner (Figures 1, 6) the RCA indices in the Polish export to the EU market have been analysed by HS sections (HS sections I-XX) in 2015 and their changes in the years 2003–2015. The horizontal axis of the diagram shows the RCA index values in 2015 (in this case, $0<RCA<3$) and the vertical axis — the changes in the values of this index in the years 2003–2015 (within the interval of [-1, +1]. A combination of these two values enabled dividing the diagram into four fields:

A – RCA index > 1 in 2015 and its improvement in the years 2003–2015,
B – RCA index > 1 in 2015 and its deterioration in the years 2003–2015,
C – RCA index < 1 in 2015 and its improvement in the years 2003–2015,
D – RCA index < 1 in 2015 and its deterioration in the years 2003–2015.

Field A contains those sections of products in which, during the EU membership, the competitive position strengthened, and which in 2015 had revealed comparative advantages in export. Field B covers those groups of products whose competitive position deteriorated in the analysed period yet managed to maintain revealed comparative advantages in export. On the other hand, Field C contains those sections of products which, despite having improved the competitive position after the accession, did not manage to achieve revealed comparative advantages in 2015. In turn, Field D covers those groups of commodities in which the competitive position deteriorated, with the absence of revealed comparative advantages in 2015.

The assessment of revealed comparative advantages in the export to the EU, carried out based on the RCA index, was preceded by a short analysis of changes in foreign trade in products of the food sector and other sectors of the economy against a background of Polish trade in total and an analysis of the balance of trade in these products against a background of the national trade balance. The analysis covered Polish foreign trade with the European Union.

The data source was the WITS-Comtrade commercial database in which trade flows are expressed in USD. The analysis was carried out at the level of HS sections. The term "food products" covers the following HS sections: I — live animals and animal products, II — vegetable products, III — fats and oils and IV — prepared foodstuffs1. The remaining 16 HS sections cover products from non-food sectors 2.

Role of food products in Polish foreign trade

Trade in food products (HS sections I–IV) plays an important role in Polish foreign trade in total. The share of export of these products in total Polish export prior to the Polish membership in the EU was at the level of 8–9%, then it rose to about 11–12% and in the years 2013–2015 exceeded 13%. The share of import of food products in the total Polish import was lower. In the years 2003–2008 it was about 6–7%, in 2009 exceeded 9% and since 2013 it has been about 9% (Figure 2). The difference to the benefit of export in the analysed period was usually increasing, and in 2015 amounted to 4.2 percentage point (p.p.).

The food sector is one of few branches of the national economy which achieves the positive trade balance. The surplus in trade in food products had a positive impact on the balance in total Polish foreign trade (negative

[1] Section I covers the following chapters: 01. Live animals; 02. Meat and edible meat offal; 03. Fish and seafood; 04. Dairy products and eggs; 05. Other animal products. Section II covers the following chapters: 06. Live plants and cut flowers; 07. Vegetables; 08. Fruit and nuts; 09. Coffee, tea, spices; 10. Cereals; 11. Products of the milling industry, malt, starches; 12. Oil seeds and oleaginous fruits; 13. Vegetable extracts; 14. Other vegetable products. Section III covers the following chapter: 15. Animal or vegetable fats and oils. Section IV covers the following chapters: 16. Preparations of meat and fish; 17. Sugars and sugar confectionery; 18. Cocoa and cocoa preparations; 19. Preparations of cereals, pastrycooks' products; 20. Preparations of fruit and vegetables; 21. Miscellaneous edible preparations; 22. Beverages and spirits; 23. Residues and animal fodder; 24. Tobacco and manufactured tobacco substitutes.

[2] The last section (XXI — works of art, collectors' pieces and antiques) due to the marginal relevance to foreign trade has been included into the item „Other".

until 2014), but due to its relatively low level (when compared to the deficit in trade in other products) it had no decisive impact on the changes in that balance (Figure 3). Not until 2015 did the surplus in trade in food products (USD 8.5 billion) cover the deficit in trade in products of other sectors which was clearly lower in that year (USD -3.7 billion).

For many years, trading links between the Polish food sector and foreign markets have been asymmetric (Szczepaniak, 2017, pp. 57–59), i.e. the dominant partners in this trade are permanently the European Union Member States (Figure 4). This results from the full integration of Poland with the EU, which assumes the free movement of commodities, services, capital and persons within the Community. National food producers meeting the specific sanitary, veterinary, phytosanitary and animal welfare and environmental standards, have been granted unlimited access to the large and wealthy outlet market (Szczepaniak, 2016b, p. 485). In 2015, the EU share in the export of Polish food products amounted to 81.6% (over 12 p.p. more than in 2003) and in the import — 67.5% (nearly 5 p.p. more than in 2003).

