COMPARATIVE ADVANTAGES OF THE POLISH AGRI-FOOD SECTOR ON THE US MARKET

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ABSTRACT

The aim of this paper is to identify the level and changes in comparative advantages of the Polish agri-food sector on the US market in 2004–2017. The following indicators were used in the comparative advantage analysis: Balassa's Revealed Comparative Advantage (RCA), Vollrath's Revealed Competitiveness (RC), the Revealed Symmetric Comparative Advantage (RSCA) and the Lafay's Trade Balance Index (TBI). A product mapping scheme based on the level of comparative advantage (RSCA) and export specialisation (TBI) was made. This study was supplemented with the analysis of values for the trade balance and shares of individual groups of products in the structure of Poland's exports to the US. The analyses showed that, in the years 2004–2017, Poland attained high comparative advantages in trade with these assortment groups, which were characterised by the relatively highest shares in the structure of exports to the US, as well as generated a high and frequently improving positive trade balance.

Keywords: comparative advantage, agri-food products, export, import, Poland, USA
JEL codes: F10, F14, Q17

INTRODUCTION

Competitiveness is a crucial issue in the European agri-food market, both at the regional and international level. The competitive capacity of particular economies or their sectors is affected by an extensive set of factors, which – assuming the criterion for the dependencies of respective factors on a given analysed country – may be divided into internal, directly dependent on the country, and external, more or less independent of that country. According to Sulmicki (1977), external factors are manifested in the quantitative and qualitative population size and structure, natural and capital resources, as well as applied economic governance style, whereas external factors comprise a wide range of both economic (structural, technical and technological, economic cycle) and non-economic conditions (political and institutional). Referring to the latter group of factors, one of the most significant events affecting the competitive performance of the agri-food sector, both of the EU as a regional grouping and its individual member states, was connected with EU enlargement incorporating Central and Eastern European countries in 2004. The enlargement opened free trade possibilities for 12 more countries and led to an increase in trade flows and a rise in product demand (Török and Jámbor, 2013), creating new opportunities for all EU countries, while intensifying competition

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among countries within the Single European Market, as well as markets outside the EU.

In addition to the changes in domestic policies, foreign policy resulting in the processes of negotiation or establishment of new free trade areas, has had a considerable impact on the competitive position of the agri-food sectors of EU member states, including Poland. Next to the EU-Canada Comprehensive Economic and Trade Agreement and free trade agreements negotiated with South Korea, Singapore, Vietnam and the Ukraine, the Transatlantic Trade and Investment Partnership (TTIP) has gained particular attention of the general public in EU countries. In Europe, the liberalisation of agricultural and food trade has been in the centre of the debate. The abolishment of trade barriers would give both the US and the EU an opportunity to increase their market shares and strengthen their international competitive position (Francois et al., 2013; Bureau et al., 2014). However, at the same time, in view of the differences in the production potential of the agricultural sector in EU member countries and the US (Pawlak, 2015) as well as cost leadership of American producers, questions have been raised whether in the free trade area EU producers will be able to meet the challenge of competitive pressure imposed by US agriculture. Such concerns have also been voiced in relation to the agricultural sector in Poland, characterised by less favourable production ratios, lower labour and capital productivity, as well as a lower scale of market concentration processes than observed in the US agricultural sector. Simulation analyses show that the establishment of the free trade area between the EU and US may result in the effect of the creation of Polish-American agri-food trade while the impact of the TTIP agreement on Poland's trade with other main partners may be limited (Hagemejer, Michałek and Pawlak, 2016). In view of the above, it is crucial to identify the key groups of products in agri-food trade between Poland and the US and those with comparative advantages, which may potentially become the foundation of an advantageous export specialisation. Thus, the aim of this paper is to identify the level and changes in comparative advantages of the Polish agri-food sector on the US market in 2004–2017.

THEORETICAL BACKGROUND

The concept of competitiveness does not have one universally applicable definition. Competitiveness is a relative, multidimensional concept and can be assessed for different time horizons, on different entity levels and based on different theories (Porter, 1990; Siggel, 2006; Latruffe, 2010; Pawlak, 2013). According to Porter (1990), sustainable competitive advantage is the fundamental source for above-average performance in the long run. In line with Porter's viewpoints, in this paper, competitiveness of the agri-food industry is defined as the sustained ability to attain profitable gains and maintain market share in export markets, in which the industry is active (cf. Wijnands, van Berkum and Verhoog, 2015).

