Assessment of the competitiveness of Polish food producers in the European Union

INSTITUTE OF AGRICULTURAL
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Assessment of the competitiveness of Polish food producers in the European Union

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This task is a part of the research subject: **Monitoring of agri-food markets under changing economic conditions.**

This paper has been prepared within the framework of the research task: *Monitoring of the state of competitiveness of Polish food producers*.

The main objective of the presented studies is to evaluate the competitiveness of the Polish food sector in the EU market and to verify the thesis that the competitiveness of this sector during Poland's membership in the EU has increased.

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Introduction

This paper has been prepared within the framework of the research task "Monitoring of the state of competitiveness of Polish food producers". This task is a part of the research subject "Monitoring of agri-food markets under changing economic conditions", implemented under the Multi-Annual Programme "Competitiveness of the Polish food economy in the conditions of globalisation and European integration". The studies covered by this programme were conducted at the Institute of Agricultural and Food Economics – National Research Institute (IAFE-NRI) in 2011-2014.

In the recent years, the concept of competitiveness, around which our interest is focused, has made a meteoric career and has become an extremely fashionable term. The literature of the subject defines competitiveness in different ways and individual authors pay attention to different aspects of this concept. Certainly, competition, which is a market process, and competitiveness, which is a condition expressing the position of an entity in the context of this process, may be included among the most important mechanisms of the modern socio-economic life.

An increase in the international competitiveness of the economy is currently one of the most important development challenges for many countries, and since publishing the Lisbon Strategy in 2000, it has been a priority area in the European Union (EU) economic policy. The importance of the problem is also evidenced by the fact that the improvement in competitiveness of the economy is one of the main priorities of the Europe 2020 Strategy. Increasing the EU competitiveness is in the interest of all entities functioning under the Common European Market (CEM), because when the Union is strong in economic terms, it is easier for it to face the global competition and become a desirable partner on the international arena.

For Poland, the regional economic integration is both a stage of joining the globalisation processes and a form of strengthening internal forces, so that it could face the global competition and protect itself against its adverse effects. It is obvious that Poland, as the national economy, must be competitive in the international market if it wants to be a full partner, especially for the EU countries, and to be able to develop. If Polish economic entities, including Polish food producers, want to be successful, they should also be competitive against companies functioning in the CEM and non-EU markets. Such an approach to the issues of competition and competitiveness was a reason for which, in the studies conducted by the IAFE-NRI, the competitiveness of Polish food producers is determined as an ability of national food producers to settle in foreign markets – both in the EU market and in the third-

-country markets – and an ability to develop effective export. Taking the above definition as a basis, for the purposes of evaluating the international competitiveness of the Polish food sector, an analysis is being carried out with respect to the competitive potential, competition strategy, competition instruments and competitive position of Polish food producers in the global market (in the subsequent years of the selected issues)[1].

For many years, trade connections of the Polish agri-food sector with foreign markets have been asymmetric, i.e. the EU Member States remain the dominant partners in this trade. This is, first of all, a consequence of full integration of Poland with the European Union, and the impact of the EU Common Agricultural and Trade Policy. Domestic food producers, meeting the specific standards, have been granted unlimited access to the huge outlet market characterised by the high purchasing power of consumers. In 2013, the share of the EU-28 countries in the Polish export of agri-food products amounted to 77% and the positive balance of trade with those countries reached almost USD 7.4 billion. Such a high share of the EU in the geographical structure of the export and such a high value of the balance of trade with the Community countries may prove that the Polish food sector is competitive and achieved success in the Common European Market.

The main objective of the presented studies is to evaluate the competitiveness of the Polish food sector in the EU market (which is of key importance to it) and to verify the thesis that the competitiveness of this sector during Poland's membership in the EU has increased. In order to implement this objective, several issues have been presented in this paper.

The first chapter, based on the literature review, presents the selected theoretical aspects of the "competitiveness" system, i.e. both the basic elements of this system and multidirectional relations among them. The theoretical considerations have been confronted with the results of empirical research on the international competitiveness of the Polish food sector, conducted at the IAFE-NRI in previous years.

[1] Including: I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (1) (Monitoring and evaluation of the competitiveness of Polish food producers (1))*, series "Program Wieloletni 2011-2014", No. 25, IERiGŻ-PIB, Warszawa 2011; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (2) (Monitoring and evaluation of the competitiveness of Polish food producers (2))*, series "Program Wieloletni 2011-2014", No. 40, IERiGŻ-PIB, Warszawa 2012; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (3). Potencjał konkurencyjny – wybrane elementy (Monitoring and evaluation of the competitiveness of Polish food producers (3). Competitive potential – selected elements)*, series "Program Wieloletni 2011-2014", No. 73, IERiGŻ-PIB, Warszawa, 2013; Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna (Monitoring and evaluation of the competitiveness of Polish food producers (4). Competitive position)*, series "Program Wieloletni 2011-2014", No. 74, IERiGŻ-PIB, Warszawa 2013; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (5). Synteza (Monitoring and evaluation of the competitiveness of Polish food producers (5). Synthesis),* series "Program Wieloletni 2011-2014", No. 115, IERiGŻ-PIB, Warszawa 2014.

The second chapter investigates what position is occupied by Poland among the EU Member States in terms of the EU food trade, whether the spectacular development of trade in agri-food products between Poland and the EU – which undoubtedly took place after accession – translated into greater importance of Poland in trade in food products with the European Union.

The third chapter presents the changes in the competitive position of Poland in trade in agri-food products in the EU market. In order to evaluate the competitive position, four indices have been selected, i.e. export specialisation index, trade coverage index, B. Balassa revealed comparative advantage index and Lafay index. The overview of changes in the individual indices was concluded by a summary evaluation of the competitive position of Polish food producers in the EU market.

The fourth chapter is devoted to changes in the intensity of intra-industry trade, using the Grubel-Lloyd index of intra-industry trade. The level of this index allows to evaluate indirectly the competitiveness of a given economy against a background of other countries.

The fifth chapter analyses the competition strategies used by Polish food producers in the EU market (using the K. Aiginger's method). An attempt has been made to answer the question whether the basic instruments to compete in the EU market are lower production costs, which allowed to offer lower product prices, and thus producers used a cost leadership strategy. Or just the opposite, entities used a differentiation strategy, i.e. applied non-price competition instruments, including attaching particular importance to the quality of products.

The sixth chapter is a continuation of the issue of competitiveness factors and competitive advantages achieved through these factors, namely, it analyses the differentiation of food prices among the individual European Union Member States. This allowed to evaluate the level of price competitive advantages of Polish suppliers in the EU food market.

An analysis refers to the years 2003-2013, but the study did not contain the detailed presentation of changes in the individual indicators in the subsequent years, but it concentrated more on the presentation of changes in the direction and intensity of the discussed indices, which have taken place in the past decade, as well as on the presentation of the current situation in this area[2].

[2] Some research methods and indicators used in this paper have already been analysed in the previous years, therefore, their methodological assumptions and interpretations may be partially repeated. Analyses carried out so far concerned, however, the shorter time series and applied to, first and foremost, the evaluation of competitiveness of the Polish food sector in the global market.

An analysis has been carried out both at the level of the entire EU-28 and separately for the EU-15 and EU-13[3]. The results of foreign trade in agri-food products as well as indices based on those results have been presented according to the chapters of the Harmonised Commodity Description and Coding System (the so-called HS), designated by means of two-digit codes, using the trade data from the WITS-Comtrade database. The study on price advantages included the quotations kept by Eurostat and regarding prices of consumer goods and services used in households.

Presenting this monograph to the readers, I would like to express my warm thanks to both reviewers, i.e. Prof. Masahiko Gemma (Waseda University, Tokyo, Japan) and Dr Csaba Jansik (Natural Resources Institute Finland, Luke, Helsinki, Finland), for their kindness and valuable comments.

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[3] As this analysis concerns the years 2003-2013, Croatia, which joined the European Union on 1 July 2013, was treated as the EU Member State throughout the analysed period.

1. "Competitiveness" system – selected theoretical and empirical aspects[4]

The concept of competition is defined in different ways. According to W. Kopaliński, it means a sort of rivalry and applies mainly to trade[5]. However, competition certainly applies also to many other areas of social, economic, political and cultural life. M.J. Stankiewicz defines competition as a "phenomenon whose participants compete among themselves in striving for the same goals, which means that activities taken by some of them to achieve specific goals impede (and sometimes prevent) achieving the same goals by the others"[6]. Competition may be of market (i.e. takes place among market entities both on the demand and supply side) or non-market nature. Competition entities may be blocks of countries, national economies, companies, organisational units within companies or individuals employed in companies. The subject of the "input" competition are widely understood resources (*inter alia*, raw materials, materials, semi-finished products, products, services, means of transport, capital, land, people, knowledge, information), and of the "output" competition – the offer of finished products (products or services). The scope of competition designates the area of activity of entities and may apply to production industries, product range, market segment, links of the vertical cooperation chain, geographicalal markets or competence. Due to the nature of the competition, we may distinguish perfect (pure) competition and imperfect competition. The competition may also be considered in terms of its intensity, i.e. the scale of activities and efforts made by competing entities in order to achieve the assumed goals[7].

In the process of competition between companies, an overriding objective is to achieve benefits due to the functioning in the market (*inter alia*, generation of profits, increasing the goodwill, increased market share), thanks to providing the offer of products which is more beneficial when compared to other market participants in terms of price, quality, innovation or other usefulness of products. Companies compete mainly for buyers of their products (in the outlet market), for raw materials and mater-

[4] This chapter, providing the theoretical background and outline of empirical studies on the competitiveness of Polish food producers, conducted at the IAFE-NRI, has been published in a similar version in Polish in: I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (5). Synteza*, op. cit.

[5] W. Kopaliński, *Słownik wyrazów obcych i zwrotów obcojęzycznych (The Dictionary of Words and Phrases of Foreign Origin)*, www.slownik-online.pl/kopalinski.

[6] M.J. Stankiewicz, *Konkurencyjność przedsiębiorstwa. Budowanie konkurencyjności przedsiębiorstwa w warunkach globalizacji (Competitiveness of the company. Building the competitiveness of the company under globalisation conditions)*, Wydawnictwo TNOiK "Dom Organizatora", Toruń 2005, p. 18.