The positive balance of trade in food with the Community countries reached the level of almost USD 9.4 billion (in 2003, it was less than USD 0.6 billion). In the entire analysed period, the surplus in trade in food products with the EU more than compensated for the deficit in trade with the non-EU countries (Figure 5). This significant share of the European Union in the geographical structure of export and import and such value of the balance of trade with the EU countries, growing year by year, show that the Polish food sector is competitive and has undoubtedly succeeded in the European Union market.

Therefore, it may be surely stated that trade in food products is a very important part of Polish foreign trade. The share of food export in total export is higher than that of food import in total import and the annual average growth rate of Polish food export to the global market is clearly higher than that of total Polish export. The food sector, as a branch of the economy which achieves the positive trade balance, is of great importance for the national trade balance. In the Polish trade in food products, the key role is played by trade with the European Union Member States.

Polish foreign trade in food products with the European Union against a background of trade in other product groups

In the years 2003–2015, food products (HS sections I-IV) were one of the most important commodity groups in Polish foreign trade with the European Union. In the following years, the importance of that product group was

regularly growing and in 2015, the share of food in Polish export to the EU amounted to 13.6% (when compared to 7.0% in 2003 and 11.5% in 2009), and in import — 10.3% (when compared to 5.3% in 2003 and 9.5% in 2009). Among the individual sections forming this commodity group, the highest share both in export to the EU and in import from the EU was that of prepared foodstuffs (IV), followed by live animals and animal products (I) and vegetable products (II). In all those sections of production, Poland was a major net exporter, whereby the largest in the prepared foodstuffs section. The share of fats and oils (III) in trade was minimal, and Poland remained their permanent structural net importer (Tables 1, 2, 3).

Other major commodity groups (HS section) in Polish foreign trade with the European Union were machinery and mechanical appliances (XVI), transport equipment (XVII), base metals and metallurgical products (XV), plastics and articles thereof (VII), chemical products (VI) and miscellaneous manufactured articles (XX). In 2015, those groups accounted for nearly 69% of Polish export to the EU and 74% of Polish import from the EU (Tables 1, 2, 3).

The section "machinery and mechanical appliances" plays the most important role in Polish trade with the European Union. In the years 2003–2015, the value of export of machinery and mechanical appliances increased more than 3.5 times, to USD 38.0 billion and of import — more than twice, to USD 26.5 billion. Therefore, the share of machinery and mechanical appliances in the Polish export to the EU increased by 0.7 p.p., i.e. to 24.8%, and in import it decreased by 1.8 p.p., i.e. to 23.7%. By 2005, Poland had been a net importer of machinery and mechanical appliances from the EU, and since 2006 it has been their net exporter (in 2015, the surplus in trade in these products exceeded USD 11.5 billion).

The section "transport equipment" is another important commodity group in the Polish foreign trade with the European Union. And although in the years 2003-2015, its share both in export and import decreased (by 1.6 and 1.4%, respectively), it still remained significant and amounted to: in export — 13.5% and in import — 13.2%. In the analysed period, the value of export of transport equipment to the EU increased more than three times, and at the end of that period amounted to about USD 20.7 billion. Changes in the import were smaller, as its value increased more than twice to USD 14.8 billion. Since 2004, more and more often Poland has been recording the surplus in trade in transport equipment with the EU.

Another commodity group in Polish export to the European Union is "base metals and metallurgical products," whose share in the years 2003–2015 was 10–11%. In import from the EU, the share of this group was slightly higher and amounted to 11–13%. In the analysed period, the im-

portance of this product group in export to the EU slightly decreased (by 1.5 p.p.), and in import it increased (by 1.3 p.p.). The value of export of base metals and metallurgical products increased more than three times, to about USD 10.1 billion. The value of import increased more than 2.5 times, to about USD 12.7 billion. Polish balance of trade in this product group with the EU has been positive only since 2011.