As competitiveness is a broad concept there is no general agreement on how to measure it precisely. Measurement can identify revealed performance, relying on such indicators as market performance, trade success, revealed comparative advantage indicators, etc. (Latruffe, 2010). The trade theory suggests that a nation's competitiveness is based on the concept of comparative advantage. It should be stressed here that the development of contemporary theories of trade did not limit the importance of the classical concept for comparative advantages in the explanation of the directions and structures of agricultural trade (Pawlak, 2013). The foundations provided by Ricardo and the Heckscher-Ohlin model, with the assumptions of free, unrestricted trade and perfectly competitive markets, for the concept of the comparative advantage, postulate that trade flows are the result of differences in production possibilities between countries and that a country will specialise in the production of a good, for which it has a cost advantage (Reed and Marchant, 1992; Latruffe, 2010). Such a concept is useful when measuring international competitiveness. Trade related indicators, including revealed comparative advantage indices, are typically ex-post measures, useful to demonstrate the competitive performance of a country or a sector of national economy. Although they are not able to outline the source of the advantage, they provide a clear framework for the entire competitive situation (Siggel, 2006).

MATERIALS AND METHODS

The research was based on data of the European Statistical Office (Eurostat), retrieved from the ComExt database. The methods of descriptive analysis, analogies and comparisons, as well as the deductive approach were employed in the research.

The following indicators were used in the comparative advantage analysis: Balassa's Revealed Comparative Advantage (RCA), Vollrath's Revealed Competitiveness (RC), the Revealed Symmetric Comparative Advantage (RSCA) and the Lafay's Trade Balance Index (TBI). All above-mentioned indicators were appropriately adapted to the requirements of the analysis of bilateral relations. The first one (RCA) reflects the relation of the share of exports for the analysed product in the world/regional trade to the share of exports for the entire sector in the world/regional trade and it is determined according to the formula (Balassa, 1965): $RCA_{ij} = RXA_{ij} = = (X_{ij} / X_{ik}) / (X_{nj} / X_{nk})$, where X – export, i – analysed country, j – analysed product/group of products, k – all commodities, n – reference country/countries. Values of the RCA indicator exceeding one indicate an advantageous competitive situation, while lower values demonstrate a lack of comparative advantage. Since the Balassa index facilitates estimation of comparative advantage only based on the value of exports, in order to make the analysis more objective, Vollrath's revealed competitiveness index (RC) was also calculated, which being a difference of natural logarithms of the revealed comparative advantage in exports (RCA = RXA) and an analogously determined index of revealed comparative advantage in imports (RMA), at the same time takes into consideration the import and export situation of a given country (Vollrath, 1989): $RC_{ij} = \ln (RXA_{ij}) - \ln (RMA_{ij})$. A positive RC value indicates a competitive advantage, while its negative value shows a respective adverse competitive situation.

The next part of the analysis presented in this paper uses the 'product mapping' analytical tool. This tool facilitates the division of the entire set of exported products into four groups according to two selected indicators: RSCA and TBI (Fig. 1). The Revealed Symmetric Comparative Advantage (RSCA) by Dalum, Laursen and Villumsen (1998) is an indicator of comparative advantage and the Trade Balance Index (TBI) by Lafay (1992) is an indicator of export-import activities (Smutka et al., 2016). The RSCA index, calculated from the formula: $RSCA_{ij} = = (RCA_{ij} - 1) / (RCA_{ij} + 1)$, may fall within the interval of $[-1,1]$, with values lesser than zero indicating a lack of comparative advantage and more noticeably demonstrating such an advantage (For more information on the properties of RSCA in comparison to other measures of international trade specialization see Laursen, 2015). The TBI measure assumes values within the interval of $[-1, 1]$ and it is determined according to the formula (Lafay, 1992): $TBI_{ij} = (X_{ij} - - M_{ij}) / (X_{ij} + M_{ij})$. Positive values of the index indicate export specialisation of a given country and typically reflect a trade surplus, whereas negative values show a lack of specialisation and the net importer

RSCA > 0	**Group B** Comparative advantage Net-importer (RSCA > 0 and TBI < 0)	**Group A** Comparative advantage Net-exporter (RSCA > 0 and TBI > 0)
RSCA < 0	**Group D** Comparative disadvantage Net-importer (RSCA < 0 and TBI<0)	**Group C** Comparative disadvantage Net-exporter (RSCA < 0 and TBI > 0)
	TBI < 0	TBI > 0

Figure 1. Product mapping scheme based on the level of comparative advantage and export specialisation
Source: Widodo (2009).

position of a given country for a specific product or group of products.

The analysis of comparative advantage was conducted at the level of a group of products identified following the Combined Nomenclature (CN) in two periods of analysis: 2004–2006 and 2015–2017, which provided an answer to the question whether the commodity structure of trade in agri-food products from Poland to the US was consistent with the principle of comparative advantage and whether it may be considered rational in this respect.