[7] Ibidem, pp. 17-28.

ials used in their production (in the supply market) as well as they compete among themselves (in the business market)[8].

Generally, competition is the rivalry of entities striving for the implementation of the assumed goals and an attempt to defeat the rivals in this process through the possession of specific resources and competences, development of effective competition strategies and use of appropriate competition instruments. This rivalry is also aimed at achieving benefits related to economic activities in the domestic market and international market, it applies both to the market of finished products and services as well as to the market of production factors, it takes place among economic entities.

Unlike competition, which is the market process, competitiveness is a condition expressing the position of a given entity in the context of this process. The complexity and multidimensionality of the phenomenon of competitiveness is a reason why there are no uniquely developed and widely accepted definitions thereof. Most frequently, when we write about competitiveness, simple, concise terms are used applicable to an analysed aspect or a given level of considerations. When it comes to the more general definitions of competitiveness, we may quote the definition by M.J. Stankiewicz who describes it as an ability to smoothly implement goals in the market arena of competition, whereby as this ability he means the efficiency, profitableness and economy. He distinguishes two types of competitiveness, i.e. operational (regarding the inside of a given entity) and system (regarding the broad context of behaviours of an entity)[9]. Competitiveness, as written by J. Misala, is a concept which allows to assess activities of economic entities involved in the competitive struggle from the point of view of achieved results. The mechanism allowing to assess these results is the widely understood market, where the selection of entities in terms of the level of their competitiveness is made[10].

Competitiveness, as a feature of entities operating in the market under competitive conditions, is classified according to many criteria. One of the classification criteria may be the range of this competition. In this aspect, we may talk about the national (regional) or international competitiveness. In the literature of the subject, competitiveness is, however, more often referred to the foreign or global market although there is an opinion that the success in these markets is determined by winning competitive struggle in the domestic and regional market. Such an approach is presented in the commonly quoted OECD definition from which it results that "…competitiveness implies the ability of firms, industries, regions, nations or transnational groups to face the international competition and to secure the relatively high rate of return on the produc-

[8] J. Bednarz, *Konkurencyjność polskich przedsiębiorstw na rynkach europejskich, na przykładzie wybranych branż (Competitiveness of Polish companies in European markets, on the example of selected industries)*, Wydawnicwo Uniwersytetu Gdańskiego, Gdańsk 2013, pp. 16-17.
[9] M.J. Stankiewicz, *Konkurencyjność*…, op. cit., pp. 36-38.
[10] J. Misala, *Międzynarodowa zdolność konkurencyjna i międzynarodowa konkurencyjność gospodarki narodowej. Podstawy teoretyczne (International competitive capacity and international competitiveness of the national economy. Theoretical fundamentals)*, Politechnika Radomska, Radom 2007.

tion factors and the relatively high level of employment"[11]. This also corresponds to the concept by A. Woś which states that the competitiveness of agriculture (and thus of other economy branches) may be considered from two points of view. First of all, within the framework of the national economy and then this is the internal competitiveness of this economy branch. Secondly, in international terms, and this is its external competitiveness[12].

The literature of the subject and indicators adopted for the evaluation of the competitiveness at the sectoral level show that the competitiveness at the meso level is most often evaluated in terms of results of foreign trade in particular products or groups of products, and the position of the sector's products in the global market or regional markets[13]. In the literature, we may often find opinions that the foreign market is more difficult for producers than the domestic market, so the actual level of the sectoral competitiveness may be stated only based on results achieved by producers in the international market[14]. This approach is also used in evaluating the competitiveness of the food sector. As written by K. Pawlak, "in analyses of the competitiveness of the agri--food sector, particularly useful seems an approach related to the trend of the foreign trade theory and referring to competitiveness as an ability to sell manufactured products efficiently in international markets, thus to maintain or increase market shares"[15].

The recent intensification of studies on the international competitiveness is also closely related to the integration and globalisation processes in the world. These processes, occurring with varying intensity in many areas of social and economic life, have a significant impact on the functioning and prospects of development of companies and sectors they create.

In view of the above, the studies on the competitiveness of the Polish food sector[16], conducted by the IAFE-NRI since 2005, stress that Polish food producers should be competitive compared to companies functioning in the Common European

[11] *Industrial Structure Statistics 1994*, OECD, Paris 1996 [as cited in: M.J. Stankiewicz, *Konkurencyjność*…, op. cit., p. 36].
[12] A. Woś, *Konkurencyjność wewnętrzna rolnictwa (Internal competitiveness of agriculture)*, IERiGŻ, Warszawa 2001, pp. 30-34.
[13] Including: J. Misala, *Międzynarodowa zdolność*..., op. cit., pp. 14-45; J. Misala, *Międzynarodowa konkurencyjność gospodarki narodowej (International competitiveness of the national economy)*, Polskie Wydawnictwo Ekonomiczne, Warszawa 2011, pp. 63-85; K. Pawlak, W. Poczta, *Międzynarodowy handel rolny (International agricultural trade)*, Polskie Wydawnictwo Ekonomiczne, Warszawa 2011, pp. 41-77.
[14] M. Olczyk, *Konkurencyjność. Teoria i praktyka (Competitiveness. Theory and practice)*, Wydawnictwo Fachowe CeDeWu.PL, Warszawa 2008, pp. 53-54.
[15] K. Pawlak, *Międzynarodowa zdolność konkurencyjna sektora rolno-spożywczego krajów Unii Europejskiej (International competitive capacity of the agri-food sector of the European Union countries)*, Rozprawy Naukowe, No. 448, Uniwersytet Przyrodniczy w Poznaniu, Poznań 2013, pp. 32-36.
[16] Including: I. Szczepaniak (ed.), *Ocena konkurencyjności polskich producentów żywności po akcesji do Unii Europejskiej (synteza) (Evaluation of the competitiveness of Polish food producers after accession to the European Union (synthesis))*, series "Program Wieloletni 2005-2009", No. 150, IERiGŻ-PIB, Warszawa 2009; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (2)*, op. cit.

Market (CEM), as well as in non-EU (third-country) markets and also competitive when compared to foreign companies present in the domestic market. Such an approach is tantamount to stating that the sectoral competitiveness is an ability to cope with the international competition and thus to implement a significant export volume, but also an ability to maintain a high level and speed of development of the internal market. This results in adopting, for the purposes of these studies, the definition of the competitiveness of Polish food producers as an ability of domestic food producers to settle in foreign markets – both in the EU market and in third-country markets – and an ability to develop export.

The multitude of definitions of competitiveness is a reason why individual researchers classify it in different ways, pay attention to different aspects thereof and analyse it in different terms. According to M.J. Stankiewicz, "competitiveness" system (of a company or a sector) consists of: competitive potential, competitive advantage, competition instruments and competitive position. The competitive potential determines the achievement of a specific competitive advantage. It, in turn, is a basis for preparing an offer and applying specific competition instruments which – after verification by the market – allow to achieve the specific competitive position. Simultaneously, each entity, when formulating its development strategy, must plan its future competitive position which itself is a strategic objective and, in addition, affects the way the entity is perceived by market participants. The competitive position is also an effect of the company's rivalry in a given industry, considered in the context of results achieved by competitors. The "competitiveness" system as a whole is also subject to the impacts of the external environment, which is meant as all events, objects, situations and entities affecting competitiveness while not being its components[17]. In this aspect, M.J. Stankiewicz goes from the competitive potential to the competitive advantage, and then to competition instruments and competitive position.

These issues are perceived a little bit different by J. Misala, who – after a multifaceted and multidimensional analysis of the concept of the international competitiveness – distinguishes three components thereof: international competitive capacity, international competitiveness *sensu stricto* and international competitive position. The international competitive capacity is a sort of an ability to compete for benefits from international economic trade and consists of two components: real and institutional (systemic). The international competitiveness *sensu stricto,* also referred to as the international competitive advantage, means the current condition and trends of changes in the real and institutional component of the international competitive capacity in a struggle for benefits from participation in the international division of labour. The two concepts, i.e. the international competitive capacity and international competitiveness *sensu stricto*, interact. Both these concepts are also reflected in the evolution of the international competitive position, which means the share of a given country in the widely understood international turnover (both in trade in goods and services

[17] M.J. Stankiewicz, *Konkurencyjność…*, op. cit., pp. 89-91.

and in the flows of production factors) as well as changes in the structure of this turnover. However, the international competitive position may also affect the international competitive capacity and international competitiveness *sensu stricto* (as these are dynamic concepts)[18].

These issues are organised in a similar way by W. Bieńkowski, who distinguished the competitive capacity and competitive position. The competitive position (also called result-based competitiveness) is the level of the economic development achieved by a given country, including the position in foreign trade. The competitive capacity (factor--based competitiveness) is everything which determines the capacity to compete in foreign markets and achieving the specific competitive position by the given economy[19].

The factor-based and result-based competitiveness is also referred to by M. Gorynia, who mentions the following dimensions of competitiveness: competitive potential, competitive strategy and competitive position. In this aspect, the competitive potential is an ability of the company to compete in the future (implementable competitiveness). On the other hand, the competitive strategy describes how companies build and use their competitive potential so as to achieve the specific competitive position (implemented competitiveness). Thus, the possessed competitive potential is a factor--based category and the achieved competitive position – the result-based category[20]. When synthesising, we may conclude that the company's competitive potential determines the application of a specific competition strategy, and this strategy allows to achieve the specific competitive position.

The issue of the competitive position is understood in the broadest terms by J.W. Bossak, which results from the fact that he shifted the focus of the analysis of the international competitiveness from studies on the trade, service, technological and capital turnover to the international conditions of the economic development. In this aspect, the competitive position applies not only to trade results, but also to future opportunities and risks, competitive weakness and force as well as dynamically changing market considerations, also financial. It evaluates the potential, force, strength and ability to create values. It includes, in particular, such issues as: economic equilibrium, inflation,

[18] J. Misala, *Międzynarodowa zdolność…*, op. cit., pp. 34-40.

[19] W. Bieńkowski, *Reganomika i jej wpływ na konkurencyjność gospodarki amerykańskiej (Reaganomics and its influence of the competitiveness of the American economy)*, PWN, Warszawa 1995 [as cited in: M.J. Radło, *Międzynarodowa konkurencyjność gospodarki. Uwagi na temat definicji, czynników i miar (International competitiveness of the economy. Comments on definitions, factors and indicators)*, [in:] W. Bieńkowski et al., *Czynniki i miary międzynarodowej konkurencyjności gospodarek w kontekście globalizacji – wstępne wyniki badań (Factors and indicators of the international competitiveness of economies in the context of globalisation – initial results of studies)*, "Prace i Materiały" 2008, No. 284, Instytut Gospodarki Światowej, SGH, Warszawa].