The importance of "plastics and articles thereof in Polish export to the EU was increasing for most of the analysed period, from 5.4% in 2003 to 7.3% in 2015. In the import from the EU, their share was slightly higher and ranged from 9.5 to 10.5%. In the years 2003-2015, the value of export of plastics and articles thereof increased fivefold times, to about USD 11.14 billion. The value of import of those products was increasing more slowly, as 2.5 times, to about USD 11.13 billion in 2015. In almost all the analysed period (2003–2014), Poland recorded a deficit in trade in plastics and articles thereof with the EU, only in 2015 it generated a small surplus (USD 0.01 billion).

The importance of the section "chemical products" in Polish export to the European Union was similar to that of plastics and articles thereof. In the years 2003–2015, its share increased from 4.4% to 6.2%. The share of chemical products in Polish import with the EU was within the limits of 12–13%. In the analysed period, the value of export of chemical products increased nearly fivefold and in 2015 reached almost USD 9.5 billion. In turn, the value of their import increased nearly 2.5 times, to USD 13.6 billion. In the analysed period, Poland recorded permanent deficit in trade in chemical products with the EU.

"Miscellaneous manufactured articles" played an important role, first of all, in the Polish export to the European Union, as in 2015 their share was 6.9%. In import, the share of this product section was lower and reached 2.0%. The value of both trade flows in the analysed period increased nearly 3.5 and 2.5 times, respectively, export — to USD 10.6 billion, and import — to USD 2.2 billion. All the time, Poland recorded positive balance in trade in miscellaneous manufactured articles with the EU.

The analysis of the results of the Polish foreign trade with the European Union, carried out according to the major product groups, allows to conclude that food products are among the most important commodity sections in the Polish foreign trade with the EU, both in terms of export and import. Higher or similar share in export is only that of machinery and mechanical appliances and transport equipment, and in import, in addition to machinery and mechanical appliances and transport equipment, also base metals and metallurgical products, chemical products as well as plastics and articles thereof. In the years 2003–2015, the growth rate of foreign trade in food

products with the EU was also much higher than that of other commodity groups. In trade in food with the European Union, Poland achieved a high and quickly increasing surplus (relatively comparable balance was generated only by trade in machinery and mechanical appliances and miscellaneous manufactured articles), which positively affected the national trade and payment balance.

Assessment of Polish comparative advantages in export of food products to the European Union against a background of export of other product groups based on the RCA index

In 2015, the revealed comparative advantages (RCA) index of Polish export of food products to the European Union amounted to 1.35, which means that the share of this product group in total Polish export was 35% higher than the share of these products in export of all countries of the world (Table 4). When compared to 2003, as well as to 2009, there was a significant increase in revealed comparative advantages in the Polish export to the EU (in those years, the RCA index was 0.80 and 1.17, respectively), which points to a definite improvement in the competitive position of Polish food producers in the EU market. In 2015, among four HS sections covering food products, the RCA indices higher than 1 occurred in the group of animal products (1.70) and prepared foodstuffs (1.52). Those sections accounted for 10.8% of Polish export to the EU. In the remaining sections covering food products (vegetable products and fats and oils), the RCA indices were lower than 1, and therefore the share of those product groups in the total Polish export was lower than the share of those products in global export (by 14% and 13%, respectively).

In 2015, in export of products of other sectors Poland held revealed comparative advantages in export to the European Union, as measured by the RCA index, in 8 out of 16 HS sections, which in total accounted for 69.9% of the Polish export to the EU. Among them, there were sections of various importance for Polish export, with both relatively high and low levels of technological advancement. The highest revealed comparative advantage index in export was characteristic of such production sections as: miscellaneous manufactured articles (2.68), wood and articles of wood (2.41), articles of stone, ceramic products, glass (1.70), pulp of wood, paper and articles thereof (1.56) as well as plastics and articles thereof (1.41). Their total share in the Polish export reached 21.5%. All three sections with the highest share in Polish export to the EU (machinery and mechanical appliances, transport equipment and base metals and metallurgical prod-

ucts) were also characterised by the RCA index exceeding 1, which means that Poland held comparative advantages in export of these products to the EU market.

In the years 2003-2015, the revealed comparative advantages (RCA) indices in export to the EU increased in all groups of food products — minimally in the group of vegetable products (by 0.01 point), and quite significantly in the remaining three product sections, i.e. the group of animal products (0.83 p.), fats and oils (0.76 p.) and prepared foodstuffs (by 0.75 p.). Among products of other sectors in the analysed period the RCA indices in export to the EU increased in 6 out of 16 HS sections, most significantly in case of arms and ammunition (by 0.41 p.), followed by pulp of wood, paper and articles thereof (by 0.37 p.) and plastics and articles thereof (by 0.28 p.). In the same period, there was a significant decrease in the RCA index in export of miscellaneous manufactured articles (by 0.98 p.), wood and articles of wood (by 0.81 p.) and Hides and skins and articles thereof (by 0.76 p.) to the EU — cf. Figure 6.