RESULTS AND DISCUSSION

In 2015–2017, the value of export of agri-food products from Poland to the US reached about EUR 421 million, while the import of agri-food products from the US to Poland exceeded the value of EUR 161 million (Table 1). In 2017, for Poland, the US were the first non-EU export partner and ranked 5th in terms of imports (ComExt-Eurostat, 2018), while the value of a positive balance in bilateral turnover amounted to almost EUR 260 million. In trade, between Poland and the US, food preparations were dominant, in the years 2015–2017, accounting for almost 55% of total exports and 65% of imports (Table 1). In terms of the importance in trade structure, live animals and animal origin products ranked second. What is essential, in the years 2004–2017, the value of their exports to

the US market increased over 7-fold, to EUR 142 million, while their share in exports increased by almost 22 percentage points, reaching over 33% and proportionally reducing the importance of prepared foodstuff. In imports of agri-food products from the US an opposite trend was observed – despite an increase in the absolute import values, the importance of animal origin products decreased to the advantage of an increasing share of food industry products. However, it should be noted here that nearly 50% of the value of imports from the US market resulted from the purchase of by-products of the food industry, animal fodder, tobacco and beverages rather than basic foodstuff (Table 2).

Based on the determined RCA values, it may be stated that, in the years 2004–2006, Poland had revealed a comparative advantage on the US market in the exports of all groups of products classified at that time as key products in the structure of exports (Table 2). The most advantageous competitive situation was observed in the exports of milling industry products, preparations of meat, as well as cocoa and cocoa products. Excluding the first of the above-mentioned groups of products, in the period until 2017, comparative advantage generated in exports to the US market were considerably strengthened. Moreover, the competitive position of Poland was also significantly improved in the exports of cereal preparations, sugar confectionery and dairy products, which

Table 1. Commodity structure of trade in agri-food products between Poland and the US by CN sections in 2015––2017

CN section	Export			Import			Trade balance (EUR million)
	EUR million	%	2004–2006 = 100	EUR million	%	2004–2006 = 100	
Live animals; animal products	142.2	33.8	709.4	33.8	20.9	220.1	108.4
Vegetable products	46.1	11.0	227.1	21.1	13.1	151.2	25.0
Animal or vegetable fats and oils	1.3	0.3	155.4	2.3	1.4	190.0	−1.0
Prepared foodstuff; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes	230.9	54.9	190.1	104.3	64.6	428.0	126.6
Total	420.6	100.0	258.6	161.5	100.0	294.2	259.1

Source: ComExt-Eurostat database, own calculations.

Table 2. Comparative advantage of the Polish agri-food sector in relation to the US market and the share of individual product groups in the total value of trade between Poland and the USA

Specification	CN code	2004–2006				2015–2017			
		RCA	RC	Share in the total value of export (%)	Share in the total value of import (%)	RCA	RC	Share in the total value of export (%)	Share in the total value of import (%)
Live animals	01	3.48	2.49	0.3	0.1	1.57	0.90	0.1	0.0
Meat and edible meat offal*	02	0.11	−4.34	0.2	1.5	×	×	25.8	0.0
Fish and crustaceans, molluscs and other aquatic invertebrates	03	0.18	−3.45	3.5	19.6	0.21	−3.13	4.2	20.0
Dairy produce	04	9.42	4.49	5.2	0.6	113.82	9.47	2.3	0.0
Products of animal origin n.e.c.	05	0.51	−1.37	3.1	6.2	1.68	1.04	1.5	0.9
Live trees and other plants	06	2.94	2.15	0.6	0.2	2.02	1.41	0.2	0.1
Edible vegetables	07	4.42	2.97	1.5	0.3	8.29	4.23	3.6	0.4
Edible fruit and nuts	08	0.06	−5.65	0.8	13.8	0.08	−4.97	0.6	7.6
Coffee, tea, maté and spices	09	1.90	1.28	0.5	0.3	102.85	9.27	1.1	0.0
Cereals	10	0.03	−7.05	0.0	1.2	0.43	−1.71	0.3	0.7
Products of the milling industry	11	164.69	10.21	8.5	0.1	116.43	9.51	4.8	0.0
Oil seeds and oleaginous fruits	12	0.08	−5.12	0.5	6.7	0.11	−4.34	0.4	3.1
Lac; gums, resins and other vegetable saps and extracts	13	0.01	−8.89	0.0	2.9	0.01	−9.35	0.0	1.0
Vegetable plaiting materials; vegetable products n.e.c.	14	0.39	−1.86	0.0	0.0	0.02	−8.18	0.0	0.0
Animal or vegetable fats and oils	15	0.23	−2.93	0.5	2.2	0.22	−3.07	0.3	1.4
Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates	16	78.60	8.73	23.2	0.3	1 288.10	14.32	14.0	0.0
Sugars and sugar confectionery	17	14.73	5.38	3.7	0.3	100.99	9.23	3.1	0.0
Cocoa and cocoa preparations	18	44.94	7.61	5.9	0.1	2 164.57	15.36	10.8	0.0
Preparations of cereals	19	15.17	5.44	5.5	0.4	221.03	10.80	3.9	0.0
Preparations of vegetables, fruit or nuts	20	12.54	5.06	7.6	0.6	1.82	1.19	8.9	4.9
Miscellaneous edible preparations	21	0.15	−3.76	3.7	24.1	0.24	−2.86	2.9	11.9
Beverages, spirits and vinegar	22	4.27	2.90	25.0	5.9	0.59	−1.04	10.8	18.3
Residues and waste from the food industries; prepared animal fodder	23	0.00	−11.76	0.0	3.0	0.04	−6.70	0.5	13.5
Tobacco and manufactured tobacco substitutes	24	0.00	−12.56	0.0	9.8	0.00	−17.06	0.0	15.9