[20] M. Gorynia, *Luka konkurencyjna na poziomie przedsiębiorstwa a przystąpienie Polski do Unii Europejskiej. Implikacje dla strategii firm i polityki gospodarczej (Competitive gap at the level of the company vs. Poland's accession to the European Union. Implications for strategies of companies and for the economic policy)*, Wydawnictwo AE w Poznaniu, Poznań 2002, pp. 68-69.

unemployment, budget changes, current financial situation, international debt, foreign exchange reserves, changes in exchange rates[21].

In the literature of the subject regarding competitiveness, the decomposition of the competitiveness "system" is thus determined in different ways, and its elements are differently defined and stressed. In the context of the presented considerations, for the purposes of the studies on the international competitiveness of the Polish food sector, conducted by the IAFE-NRI, the following elements of the "competitiveness" systems have been distinguished: competitive potential, competition strategy, competition instruments and competitive position (Diagram 1.1). Each of these subsystems may be further divided into the possessed (previously built) component and component being built. The individual elements of the "competitiveness" system refer to various areas thereof and demonstrate strong cause-and-effect relationships. In most general terms, we may conclude that the competitive potential possessed by the company determines the application of the specific competitive strategy, this strategy gives rise to the selection of specific competition instruments, which, in turn, allow to achieve the specific competitive position. In fact, the relationships among these four elements of the "competitiveness" system are multidirectional and much more complex, though. Decisions made within one subsystem affect the functioning of the others. The competitive position – as it results from the basic dependence – is a result of competing, but also the basis for competing at the level resulting from this very position. Aiming at achieving the specific competitive position requires, in turn, formulating the competition strategy, selection of efficient competition instruments and earlier – a detailed analysis of the competitive potential. However, the possessed potential may appear inadequate and only its development by new resources and competences (i.e. building the new competitive potential) will allow to implement the specific competition strategy and create competition instruments and, consequently, achieve the planned competitive position. Not without importance is also the maintenance of the appropriate quality of cooperation with the external environment, which, on the one hand, affects the company and, on the other, changes under its influence.

These and other relationships among the individual elements of the "competitiveness" system are a reason why competitiveness management is nothing but a constant impact, i.e. planning, building, using and achieving, in terms of four subsystems: competitive potential, competition strategy, competition instruments and competitive position, which together determine the competitiveness of sectors and entities forming these sectors[22].

Above, there was an attempt to show the main relationships among the individual elements of the "competitiveness" system but these subsystems require more detailed presentation, particularly in the context of the specific nature of the studies conducted at the IAFE-NRI.

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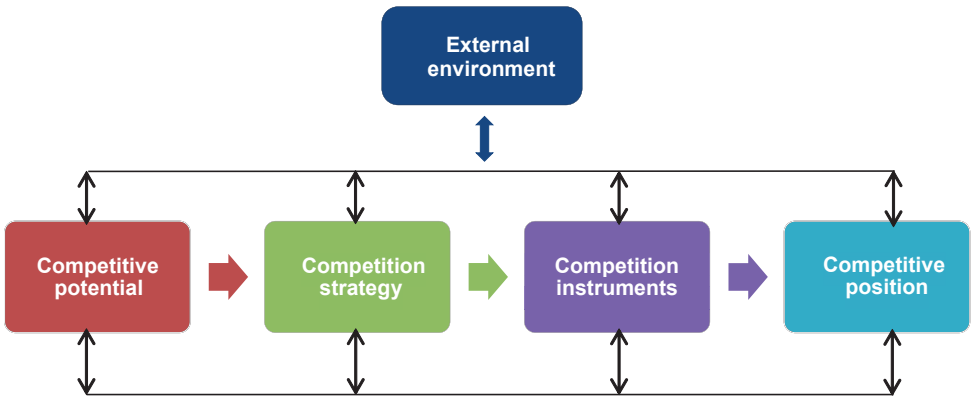
[21] J.W. Bossak, *Konkurencja i współpraca międzynarodowa (Competition and international cooperation)*, Difin, Warszawa 2013, pp. 169-174.

[22] M.J. Stankiewicz, *Konkurencyjność…*, op. cit., p. 91; J. Bednarz, *Konkurencyjność…*, op. cit., p. 27.

Diagram 1.1. The "competitiveness" system and cause-and-effect relationships among its elements



Source: own elaboration based on: M.J. Stankiewicz, Konkurencyjność..., op. cit., p. 90; J. Bednarz, Konkurencyjność..., op. cit., p. 27.

The concept of the competitive potential is addressed in different ways. Usually, the competitive potential is defined as all tangible and intangible assets of the company (at the meso level – of the sector), necessary to ensure the functioning of this company on the market arena of competition. The competitive potential possessed by the company is, therefore, a primary reservoir of sources of the competitive advantages, gives rise to the application of specific competition instruments and allows to achieve the specific competitive position. However, the competitive potential itself does not determine competitiveness[23].

Possessing unique resources and skills, in other words factors of success, is certainly one of sources of building the competitive advantage in the market. Resources themselves, however, are perceived in different ways. In economic sciences, resources usually mean production factors (land, capital, labour), while in management sciences, resources are all those elements which are related to the functioning of the company as an organisation, its presence in the market or relationships with the environment. Therefore, the competitive potential depends on the market and non-market considerations, internal considerations (depending on the company) and external considerations (macro- and mesoeconomic)[24]. Both approaches are combined by K. Pawlak, who says admittedly that the competitive potential of the agri-food sector is determined by the volume and efficient use of possessed production resources, but simultaneously proves that the international competitive capacity of this sector is determined not only by its competitive potential, but also by the foreign and international economic policy[25].

[23] M.J. Stankiewicz, *Konkurencyjność*..., op. cit., pp. 89-91.
[24] J. Bednarz, *Konkurencyjność*..., op. cit., p. 175.
[25] K. Pawlak, *Międzynarodowa zdolność konkurencyjna*..., op. cit., p. 409.

These issues are organised by M. Gorynia according to whom the competitive potential may be considered in a narrow and broad aspect. In the narrow aspect, it includes all resources used or possible to be used by the company, while these resources may be divided into three groups: primary, secondary and resulting. In the broader aspect, the competitive potential of the company, in addition to widely understood resources, includes also many other elements such as: culture of the company, its organisational structure and strategic vision, company-specific behaviour[26].

From the point of view of building, maintaining and strengthening the competitive position of the company in the international market, including creating the value and achieving extraordinary results in the given sector, particularly important are these resources forming the competitive potential, which are assets of this entity. Such assets are unique resources, often strategic in nature, which make the given entity distinctive against the background of its competitors, allow its development and foreign expansion. The basis for competitiveness is the economic efficiency of the use of such resources.

The competition strategy is an integrated and coordinated group of activities and obligations taken by the company in order to achieve the competitive advantage in a specific market. The competition strategy is also a strategy geared towards the improvement in the competitive position of products offered by the company within the served market segment[27].

According to the M.E. Porter's classical approach to formulating strategies, used by most authors discussing competition strategies of companies, the competition strategy means taking aggressive or defensive activities by the company, with the aim of maintaining the position in the given sector, effective dealing with five competitive forces and achieving the higher rate of return by the company. These five competitive forces are: threat of new entrants, intensity of competitive rivalry, threat of substitute products or services, bargaining power of customers, bargaining power of suppliers. All these forces determine the intensity of competition in the given sector and its profitability, and the strongest force or forces is/are decisive for the formulation of the competition strategy[28].

Developing the competition strategy means developing a general formula, how the given entity intends to compete, what are its objectives (economic and non-economic) and what rules of conduct will be needed to achieve these objectives (*inter alia*, target markets, range of products, marketing, sales and distribution channels, production, labour force, supplies, research and development, finance and control).

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[26] M. Gorynia, *Teoretyczne aspekty konkurencyjności (Theoretical aspects of competitiveness)*, [in:] M. Gorynia, E. Łaźniewska (eds.), *Kompendium wiedzy o konkurencyjności (Compendium of knowledge on competitiveness)*, Wydawnictwo Naukowe PWN, Warszawa 2009, pp. 55-57.

[27] G. Johnson, K. Scholes, R. Whittington, *Exploring Corporate Strategy*, Prentice Hall, Upper Sadle River 2008; T.L. Wheelen, J.D. Hunger, *Concepts in Strategic Management Business Policy*, 11th ed., Prentice Hall, Upper Sadle River 2008 [as cited in: J. Bednarz, *Konkurencyjność…*, op. cit., p. 163].

[28] M.E. Porter, *Strategia konkurencji. Metody analizy sektorów i konkurentów (Strategy of competition. Methods of analysing sectors and competitors)*, Wydawnictwo MT Biznes Sp. z o.o., Warszawa 2006, pp. 23-26, 60.

In other words, this is a combination of objectives for which the company is aiming and of measures through which it tries to achieve these objectives[29].

M.E. Porter distinguished three basic types of competition strategies, which are to serve creating and maintaining the strong competitive position by the company, in the long term, and achieving better results than competitors in the sector. These are the following strategies: cost leadership (leading position in terms of total costs), differentiation and concentration (market niche)[30].

The first of these strategies consists in achieving the leading position in the sector in terms of total costs. When implementing this strategy, the company tries to present an offer of products manufactured at lower costs when compared to its competitors, but at least equally attractive for the customer. This allows it to offer lower prices than competitors or to achieve higher margins with the similar price level, and use the income surplus obtained in this way for strengthening its competitive potential. Strict control of direct and overhead costs, which is required in this situation, is associated with a permanent analysis of the efficient use of technologies, selection of raw materials and materials, use of the production capacity, organisation of the company, qualifications of employees, efficiency of activities in the area of sales, customer service, advertising, or R&D activity. In turn, the differentiation strategy consists in offering, by the company, something which is considered unique across the sector, in other words, finding such attributes which will affect the perception of the company as the one bringing the "new quality" into the market. The differentiation methods may be, *inter alia*, product model or brand, technology, product features, post-sales service, sales network, while the ideal situation is when the company differentiates its offer in several aspects. The choice of the differentiation strategy entails a need to incur additional costs by the company, which are reflected by prices higher than of its competitors. The third of these strategies consists in the concentration of the company's activity on a relatively narrow area, i.e. on the specific group of customers, specific range of products or specific geographical market. Because of the narrow specialisation, the company may serve the selected market segment more efficiently and more effectively than competitors, i.e. satisfy the needs of this segment better and/or ensure lower costs of its service. The company, which is able to concentrate, may get profits higher than average in the sector[31].