Among food products, Field A included animal products (I) and prepared foodstuffs (IV). In these product sections, there were, in fact, comparative advantages in export to the EU in 2015, and they got stronger during the Polish membership in the Community. The other two sections of food products, i.e. vegetable products (II) and fats and oils (III) were included in Field C. This means that despite the increased competitive position following the accession, revealed comparative advantages in export of those products to the EU in 2015 were not achieved.

Discussion

The article assessed comparative advantages in the Polish export of food and non-food products to the EU. The analysis, which uses the revealed comparative advantage index, shows that Poland has comparative advantages in export of food to the EU market. These conclusions are consistent with the findings of other authors (inter alia, Pawlak & Poczta, 2011, p. 145; Marks-Bielska *et al*., 2015, p. 759). However, literature on the subject has been lacking comparative studies on comparative advantages in Polish export of food products to the EU compared to other product groups. This study fills the gap in this area and proves that, compared to non-food products, export of Polish food also has significant comparative advantages.

Conclusions

In the years 2003–2015, the value of Polish trade in food products increased more than fivefold, reaching nearly USD 43 billion in 2015. In the same period, export of food increased almost six-fold — to USD 25.6 billion, and its import increased nearly 4.5 times — to USD 17.1 billion. The food sector was one of few sectors of the national economy with the positive balance of trade. The Polish surplus in food trade, against the deficit in trade in non-food products, had a positive impact on the national trade balance. However, due to its level, it had no decisive impact on the changes in that balance in most years. Not until 2015 did the surplus in trade in food products (USD 8.5 billion) cover the deficit in trade in products of other sectors, which was clearly lower in that year (USD -3.7 billion) and the balance of total Polish foreign trade for the first time had a positive value (Szczepaniak, 2016a, pp. 31–76).

For many years, the European Union Member States have remained the most important Polish partners in food trade (in 2015, their share in export amounted to 81.6% and in import — 67.5%). Food products also belong to the basic commodity groups in Polish foreign trade with the European Union, both in terms of export and import (in 2015, their share was 13.6% and 10.3%, respectively).

Polish export to the EU was characterised by a diversified level of comparative advantages, as measured by the RCA index. Among 20 HS sections, in 2015 Poland held revealed comparative advantages in export of products to the EU in 10 sections (2 food and 8 non-food). Food products accounted for 11% of the value of Polish export to the EU and non-food products — 70%. Those sections generated the surplus amounting to USD 8.4 billion and 31.2 billion, respectively.

The development of Polish foreign trade in food products during the Polish membership in the European Union, as well as quite high and growing comparative advantages in export of these products to the EU — when compared to non-food products — point to the competitiveness and great importance of the Polish food sector for the national economy.

Future studies of comparative advantages in Poland's foreign trade in food products should take into consideration the application of the indicators being a modification of the revealed comparative advantage index of B. Balassa, e.g. the relative trade advantage (RTA) index. An analysis based on the RTA index would have a more comprehensive character, as it would also take into account the situation in both export and import of the country (Wijnands & Verhoog, 2016, p. 16).

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Annex

Table 1. Polish export to the European Union in the years 2003–2015, by HS section