* In the years 2015–2017 values of RCA and RC could not be determined due to the marginal volume of US exports to the EU, which was not recorded in Eurostat statistics.

Source: ComExt-Eurostat database, own calculations.

in the years 2015–2017 accounted jointly for almost 10% value of food exports from Poland to the US. In the years 2015–2017, a high comparative advantage was also obtained in the exports of meat and edible meat offal, generating for Poland over 1/4 of total revenue from exports of agri-food products to the US (values of RCA and RC could not be determined due to the marginal volume of US exports to the EU, which was not recorded in Eurostat statistics). In turn, the weakening comparative advantage in the exports of fruit and vegetable preparations to the US is disturbing, particularly since the exports of this group of products increased 3-fold in the analysed period, while concerns are also raised by the loss of a strong competitive position in the exports of both non-alcoholic and alcoholic beverages, which accounted for almost 11% of total food exports from Poland to the US. It needs to be stressed that, in the years 2004–2017, Poland strengthened its competitive position on the US market in the case of products, which generated almost 75% of total revenue from exports. Similar conclusions were provided

for by the analysis of values for Vollrath's revealed competitiveness indexes (RC). The level of comparative advantage, recorded in the years 2004–2017, was primarily related to the scope of market protection, including both tariff and non-tariff barriers to trade, and the changes in competitiveness in the period considered followed changes in price relations due to the exchange rate for the Polish zloty (PLN) to the US dollar (USD).

Positioning of products based on the levels of comparative advantage and the degree of export specialisation confirmed the finding that, in the years 2004–2017, Poland enjoyed a high comparative advantage in trade for these assortment groups accounting for the relatively highest shares in the structure of exports to the US, as well as generated a high and frequently improving positive trade balance (excluding beverages, spirits and vinegar; Fig. 2).

In the years 2004–2006, among products ranking high in exports to the US market (min. 3.5% value of exports), only in the case of fish and crustaceans (CN 03), a lack of comparative advantage was not
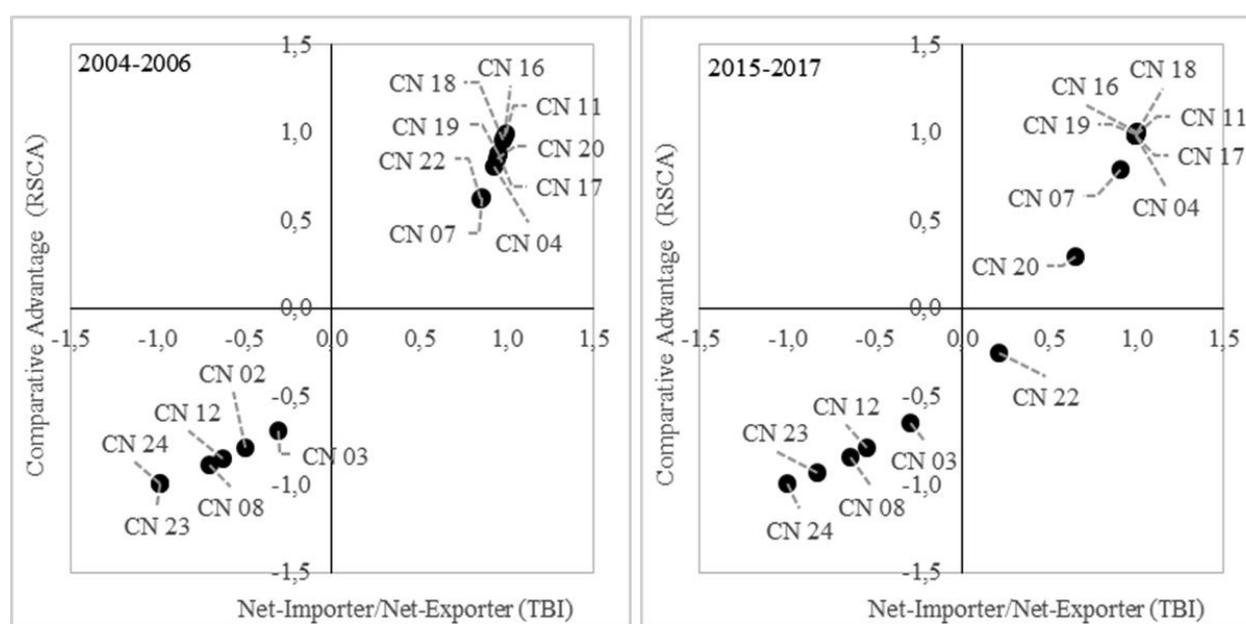