Competition strategies defined by M.E. Porter are often the subject of studies devoted to competitiveness. Sometimes, the cost leadership strategy is called the price strategy, and the differentiation strategy – the quality or prestige strategy. Other strategies

[29] Ibidem, pp. 16-18.
[30] Ibidem, p. 60.
[31] J. Bednarz, *Konkurencyjność…*, op. cit., pp. 164-165; M.E. Porter, *Strategia…*, op. cit., pp. 60-67; I. Szczepaniak, *Strategie konkurencji stosowane przez polskich producentów żywności na rynku Unii Europejskiej (Competition strategies used by Polish food producers in the market of the European Union)*, [in:] Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, No. 361, Uniwersytet Ekonomiczny we Wrocławiu, Wrocław 2014.

are also mentioned, e.g. information strategy (based on faster access and better use of information) or "time" strategy (based on shortening the duration of all processes taking place in the company)[32]. Despite various attempts to define the competition strategy, M.E. Porter still remains the undisputed authority in this area.

Competition instruments, the third element of the "competitiveness" system, allow the company to be distinctive in the market against the background of competitors and thus to acquire customers. They determine whether the customer chooses an offer of the given company or an offer of its competitors. M.J. Stankiewicz defines competition instruments as "measures deliberately created by businessmen to acquire customers for the presented market offer"[33]. The role of competition instruments is to inform the largest possible number of buyers about an offer of the company, attract their attention and make them believe that an offer of the given company is the best. Their basic tasks also include leading to the implementation of a transaction beneficial to the company and satisfying to customers, building confidence in the entity and, in the longer term, keeping the loyalty of customers and making them conclude further transactions in the future[34]. Competition instruments are applied in three areas ("arenas"), i.e. in the supply market ("input"), the outlet market ("output") and the so-called business market, i.e. when the company itself is the subject of an offer ("wants to sell well"). All these instruments should lead to the acceptance of an offer of the company by the market and, consequently, to the creation of value added. In this respect, however, "output" instruments, applied in the outlet markets, are of the greatest importance. These instruments are a direct source of income for the company, thus, their role is superior[35].

The list of competition instruments maybe longer or shorter, depending on the specific nature of the given sector, type of the product, market development, activity of competitors or expectations of customers. The most popular is the concept of the so-called marketing-mix (4P) made up of four marketing tools (instruments), through which the company may influence the market. They are: product, price, place and promotion[36]. Over time, the list of marketing instruments has been extended by new elements, i.e. people, process, physical evidence and pleasure[37]. Even more extended concept of marketing-mix was presented by M. Haffer, who distinguished eighteen competition instruments applied by companies[38].

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[32] M.J. Stankiewicz, *Konkurencyjność...*, op. cit., pp. 181-182.
[33] Ibidem, p. 241.
[34] J. Bednarz, *Konkurencyjność...*, op. cit., pp. 219-220.
[35] M.J. Stankiewicz, *Konkurencyjność...*, op. cit., p. 242-251.
[36] P. Kotler, *Marketing. Analiza, planowanie, wdrażanie i kontrola (Marketing. Analysis, planning, implementation and control)*, Wydawnictwo Felberg SJA, Warszawa 1999, pp. 89-91.
[37] J. Bednarz, *Konkurencyjność...*, op. cit., p. 223.
[38] M. Haffer, *Instrumenty konkurowania (Competition instruments)*, [in:] M.J. Stankiewicz (ed.), *Budowanie potencjału konkurencyjności przedsiębiorstwa (Building the competitive potential of the company)*, Wydawnictwo TNOiK "Dom Organizatora", Toruń 1999, p. 52.

Using the concept of marketing-mix, M.J. Stankiewicz has grouped competition instruments (both those mentioned by M. Haffer and others) according to the sphere of their perception by customers and distinguished four groups of instruments:

- quality competition instruments in which he included such properties (functionalities) of products or services as: quality, modernity, differentiation, brand, distinction, environmental performance, scope of the range of products, flexibility in adapting to the needs of customers, marketing new and modernised products and creating customer preferences using these products, attractiveness of the packaging;
- price competition instruments, including: level of prices, promotional prices, prices of novelties, payment terms, price discounts, seasonal reductions, hire purchase and credit sales, prices of sales-related and post-sales services, prices of spare parts, warranty terms;
- service and services competition instruments, namely: range of sales-related and post-sales services, their quality, availability of spare parts, easy access to products in the market, convenience of time and place of their purchase, diversification of the distribution method, timeliness of supplies;
- communication and information competition instruments, including: advertising, promotion, personal sales, public relations, fairs and exhibitions, loyalty programmes, keeping in contact with customers and responding quickly to signals from them, using the Internet as the online communication system[39].

The more economic entities compete among themselves in the market and the more mature is this market, the more important is the role played by competition instruments and various combinations of competition instruments should be applied to a greater extent.

The interpretation of the concept of the competitive position is diversified. M.J. Stankiewicz distinguishes three approaches to explaining the competitive position. The first of them, treats the competitive position as a manifestation of the competitive capacity of the company, seen *ex ante* and inherent in strengths possessed by the company (critical success factors). In this aspect, it is a source of the advantage being achieved. The second approach, treats the competitive position as an indicator of the achieved competitive advantage and therefore as the result of competing (*ex post* category). In accordance with the third approach, the competitive position is, at the same time, a source, a manifestation and an indicator of the competitiveness[40]. The first two approaches are also referred to by M. Gorynia, who suggests the distinction of the *ex post* competitiveness and the *ex ante* competitiveness. He means the former as the current competitive position, i.e. that which has been achieved, acquired in the process of competing. The latter is the future competitive position, achievable, specified by the entity's capacity to compete in the future, i.e. by its competitive potential[41]. The com-

[39] M.J. Stankiewicz, *Konkurencyjność*..., op. cit., pp. 254-255.
[40] Ibidem, pp. 293-298.
[41] M. Gorynia, *Teoretyczne aspekty*…, op. cit., p. 54.

petitive position is presented in a quite synthetic way by W. Urbaniak, who writes that it shows the present condition, effects of the activity, position achieved by the given entity during the rivalry with competitors and is a sort of a summary of its strengths and weaknesses in relation to competitors[42].

In turn, J. Misala is most interested in the international competitive position, while, when compared to other elements of the "competitiveness" system, he regards this concept as relatively narrow. As the international competitive position, he means the "condition and changes in shares of the given country in the widely understood international turnover, i.e. in international trade in goods and services, and in international movements of production factors as well as the evolution of the structure of these movements (...) taking into consideration cause-and-effect relationships accompanying the development of external economic connections of this country"[43].

To evaluate the competitive position understood in this way, lag indicators are used, which allow to evaluate the evolution of various features of foreign trade in the past. The basic lag indicators used to evaluate the international competitive position in mesoeconomic terms are various types of indices based on the results of foreign trade (import/export relations, situation of the current account balance) and also on the production results (e.g. import penetration rate of the internal market, export specialisation level, export orientation index) as well as indices based on cost and price relations. There is also a large number of synthetic indicators, designed, if necessary, on a basis of various methods[44]. When organising this issue, J. Misala divided the indicators of the international competitive position into two basic groups: qualitative (including simple indicators and indicators obtained using appropriate methods), and price and cost indicators[45]. In this aspect, the evaluation of the achieved competitive position is most often based on *ex post* indices. Each of these indices has its advantages and disadvantages. In order to analyse the competitive position in a reliable manner, we should not limit ourselves to the application of one index only.

Summing up the existing considerations, each entity whose objective is to gain the strong competitive position in the international market should build its competitive advantage based on the competitive potential it possesses (in particular resources and competences of strategic importance), effective competition strategies and properly selected combinations of competition instruments, while making use of opportunities resulting from its functioning in the external environment. This applies also to Polish food producers for whom Poland's membership in the EU, meaning

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[42] W. Urbaniak, *Konkurencyjność – próba zdefiniowania zjawiska (Competitiveness – an attempt to define the phenomenon)*, [in:] Acta Universitatis Lodziensis. Folia Oeconomica, Wybrane zagadnienia z zakresu finansów i handlu międzynarodowego, Vol. 204, Łódź 2007, pp. 243-252 [as cited in: K. Pawlak, *Międzynarodowa zdolność…*, op. cit., p. 32].

[43] J. Misala, *Międzynarodowa zdolność…*, op. cit., pp. 37-38.

[44] J. Misala, *Międzynarodowa konkurencyjność…*, op. cit.

[45] J. Misala, *Wymiana międzynarodowa i gospodarka światowa. Teoria i mechanizmy funkcjonowania (International trade and world economy. Theory and mechanisms of operation)*, SGH, Warszawa 2005, p. 300.

the inclusion of Poland into the CEM area, and, consequently, entering of the Polish economy into the free-trade area, created new opportunities and became a strong impulse for the development[46].

The studies on the competitiveness of the Polish food sector, conducted by the IAFE-NRI, often referred to the issue of the competitive potential and competition instruments applied. This issue was perceived in a very broad sense, by analysing various aspects thereof in subsequent publications. The studies in this field covered a wide spectrum of issues – from external considerations to internal competitiveness factors. Such approach enabled the multi-level analysis of the competitiveness of food economy entities. External considerations of competitiveness (of business, political, institutional nature, etc.) result mainly from the globalisation processes, which affect the need to make allocation decisions in accordance with the offer of the global market. In this context, an essential element of activity of food producers is the impact of the EU Common Agricultural and Trade Policy whose mechanisms affect decisions made by individual entities. An analysis of the environment, which should be a basis for developing the action strategy and method of building the competitive advantage, makes it possible to see the opportunities and risks in the dynamically changing external world. The analysis of external considerations of competitiveness of food producers should include not only competition processes taking place between them. An important sphere of their activity should also be processes of collaboration and cooperation allowing to obtain the effect of synergy[47]. Thus, the improvement in the competitiveness of the Polish food sector should also be seen through the prism of possibilities to create competition and cooperative relationships among entities, in other words – coopetitive relationships[48].