Number and name of the HS section	2003	2009	2014	2015		
	Share in %				in million USD	change 2003 = 100
Total	**100.0**	**100.0**	**100.0**	**100.0**	**153,246.1**	**351.7**
Food products	**7.0**	**11.5**	**13.4**	**13.6**	**20,889.1**	**680.2**
I. Live animals and animal products	2.1	3.9	4.4	4.3	6,602.5	718.5
II. Vegetable products	2.0	2.1	2.3	2.4	3,718.7	425.2
III. Fats and oils	0.0	0.3	0.4	0.4	623.7	4,158.0
IV. Prepared foodstuffs	2.9	5.3	6.3	6.5	9,944.2	787.7
Other products	**93.0**	**88.5**	**86.6**	**86.4**	**132,357.0**	**326.8**
V. Mineral products	5.1	3.4	4.5	3.7	5,654.7	254.9
VI. Chemical products	4.4	5.0	6.6	6.2	9,483.2	490.2
VII. Plastics and articles thereof	5.4	6.1	7.3	7.3	11,139.0	476.6
VIII. Hides and skins and articles thereof	1.0	0.4	0.4	0.5	713.6	172.0
IX. Wood and articles of wood	3.5	2.1	2.2	2.2	3,334.7	215.7
X. Pulp of wood, paper and articles thereof	3.4	2.7	3.0	3.2	4,878.3	324.8
XI. Textiles and textile articles	6.7	3.6	3.6	3.8	5,778.0	197.9
XII. Footwear, headgear	0.6	0.3	0.5	0.6	925.8	378.2
XIII. Articles of stone, ceramic products, glass	2.2	1.8	2.0	1.9	2,943.7	309.4
XIV. Precious metals and stones, pearls and articles thereof	0.4	0.6	0.6	0.5	778.9	433.9
XV. Base metals and metallurgical products	11.6	9.6	10.9	10.1	15,488.9	306.7
XVI. Machinery and mechanical appliances	24.1	25.9	24.2	24.8	38,038.9	362.8
XVII. Transport equipment	15.1	17.8	13.1	13.5	20,679.2	313.6
XVIII. Optical instruments and apparatus	0.7	0.8	1.0	1.2	1,908.8	593.5
XIX. Arms and ammunition	0.0	0.0	0.0	0.0	30.0	4,285.7
XX. Miscellaneous manufactured articles	8.7	6.3	6.6	6.9	10,578.3	278.9
Other (Section XXI. And others)	0.0	2.0	0.0	0.0	2.8	31.5

Source: own calculations based on the WITS-Comtrade data.

Table 2. Polish import from the European Union in the years 2003–2015, by HS section

Number and name of the HS section	2003	2009	2014	2015		
	Share in %				in million USD	change 2003 = 100
Total	**100.0**	**100.0**	**100.0**	**100.0**	**111,816.1**	**238.5**
Food products	**5.3**	**9.5**	**10.5**	**10.3**	**11,510.3**	**464.4**
I. Live animals and animal products	0.5	2.7	3.4	3.1	3,473.3	1,369.6
II. Vegetable products	1.8	2.5	2.3	2.4	2,629.6	312.3
III. Fats and oils	0.4	0.5	0.7	0.6	684.2	329.1
IV. Prepared foodstuffs	2.5	3.8	4.1	4.2	4,723.3	402.1
Other products	**94.7**	**90.5**	**89.5**	**89.7**	**100,305.8**	**225.9**
V. Mineral products	2.3	4.2	3.2	2.7	3,028.5	276.0
VI. Chemical products	12.3	13.0	12.8	12.2	13,630.4	237.2
VII. Plastics and articles thereof	9.5	9.3	10.5	10.0	11,129.7	249.5
VIII. Hides and skins and articles thereof	1.1	0.5	0.6	0.6	709.0	132.7
IX. Wood and articles of wood	1.0	0.9	0.9	0.7	814.6	177.5
X. Pulp of wood, paper and articles thereof	4.8	4.0	4.2	4.3	4,827.4	215.5
XI. Textiles and textile articles	5.9	3.5	3.2	3.3	3,687.1	132.4
XII. Footwear, headgear	0.4	0.2	0.4	0.5	557.7	337.8
XIII. Articles of stone, ceramic products, glass	2.1	1.5	1.3	1.3	1,442.9	143.4
XIV. Precious metals and stones, pearls and articles thereof	0.1	0.2	0.2	0.2	236.1	460.2
XV. Base metals and metallurgical products	11.4	12.1	13.3	12.7	14,194.2	264.8
XVI. Machinery and mechanical appliances	25.5	23.0	21.8	23.7	26,488.3	221.9
XVII. Transport equipment	14.6	11.6	13.0	13.2	14,766.1	215.1
XVIII. Optical instruments and apparatus	1.6	2.0	1.8	2.0	2,194.8	293.3
XIX. Arms and ammunition	0.0	0.0	0.0	0.0	51.7	297.1
XX. Miscellaneous manufactured articles	2.0	1.7	1.8	2.0	2,210.1	241.5
Other (Section XXI. And others)	0.0	2.7	0.5	0.3	337.3	1,492.5

Source: own calculations based on the WITS-Comtrade data.