Figure 2. Product mapping scheme for selected agri-food product groups exported from Poland to the US by level of comparative advantage and export specialisation in 2004–2006 and 2015–2017 (Widodo's method)

Source: ComExt-Eurostat database, own calculations.

conducive to initiating export specialisation, while their exchange was connected with a trade deficit. In the years 2004–2006, the groups of products, in the exchange of which Poland generated the highest comparative advantage and attained the position of net exporter, accounted jointly for almost 88% of total exports of agri-food products to the US and provided a trade surplus of EUR 137.5 million, exceeding by 30% the positive total trade balance (Table 3).

Although, in the years 2015–2017, the share of the most competitive assortment groups in Polish exports to the US market decreased to 80%, in their exchange, the recorded trade balance was almost 2.5-fold greater than in the years 2004–2006 (EUR 326 million). Positioning of products according to the Widodo method also confirmed the weakening of the competitive position of Poland in the exports of fruit and vegetable preparations (CN 20) and beverages and spirits (CN 22) to the US, i.e. the findings resulting from the analysis of the Balassa and Vollrath's indexes. While the latter groups of products recently still generated a positive trade balance, in comparison to the years 2004–2006, it was decreasing, thus Poland was losing its previous comparative advantage. The assortment groups, for which due to a lack of advantage no export specialisation was attempted (CN 03, CN 08, CN 12, CN 23, CN 24), in both analysed periods were imported, accounting for 85% (2004––2006) and 75% (2015–2017) of total expenditure for food imports from the US. The value of imports for these groups of products exceeded the value of their exports by over EUR 83 million and by approx. 1/3 reduced the total value of trade balance.

CONCLUSIONS

The analyses showed that, in the years 2004–2017, Poland attained a high comparative advantage in trade with assortment groups which were characterised by the relatively highest shares in structure of exports to the US, as well as generated a high and frequently improving positive trade balance. In turn, imports predominantly involved products with no comparative advantage, which is consistent with the classical principle of comparative advantage. It may be stated that the attained comparative advantage was sources of an advantageous export specialisation and, from this point of view, the commodity structure in trade of agri-food products of Poland with the US may be considered rational. However, it needs to be observed here that apart from meat, preparations of meat and preparations of fruit or vegetables, neither agricultural raw materials nor products of the basic branches of the food industry were exported from Poland to the US. In turn, imports included products complementary to domestic production and to a considerable extent were necessary. Analysis of the commodity structure of trade showed that the US market, at a relatively small role

Table 3. The share of individual groups resulting from product mapping in the total value of trade between Poland and the US and their trade balance

Item	2004–2006			2015–2017		
	Share in the total value of export (%)	Share in the total value of import (%)	Trade balance (EUR million)	Share in the total value of export (%)	Share in the total value of import (%)	Trade balance (EUR million)
Group A	87.6	9.0	137.5	80.0	6.5	326.2
Group B	×	×	×	×	×	×
Group C	3.1	6.2	1.7	11.1	19.0	16.2
Group D	9.3	84.8	−31.4	8.8	74.5	−83.3
Total	100.0	100.0	107.7	100.0	100.0	259.1

Source: ComExt-Eurostat database, own calculations.

for the agri-food sector on a macro scale, is crucial for several branches of the Polish agri-food industry, including e.g. fish, meat, fruit and vegetable, confectionery and spirit industries.

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