The effectiveness is one of the basic indicators of the competitive potential, allowing to evaluate this potential by determining the effectiveness of various types of inputs and thus to identify sources of an increase in effects of activity, i.e. to evaluate

[46] Polish membership in the European Union has basically changed the economic conditions of functioning of Polish food producers, and contributed to accelerating the development of the Polish economy. The most important reason for these changes, apart from the macroeconomic and global determinants, was the inclusion of Poland into the area of the Common European Market and, consequently, entering of the Polish economy into the free-trade area. It was tantamount to the abolition of customs duties and other trade restrictions in trade with other EU Member States, covering our country with the external Union tariff and trade agreements concluded by the EU prior to the day of enlargement and termination of all trade agreements concluded earlier by Poland [cf. I. Szczepaniak (ed.), *Ocena rozwoju konkurencyjności polskich producentów żywności po integracji z Unią Europejską (Evaluation of development of the competitiveness of Polish food producers after the integration with the European Union)*, series "Program Wieloletni 2005-2009", No. 99, IERiGŻ-PIB, Warszawa 2008, p. 9].

[47] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (3). Potencjał konkurencyjny…*, op. cit., pp. 8-9.

[48] I. Szczepaniak, *Koopetycja w formie klastrów a konkurencyjność polskiego sektora żywnościowego (Co-opetition in the form of clusters and competitiveness of Polish food sector)*, [in:] R. Borowiecki, T. Rojek (eds.), *Współczesne formy relacji międzyorganizacyjnych. Współpraca – kooperacja – sieci (Modern forms of interorganisational relationships. Collaboration – cooperation – networks)*, Uniwersytet Ekonomiczny w Krakowie, Kraków 2014, pp. 51-61.

the extent to which these effects result from material inputs (indirect consumption) and from labour and capital inputs (fixed and current assets). The increasing effectiveness of agri-food processing (both labour, material inputs and involved assets), particularly significant on a microscale, means an increase in the competitive potential of this sector and the improvement in its competitive position. Food producers, by increasing the export and export share in sales of products, achieve the improvement in relationships between effects of economic activity and resources engaged in this activity. The productivity is, on the other hand, the essential factor of the competitiveness as it determines an ability to use existing resources. Due to this, many economists identify productivity with competitiveness, stressing its key role in development strategies of companies. The low share of the total productivity in the growth of production of agri-food processing shows that there is still a possibility to increase the competitive potential of entities in the sector, e.g. by an increase in technological and organisational progress in companies[49].

The existing studies show the gradual, but systematic, reduction in price advantages in markets of agricultural and food processing products, as well as in the food consumer market, which results from the progressive convergence of national prices with those in the European Union. As a consequence, the importance of the customer in relations with producers increases and effective income-cost relationships are sought. The application of non-price competition instruments by producers becomes more and more necessary. The studies indicate that food producers increasingly appreciate the importance of quality and innovation as competition instruments. This is a rationale showing that at least some Polish food industry companies use the competition by distinction, which may allow them to build the permanent competitive advantage. Therefore, it is required to introduce in companies such income-cost solutions which are conducive to providing quality and health safety assurance systems. In connection with health and food awareness growing among customers, food products of high health values will also be increasingly important. In the context of these considerations, we may conclude that sources of the competitive advantage of Polish food producers are, first of all, low costs and price of offered products and the increasing awareness and implementation of the quality competition. In the long term, the success of the company also determines its effectiveness and productivity, ability to take innovation and knowledge management activities[50].

Polish food producers, functioning in the increasingly difficult international environment, i.e. in conditions of the aggressive rivalry with foreign entities, both in the domestic and foreign markets, are forced to treat competitiveness-related issues in a special way. Failure to follow the rules of the market game, shaped generally by the EU and global determinants, may, in fact, result in a situation where Polish food producers will be reduced to the role of passive participants, rather than full economic

[49] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (2)*, op. cit.
[50] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (3). Potencjał konkurencyjny…*, op. cit., p. 9.

partners[51]. Hence, the need to put an emphasis on formulating such competition strategies and on seeking such competition instruments which will allow companies to improve their competitive position in the domestic and international markets. These processes make it necessary to seek determinants of the level of the competitiveness of companies, sectors or countries and their groupings. The identification of these factors determines, to a large extent, the economic policy of the country and action strategies of individual entities.

One of methods to analyse the way of competing in the international market, used in the studies conducted by the IAFE-NRI, is the quality and price method suggested by K. Aiginger[52]. This method consists in investigating the characteristics of trade from the point of view of absolute, not comparative, advantages of the country over foreign countries in various fields of the economy. The evaluation of the competing strategy in Polish agri-food trade in the world market, made pursuant to the above method, showed that after a period of multidirectional fluctuations in the importance of individual competition strategies in Polish agri-food export, in the recent years the differentiation strategy, based on the effective competition with product quality, has clearly gained in importance. Still, the importance of the effective strategy of competing with lower prices was quite significant. The role of other strategies was much lower[53].

An important part of the studies on the competitiveness of the Polish food sector, conducted at the IAFE-NRI, is the evaluation of changes in the competitive position of Polish food producers in foreign markets. The results of foreign trade in agri-food products and Poland's importance in the European Union food trade have been adopted as the most important manifestations of the evolution of this position. An analysis of foreign trade has showed that after obtaining access to the EU market, Poland saw the dynamic development of foreign trade in agri-food products. In 2003-2013, the export value of those products has grown fivefold, and the positive balance of trade rose by almost fourteen times. The European Union remained the main trading partner of Poland with regard to trade in agri-food products. Simultaneously, the Polish share in the EU trade in agri-food products has increased by several times. This significant improvement in trade results of the Polish food sector proves that Polish food producers have the increasingly stronger competitive position in the EU market.

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[51] I. Szczepaniak, *Wpływ globalizacji i integracji europejskiej na konkurencyjność polskiego sektora żywnościowego (Influence of the globalisation and the European integration on the competitiveness of the Polish food sector)*, [in:] *Nowe strategie na nowy wiek – granice i możliwości integracji regionalnych i globalnych (New strategies for the new century – limitations and possibilities of regional and global integrations)* (ed. by M. Chorośnicki, J.J. Węc et al.), Uniwersytet Jagielloński w Krakowie, Krakowska Oficyna Naukowa TEKST, Kraków 2013, pp. 59-72.

[52] K. Aiginger, *Unit Values to Signal the Quality Position of CEECs*, [in:] *The Competitiveness of Transition Economies* (coordinator Y. Wolfmayr), OECD proceedings, WIFO, WIIW, OECD 1998, pp. 93-121; K. Aiginger, *The Use of unit values to discriminate between price and quality competition*, "Cambridge Journal of Economics", Vol. 21, No. 5, Oxford University Press 1997, pp. 571-592.

[53] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (2)*, op. cit., pp. 71-90; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (5). Synteza*, op. cit.

Changes of the Polish competitive position in trade in agri-food products in the world market were evaluated based on an analysis of selected indices, i.e. export specialisation index, trade coverage index, B. Balassa revealed comparative advantage index, Lafay index and Grubel-Lloyd index of intra-industry trade. The selection of indices applied in the analysis resulted from the adopted objective of the studies and took account of the fact that in similar analyses it is definitely better to apply several indicators rather than one indicator only. From the point of view of correct deduction, the fact that the selected indices could be calculated on the basis of the same data source and for the same time horizon was also of importance[54].

Although the literature of the subject includes all analysed indices into one group of indicators of the international competitive position, they still allow to evaluate slightly different aspects of competitiveness. The first four indices show the inter--industry specialisation in trade in a given group of products. This type of trade is usually identified with a given country having comparative (relative) advantages in trade in such products. In each country, there are bigger or smaller possibilities of turning comparative advantages into competitive advantages or of creating new advantages of this type. Then again, indices of intra-industry trade inform about the intra-industry specialisation. As opposed to the inter-industry specialisation, countries participating in the intra-industry specialisation compete in foreign markets with products or varieties of products as part of the same industry (and not with groups of products in which they have comparative advantages over trading partners). The information about the export of what goods the country specialises in and how intense this specialisation is allows to evaluate indirectly the level of competitiveness of the given economy against the background of other countries[55].

The evaluation of the Polish competitive position in trade in agri-food products in the world market in 2003-2013, based on an analysis of the selected competitiveness indices, shows the diversified situation of this sector in terms of commodities. At the same time, it proves that in this period the individual indices in many groups of products have significantly improved. Thus, the share of products, in terms of which Poland was competitive in the world market, in the total agri-food export has increased[56].

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[54] Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., pp. 38-74.

[55] Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., pp. 11, 75-91; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (5). Synteza*, op. cit.; I. Szczepaniak, *Development of Intra-industry Trade as a Measure of Competitiveness of the Polish Food Sector*, [in:] Oeconomia Copernicana, No. 2, IBG, PTE, Uniwersytet Mikołaja Kopernika, Toruń 2013, pp. 147-164.

[56] Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., pp. 11, 38-91; I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (5). Synteza*, op. cit.

The dynamic growth of trade in agri-food products and the improvement in the international competitive position of the Polish food sector proved that Polish food producers were well prepared for the European Union membership and for the functioning in the world market. They managed perfectly in the demanding international market, and during ten years of the functioning of Poland under the Common European Market, they have undoubtedly succeeded in that market. However, the improvement in the international competitive position of Polish food producers would not have been possible if they had not developed their competitive potential, used effective competition strategies and proper competition instruments, and therefore been able to successfully manage the individual elements of the "competitiveness" system. The complexity of the "competitiveness" system and multidimensionality of relationships between its elements implies a holistic approach both to the actual creation of the competitiveness of sectors and entities forming them as well as to the evaluation of this phenomenon.