Table 3. Balance of trade of Poland with the European Union in the years 2003–2015, by HS sections

Number and name of the HS section	2003	2009	2014	2015
	in million USD			
Total	**-3,317.2**	**16,538.9**	**38,949.1**	**41,430.0**
Food products	**592.5**	**3,808.3**	**8,838.3**	**9,378.7**
I. Live animals and animal products	665.3	1,705.4	2,977.0	3,129.3
II. Vegetable products	32.4	-35.9	845.1	1,089.1
III. Fats and oils	-192.9	-98.0	-141.5	-60.5
IV. Prepared foodstuffs	87.7	2,236.8	5,157.7	5,220.9
Other products	**-3,909.7**	**12,730.7**	**30,110.8**	**32,051.2**
V. Mineral products	1,120.7	-152.2	3,358.5	2,626.2
VI. Chemical products	-3,811.2	-6,586.4	-5,202.8	-4,147.2
VII. Plastics and articles thereof	-2,121.2	-2,035.6	-1,136.1	9.3
VIII. Hides and skins and articles thereof	-119.1	-35.1	-87.5	4.7
IX. Wood and articles of wood	1,086.9	1,512.6	2,610.8	2,520.1
X. Pulp of wood, paper and articles thereof	-738.2	-706.9	-208.6	50.9
XI. Textiles and textile articles	134.4	652.7	1,882.6	2,090.9
XII. Footwear, headgear	79.7	95.8	331.0	368.1
XIII. Articles of stone, ceramic products, glass	-54.5	581.4	1,591.9	1,500.8
XIV. Precious metals and stones, pearls and articles thereof	128.2	442.3	744.4	542.9
XV. Base metals and metallurgical products	-309.3	-754.6	1,282.9	1,294.8
XVI. Machinery and mechanical appliances	-1,453.9	7,007.3	12,354.2	11,550.7
XVII. Transport equipment	-270.2	8,683.6	5,234.5	5,913.1
XVIII. Optical instruments and apparatus	-426.7	-912.1	-605.9	-286.0
XIX. Arms and ammunition	-16.7	-34.6	-12.8	-21.6
XX. Miscellaneous manufactured articles	2,878.0	5,305.4	8,593.4	8,368.2
Other (Section XXI. And others)	-13.7	-333.0	-619.7	-334.5

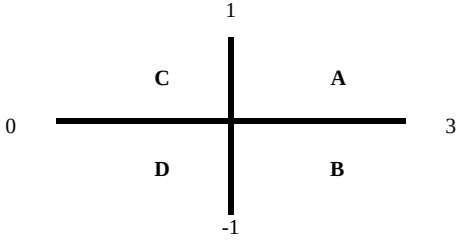
Source: own calculations based on the WITS-Comtrade data.

Table 4. Revealed comparative advantage (RCA) indices in Polish export to the European Union, in the years 2003–2015, by HS section

Number and name of the HS section	2003	2009	2014	2015	Change in the years 2003-2015 in points
Food products	**0.80**	**1.17**	**1.34**	**1.35**	**0.55**
I. Live animals and animal products	0.88	1.50	1.69	1.70	0.83
II. Vegetable products	0.85	0.78	0.84	0.86	0.01
III. Fats and oils	0.11	0.74	0.83	0.87	0.76
IV. Prepared foodstuffs	0.77	1.26	1.52	1.52	0.75
Other products	**1.02**	**0.98**	**0.96**	**0.96**	**-0.06**
V. Mineral products	0.76	0.32	0.32	0.39	-0.38
VI. Chemical products	0.42	0.43	0.59	0.53	0.11
VII. Plastics and articles thereof	1.13	1.34	1.44	1.41	0.28
VIII. Hides and skins and articles thereof	1.39	0.64	0.57	0.64	-0.76
IX. Wood and articles of wood	3.22	2.40	2.53	2.41	-0.81
X. Pulp of wood, paper and articles thereof	1.19	1.21	1.53	1.56	0.37
XI. Textiles and textile articles	1.21	0.75	0.77	0.79	-0.42
XII. Footwear, headgear	0.62	0.32	0.42	0.54	-0.08
XIII. Articles of stone, ceramic products, glass	1.71	1.62	1.87	1.70	-0.01
XIV. Precious metals and stones, pearls and articles thereof	0.33	0.35	0.32	0.29	-0.05
XV. Base metals and metallurgical products	1.66	1.35	1.40	1.31	-0.35
XVI. Machinery and mechanical appliances	0.99	1.24	1.17	1.15	0.16
XVII. Transport equipment	1.11	1.66	1.22	1.11	0.00
XVIII. Optical instruments and apparatus	0.23	0.26	0.31	0.35	0.11
XIX. Arms and ammunition	0.02	0.05	0.50	0.43	0.41
XX. Miscellaneous manufactured articles	3.66	2.60	2.85	2.68	-0.98
Other (Section XXI. and others)	0.00	0.32	0.00	0.00	0.00