2. Role of Poland in foreign trade in agri-food products of the European Union

This chapter evaluates to what extent an increase in trade in Polish agri-food products, which has taken place in the period from 2003 to 2013, translated into the strengthening of its position in the EU trade in agri-food products. First, there is a brief presentation of the results of Polish foreign trade in agri-food products, broken down by agricultural products and food industry products. Then, the paper presents what position is occupied by Poland in agri-food trade, after accession and among 28 European Union countries. Further on, for the purposes of evaluating the importance of Poland in the EU agri-food trade, an index analysis was carried out based on four selected indices: (1) revealed comparative advantage index (RCA), (2) Grubel-Lloyd index of intra-industry trade (GL), (3) Herfindahl-Hirschman index of market concentration (HHI), and (4) Finger-Kreinin index of similarity between trade distributions (FK).

The study has been conducted based on the trade data from the WITS – World Integrated Trade Solution database (Comtrade, HS – Harmonized System 2002 and 1996), expressed in USD[57]. The analysed period covers the years 2003-2013. Agri-food products are represented by chapters 01-24 of the Harmonised Commodity Description and Coding System (HS). Whereas, food industry products are understood as products of three processing branches according to the Polish Classification of Activities (PKD) 2007, namely: 10. Production of food products, 11. Production of beverages, 12. Production of tobacco products. The division of agri-food products into food industry products and agricultural products required adaptation of both classifications to each other[58].

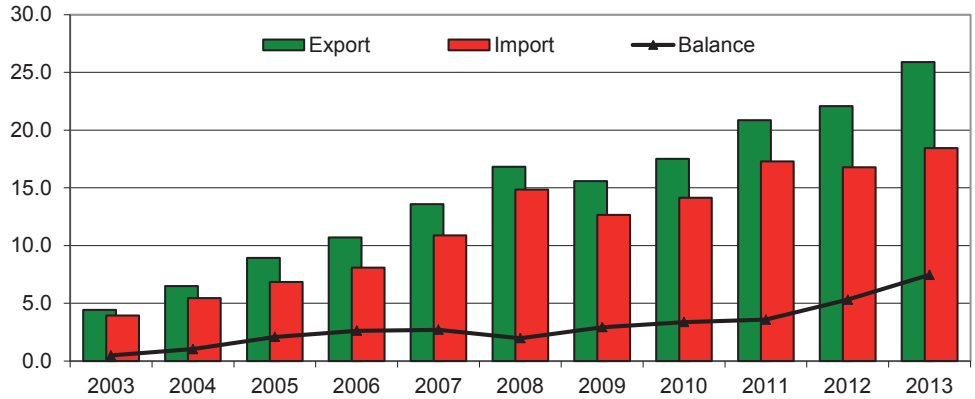
[57] So far, comparative analyses of foreign trade of the European Union used mainly data from the Eurostat database, expressed in EUR [including: Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., pp. 29-34]. Both databases are different not only in terms of currency in which the value of turnover is expressed but also in terms of presenting trade flows in statistics. In Eurostat, the import is presented by country of dispatch (i.e. the country from which the commodity has been imported into Poland, as the country of destination and consumption), while in Comtrade – by country of origin (i.e. the country in which the commodity has been produced or processed and reached Poland in that form). In the same way as in Comtrade, the import is presented in the statistics of the Central Statistical Office and the Ministry of Finance.

[58] For the purposes of the paper, 17 food industry sectors were singled out which included the following classes of production according to PKD 2007: meat (10.11, 10.12, 10.13), fish (10.20), fruit and vegetable (10.31, 10.39), fats (10.41, 10.42), dairy (10.51, 10.52), milling and starch (10.61, 10.62), bakery and pasta (10.71, 10.72, 10.73), sugar (10.81), confectionery (10.82), coffee and tea (10.83), concentrates (10.84, 10.85, 10.86, 10.89), feedstuffs (10.91, 10.92), spirit (11.01), wine (11.02, 11.03, 11.04), brewing (11.05, 11.06), non-alcoholic beverages (10.32, 11.07), tobacco (12.00). Then, using the Polish Classification of Products and Services 2008, products from the HS trade classification have been assigned to the individual food industry sectors (Annex 2.1). It is assumed that the difference between agri-food products (HS chapters 01-24) and food industry products (as defined above) are agricultural products.

2.1. Results of trade in Polish agri-food products

In 2003-2013, the value of the Polish export of agri-food products increased as much as 5.9 times, to the level of USD 25.9 billion (Chart 2.1). Whereas, the import of agri-food products increased by 4.7 times, to the level of USD 18.4 billion. During the EU membership, Poland had a permanent positive balance of trade in agri-food products, and its value was growing on a regular basis. The value of the surplus increased in the analysed period from only USD 0.5 billion in 2003 to USD 7.5 billion in 2013.

Chart 2.1. Poland's foreign trade in agri-food products, in USD billion



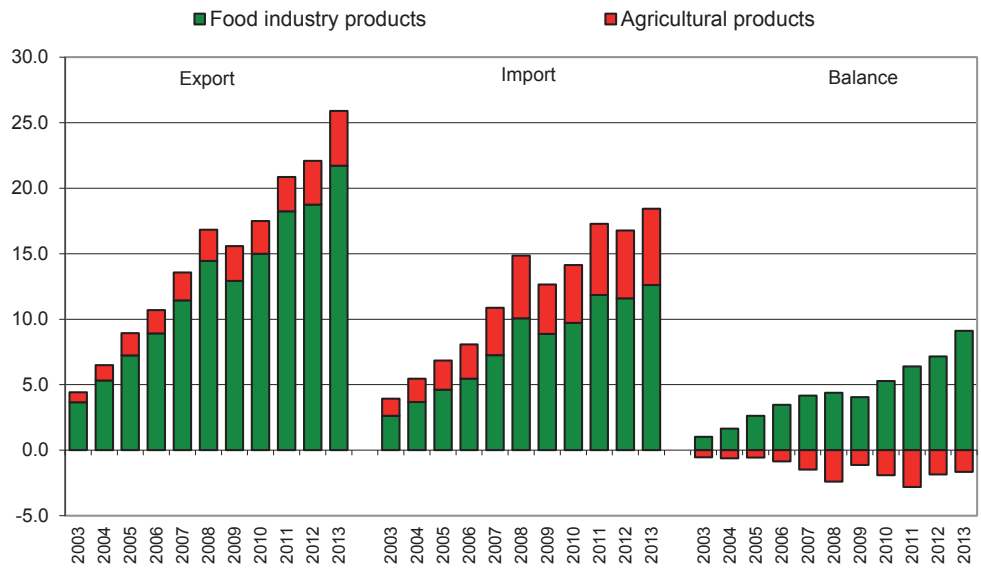
Source: own calculations based on WITS-Comtrade data.

Polish trade in agri-food products was dominated by food industry products. Over the analysed period, the importance of those products in the Polish agri-food export was significantly higher than in the import and oscillated in the range of 81-86% (Chart 2.2). In the import, food industry products accounted for about 2/3 of foreign food supplies to Poland. An increase in the surplus of Polish trade in agri-food products after accession results from the growing surplus of trade in food industry products. In 2013, its value amounted to more than USD 9.1 billion. Whereas, the balance of trade in agricultural products was permanently negative.

The developed commodity structure of trade in agri-food products is beneficial for the Polish economy and confirms the thesis on the export-oriented nature of the development of the national food industry. By exporting processed products, producers gain much higher benefits from value added than by exporting only raw materials required for production of these products. Moreover, industrial food processing intended for export enables better use of resources and thus allows to gain economies of scale. The export of processed (final) products is also conducive to promoting the Polish food sector in external markets, which is more difficult to pursue by exporting agricultural raw materials or industrial semi-products used in secondary food processing[59].

[59] Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., pp. 21-22.

Chart 2.2. Poland's foreign trade in agricultural products and food industry products, in USD billion



Source: own calculations based on WITS-Comtrade data.

In turn, the import of raw materials (most frequently from other climate zones), and then processing them in the country, is more beneficial than the import of finished products, because it is conducive to improving the balance of foreign trade and also enables generation of greater value added, better use of the economic potential and job creation. On the one hand, the import of these products complements the market supply and enhances the offer of domestic producers (in this context, it is competitive for domestic products) and, on the other, it is of processing nature as some of these products are processed in national companies and then re-exported (in this context, it is beneficial both for producers and for the entire economy). The processing export--oriented import develops, first and foremost, thanks to lower production costs in the Polish food industry (*inter alia*, costs of labour, raw materials, energy), which confirms the thesis on price and cost competitive advantages of this export[60].

During the EU membership, the commodity structure of the Polish export and import of food industry products has changed. In the export, the importance of fruit and vegetable industry products clearly decreased, of non-alcoholic beverages – decreased to a lesser extent, while the importance of the tobacco, meat and concentrates industry products increased (Table 2.1). In 2013, products of three of the most important food industries, i.e. meat, dairy and tobacco, generated nearly 44% of revenues from the export of Polish food industry products. In the import, however, after accession,

[60] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (2)*, op. cit.

the importance of products of the fats, fish, confectionery and concentrates industries decreased, while the importance of products of mainly the meat industry and also of the dairy, bakery and pasta industries increased. In 2013, products of the meat, fats, concentrates, fish and confectionery industries were of the greatest importance in supplies to Poland. The above-mentioned five of the most important product groups accounted for as much as 61% of the Polish import of food industry products.