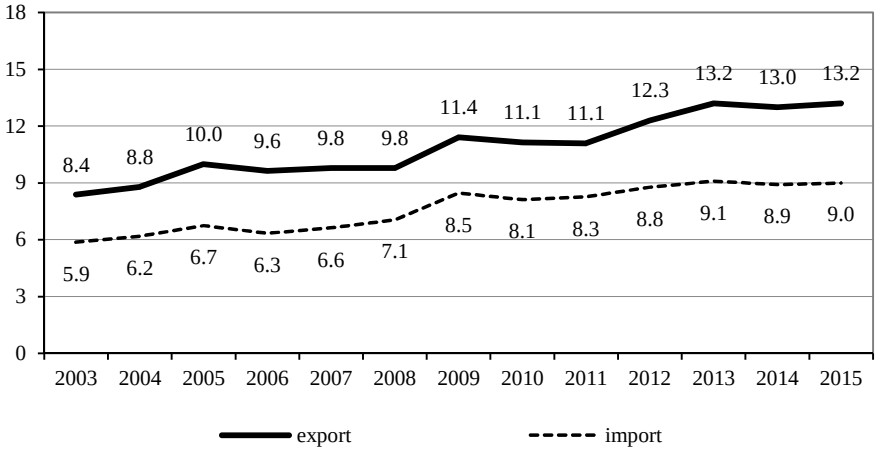
Source: own calculations based on the WITS-Comtrade data.

Figure 1. Values of the RCA index and its changes



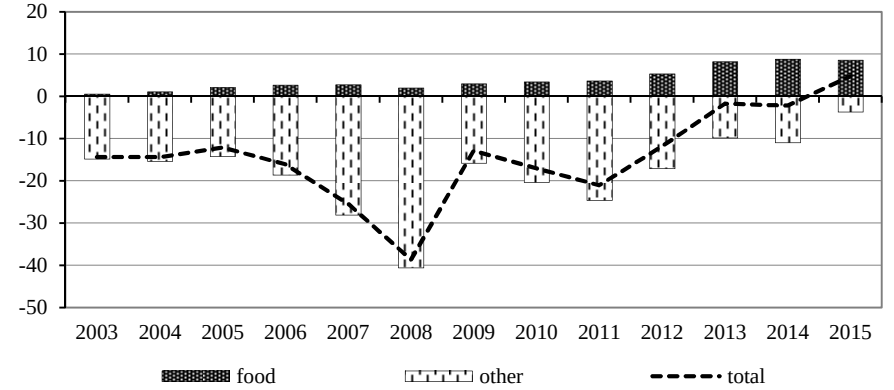
Source: own study based on Ambroziak & Szczepaniak (2011, pp. 47–51).

Figure 2. Share of food products in Polish foreign trade in total (in %)



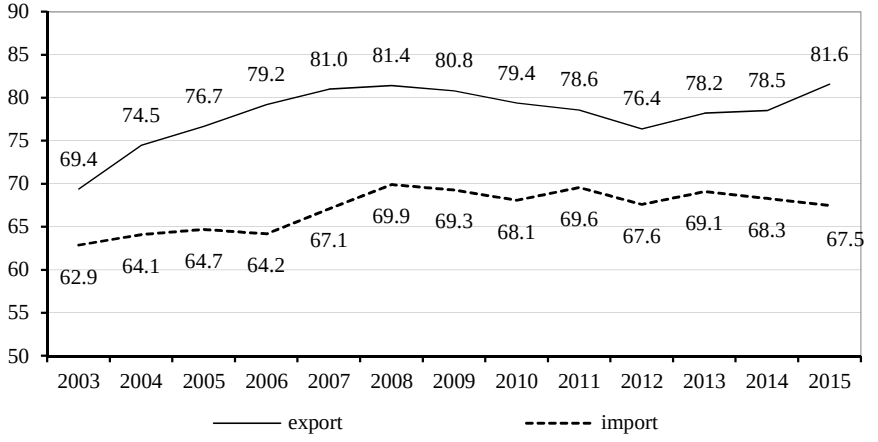
Source: own calculations based on the WITS-Comtrade data.