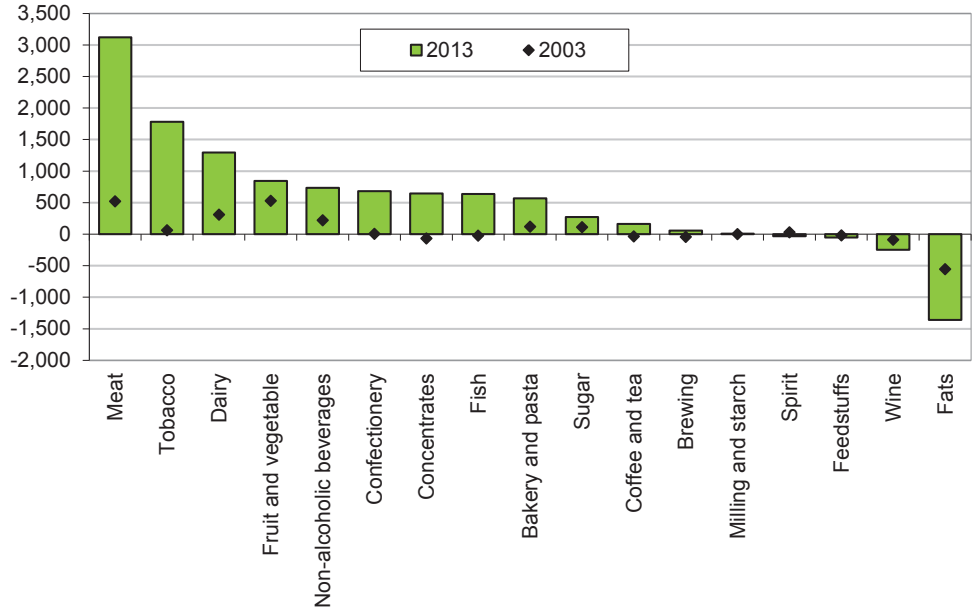
Table 2.1. Commodity structure of the Polish export and import of food industry products in 2003 and 2013, in percent

Food industries	Export		Import	
	2003	2013	2003	2013
Meat	20.9	24.6	9.3	17.7
Fish	7.8	7.8	11.8	8.4
Fruit and vegetable	18.7	7.6	6.0	6.4
Fats	1.0	3.9	22.7	17.6
Dairy	10.0	10.0	2.2	7.0
Milling and starch	2.1	2.4	3.0	4.1
Bakery and pasta	4.5	4.6	1.9	3.5
Sugar	3.5	2.0	0.8	1.3
Confectionery	7.8	7.9	10.7	8.1
Coffee and tea	2.9	3.2	5.6	4.3
Concentrates	6.7	8.0	12.0	8.7
Feedstuffs	1.9	2.0	3.5	3.8
Spirit	1.4	0.9	0.9	1.8
Wine	0.0	0.1	3.4	2.2
Brewing	0.5	0.8	2.5	0.9
Non-alcoholic beverages	8.2	5.0	3.1	2.7
Tobacco	2.0	9.0	0.5	1.5
Food industry in total	100.0	100.0	100.0	100.0

Source: own calculations based on WITS-Comtrade data.

The positive balance of trade in food industry products, achieved by Poland in 2013, results primarily from the surplus in trade in products of the meat, tobacco, dairy and fruit and vegetable industries (Chart 2.3). During the EU membership, products of the first three of the above-mentioned industries have clearly improved the balance of trade, while the surplus in trade in products of the fruit and vegetable industry has improved to relatively the lowest extent. The positive balance of trade (more than USD 500 million) in 2013 was also achieved by the non-alcoholic beverages, confectionery, concentrates, fish and bakery and pasta industries. But then, Poland recorded a permanent deficit in trade in products of the fats, wine, feedstuffs and spirit industries, and its value increased.

Chart 2.3. Polish balance of trade in food industry products, by industries, in USD million



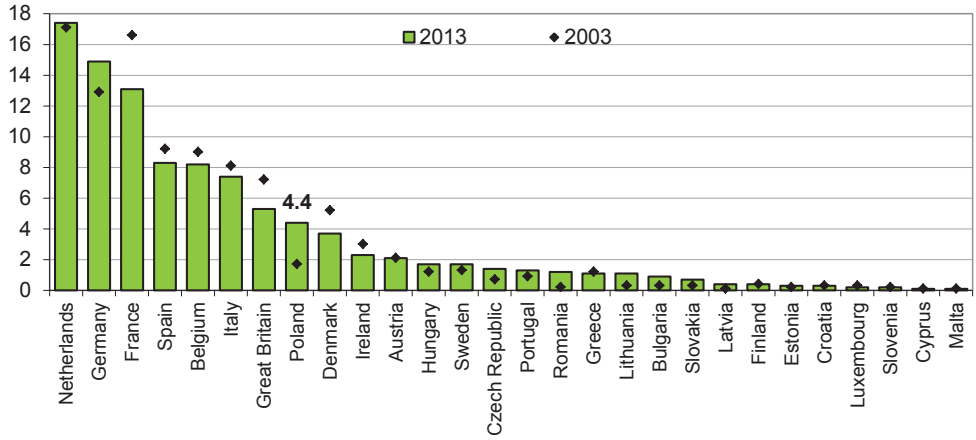
Source: own calculations based on WITS-Comtrade data.

2.2. The share of Poland in foreign trade in agri-food products of the EU

The dynamic development of the Polish agri-food export during the EU membership contributed to the substantial increase in the importance of Poland in the total European Union agri-food export. In 2003-2013, the share of Poland in the EU agri--food export increased by more than 2.5 times, from 1.7% in 2003 to 4.4% in 2013 (Chart 2.4). Thus, Poland was ranked eighth in terms of the food export value in the EU. However, it still lags behind the largest EU exporters of agri-food products such as: Germany, the Netherlands, France, and also Belgium, Italy, Spain and Great Britain. Despite the clear improvement during the EU membership (over the analysed period, Poland managed to outrival Austria, Denmark and Ireland), the Polish position in the EU agri-food export still does not correspond fully either to the economic potential or to the ambitions and expectations of Polish food producers.

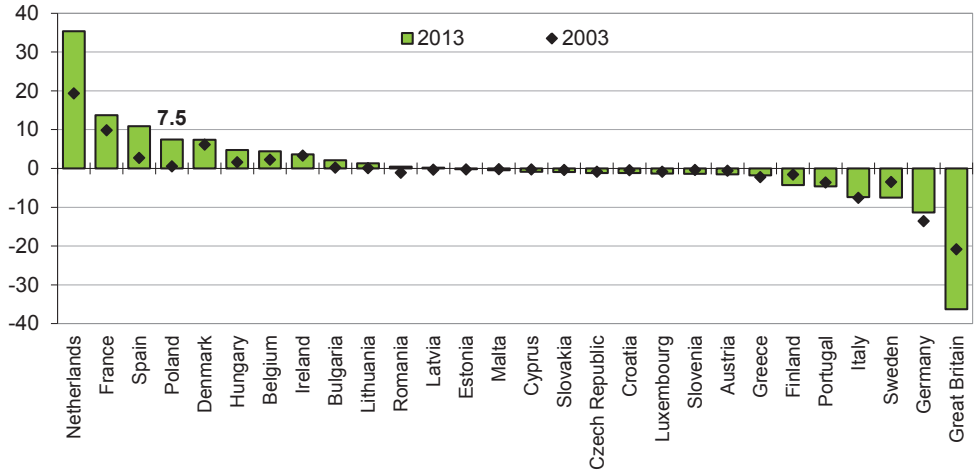
In 2013, Poland occupied the fourth place among the EU countries in terms of the value of the surplus in trade in agri-food products (USD 7.5 billion), ranking behind the Netherlands, Germany and Belgium, only (Chart 2.5). It was undoubtedly a great success of Polish food exporters, as in the last year before accession to the EU, the Polish surplus was only USD 0.5 billion, which ranked it only eighth among the EU countries. During the EU membership, Poland has become the undisputed leader in the food export among the new Member States.

Chart 2.4. The share of the individual countries in the European Union agri-food export, in percent



Source: own calculations based on WITS-Comtrade data.

Chart 2.5. The balance of trade in agri-food products of the individual European Union countries, in USD billion



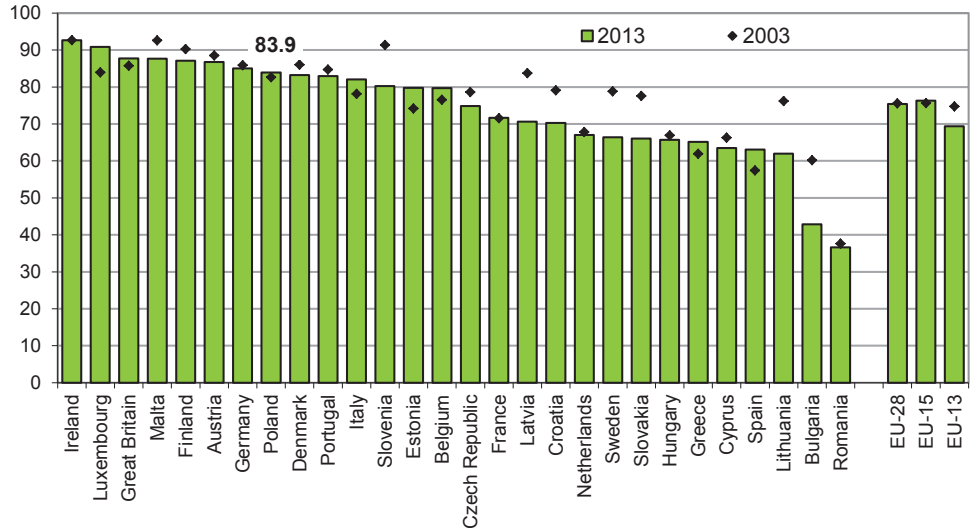
Source: own calculations based on WITS-Comtrade data.

The high positive balance of foreign trade proves the profitability of the Polish agri-food export. It is difficult to assume that companies operating in accordance with the principles of the market economy decide on the permanently unprofitable export and cover their losses with profits gained in the domestic market (of course, the incidental export at prices which do not cover costs is possible, if the company cares about the presence in the market and an improvement in the economic situation is expected)[61].

[61] Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., pp. 33.

As it has been mentioned earlier, the subject of Polish foreign trade in agri-food products were mainly food industry products. In 2013, the share of those products in the Polish food export amounted to as much as 83.9% (when compared to 75.4% in the EU) and belonged to the highest shares among the EU countries (Chart 2.6). Only the shares of Ireland, Luxembourg, Germany, Finland, Great Britain, Austria and Malta were higher than that of Poland. The share of food industry products in the Polish agri--food import in 2013 was 68.4%, i.e. similarly as in the EU. Such export structure, as it results from the previous analyses, is a very beneficial phenomenon, as the food sector entities, by implementing higher value added, use the available resources better and achieve higher profits.