Figure 3. Balance of trade in food products, other products and of total Polish foreign trade (in billion USD)



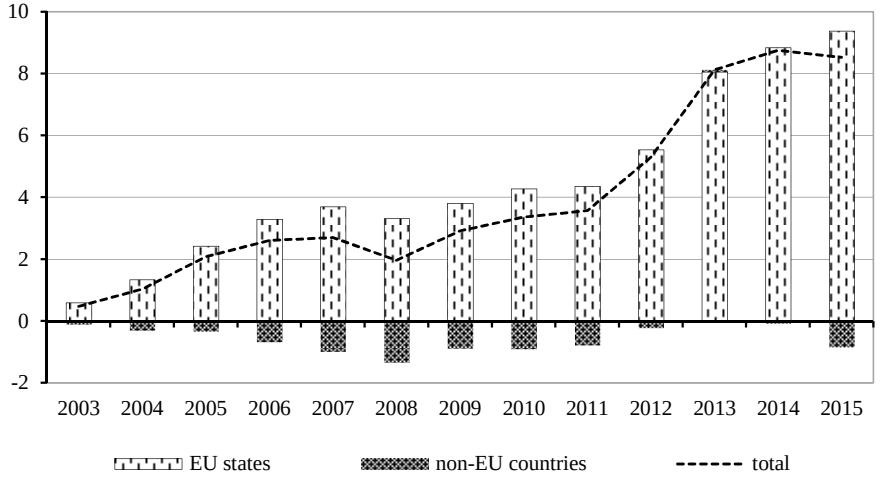
Source: own calculations based on the WITS-Comtrade data.

Figure 4. European Union share in Polish foreign trade in food products (in %)



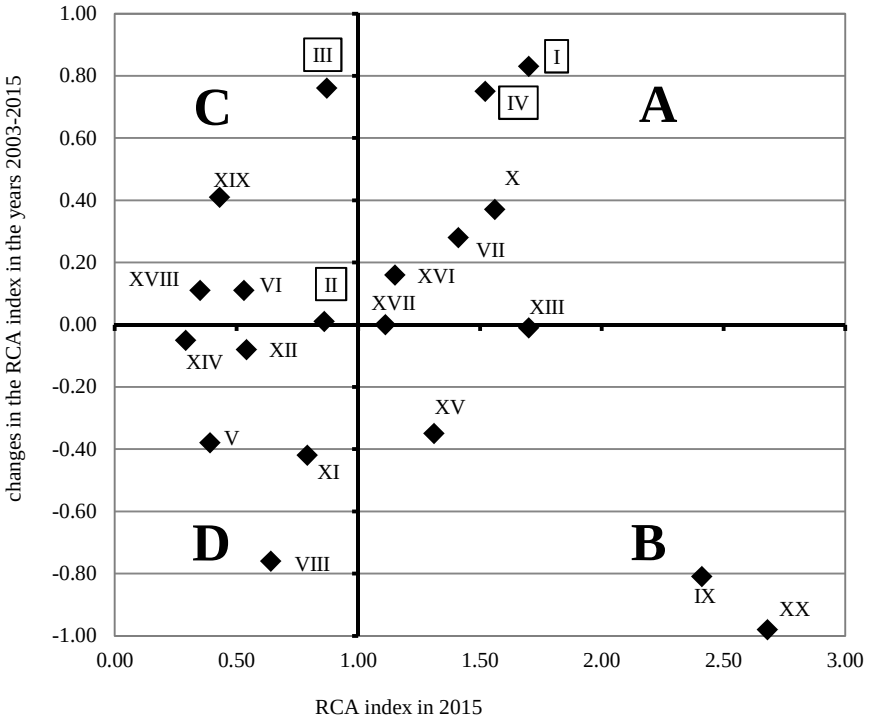
Source: own calculations based on the WITS-Comtrade data.

Figure 5. Balance of Polish foreign trade in food products with the EU countries, non-EU countries and in total (in billion USD)



Source: own calculations based on the WITS-Comtrade data.

Figure 6. The RCA indices in Polish export to the European Union in 2015 and their changes in the years 2003–2015, by HS section



Note: Description of the sections as in Tables 1–4.

Source: own calculations based on the WITS-Comtrade data.