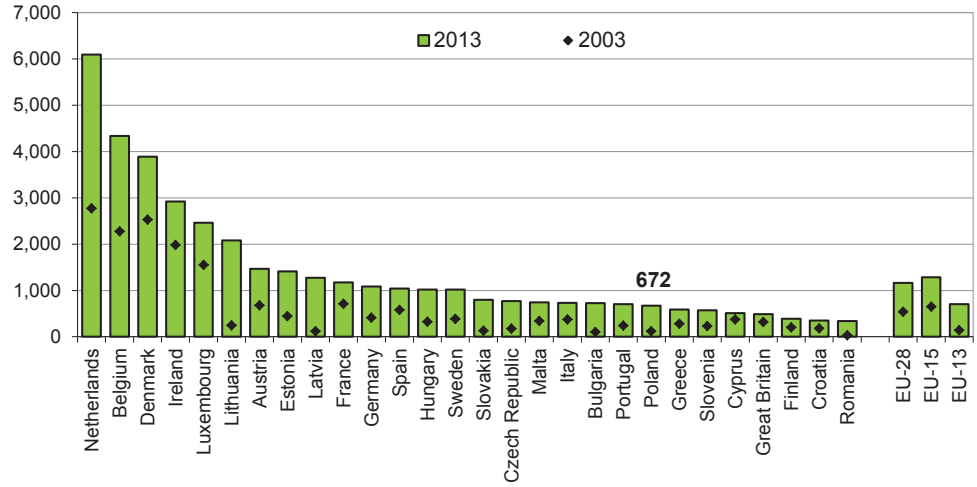
Chart 2.6. The share of food industry products in the agri-food export of the individual European Union countries, in percent



Source: own calculations based on WITS-Comtrade data.

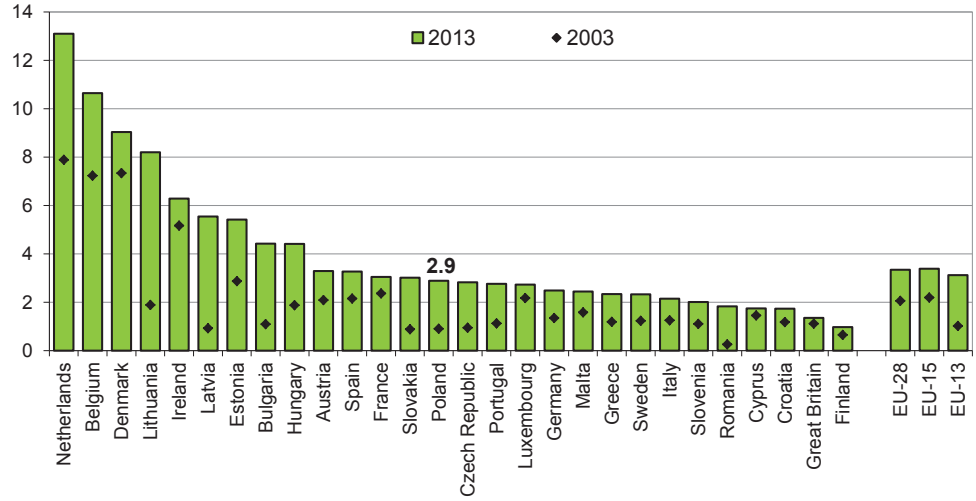
While an analysis carried out on the basis of absolute values showed that Poland had a strong position in agri-food trade among the European Union Member States, the evaluation carried out on the basis of relative values was not so unambiguous. In 2013, Poland ranked only twenty first among the EU countries in terms of the value of the export of agri-food products *per capita* (Chart 2.7). Despite the clear improvement in that index during the EU membership, it was still low and in 2013 it amounted to only USD 672 *per capita.* The leading positions were occupied by the countries with intensive agricultural economy, i.e. the Netherlands, Belgium, Denmark and Ireland. In 2013, the value of the Dutch export of agri-food products *per capita* was more than nine times higher than in Poland. The indices higher than in Poland were also recorded by the majority of the new EU Member States. After accession, that index particularly improved in Lithuania and Latvia.

Chart 2.7. Export of agri-food products of the individual EU countries *per capita*, in USD



Source: own calculations based on WITS-Comtrade and Eurostat data.

Chart 2.8. Export of agri-food products of the individual EU countries in relation to GDP, according to the purchasing power parity, in percent



Source: own calculations based on WITS-Comtrade and IMF World Economic Outlook Database, October 2014 data.

Poland came off a little bit better among the EU countries with regard to the share of the export of agri-food products in Gross Domestic Product (GDP) calculated based on the purchasing power parity (PPP). In 2013, the value of the Polish agri-food export amounted to 2.9% of Polish GDP according to the PPP, which ranked Poland fourteenth among the EU countries (Chart 2.8). The highest share of the export in GDP

was recorded by the countries with the intensive agricultural economy, i.e. the Netherlands, Belgium and Denmark. The leading positions were also occupied by: Lithuania, Latvia and Bulgaria, which during the EU membership recorded the biggest increase in that index. However, in Poland the share of the agri-food export in GDP was still higher than in Germany, Italy and Great Britain, i.e. the countries with well-developed agriculture and food processing (due to the size of the economies, this effect was of relatively minor importance).

2.3. Importance of Poland in trade in agri-food products of the EU – index analysis

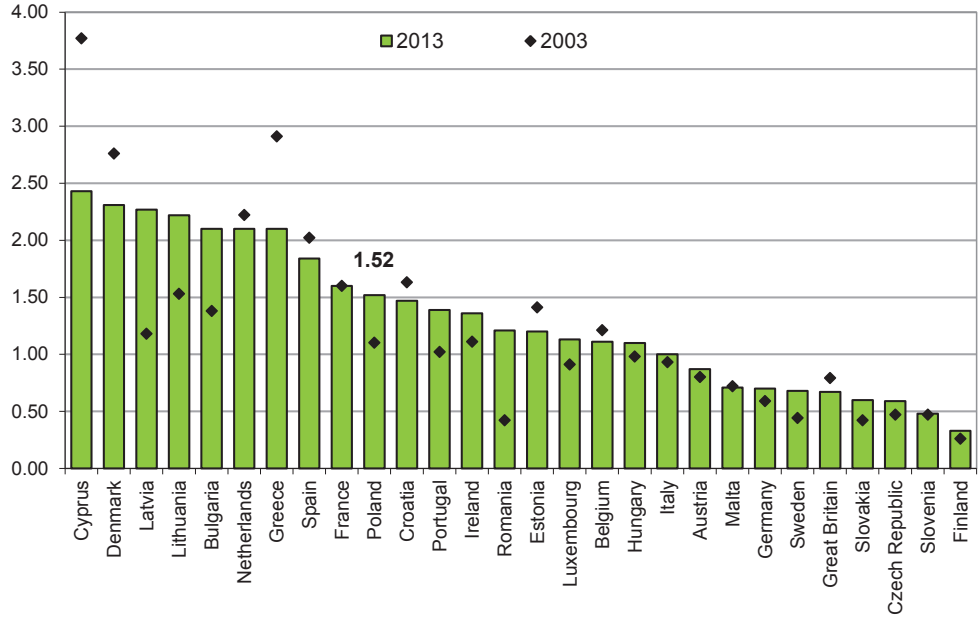
2.3.1. B. Balassa revealed comparative advantage index[62]

The essence of the B. Balassa revealed comparative advantage index (RCA) consists in determining whether the share of a given product group in the export of the country in question is higher/lower than the share of this product group in the world export to the specific market. When the index takes values greater than 1 (the share of the given product group in the export of the country in question is higher than the corresponding share in the world export) – the country in question has revealed comparative advantages in the export to the specific market. Otherwise, when the index takes values lower than 1 (the share of the given product group in the export of the country in question is lower than the corresponding share in the world export) – the country in question does not have revealed comparative advantages in the export to the specific market.

In 2013, Poland belonged to the European Union countries with the highest RCA indices in the export of agri-food products to the world market (Chart 2.9). The share of those products in the total Polish export was more than 1.5 times higher than their share in the world export (RCA = 1.52). Among the new EU Member States, only in Cyprus, Lithuania, Latvia and Bulgaria revealed comparative advantages in the export of food were stronger than those of Poland. Thus, these were relatively small countries where agriculture and food processing still plays an important role. In terms of competitiveness, Poland was also inferior to several EU-15 countries, namely Denmark, the Netherlands and France (countries with the intensive agricultural economy) as well as Greece and Spain. During the EU membership, revealed comparative advantages have become clearly stronger in the Polish agri-food export and also in that of most of the new EU Member States (except for Cyprus, Croatia and Estonia), while the greatest improvement in the value of that index was recorded by Latvia, Romania, Lithuania and Bulgaria.

[62] The Balassa revealed comparative advantage index (RCA) has been discussed in detail in Chapter 3.3.

Chart 2.9. RCA indices in the export of agri-food products of the individual EU countries



Source: own calculations based on WITS-Comtrade data.

Poland had particularly strong comparative advantages in the export of products from certain food industries (Table 2.2, Annex 2.2 and 2.3). Among the EU countries, in 2013 Poland was ranked second with regard to the RCA index value in the export of products of the confectionery industry (after the Netherlands), and of the coffee and tea industry (after Luxembourg) as well as third in the export of products of the meat industry (after Denmark and Ireland), and of the bakery and pasta industry (after Italy and Bulgaria). In the export of products of the tobacco and non-alcoholic beverages industries, Poland was ranked fifth among the most competitive EU countries. A strong competitive position was also recorded by Polish exporters of products of the concentrates and fruit and vegetable industries (Poland was ranked sixth among the EU countries with regard to the RCA index value in 2013), and also of the sugar industry (seventh place) and the fish industry (eighth place). Although the RCA indices in the Polish export of products of the dairy industry were high (RCA = 2.07), Poland did not come off well among the EU Member States and occupied the eleventh place only. Whereas, the Polish competitive position was weak – when compared to other EU Member States – in the export of products of the wine, brewing, feedstuffs, fats, milling and starch industries.

Table 2.2. RCA indices in the Polish export of food industry products, by individual industries

Food industries	RCA index value		Change in 2003-2013, in points	Position of Poland among the EU countries with regard to the RCA index value	Countries with the RCA index value higher than that of Poland[a]
	2003	2013			
Meat	1.70	2.89	1.19	3.	Denmark (5.60), Ireland (3.84)
Fish	0.81	1.39	0.58	8.	Denmark (4.37), Malta (3.82), Latvia (2.77), Portugal (2.40), Estonia (2.33)
Fruit and vegetable	3.60	2.26	-1.33	6.	Greece (9.82), Luxembourg (3.02), Spain (2.62), Belgium (2.60), Portugal (2.43)
Fats	0.15	0.55	0.40	13.	Netherlands (1.83), Spain (1.77), Portugal (1.53), Bulgaria (1.51), Hungary (1.01)
Dairy	1.43	2.07	0.63	11.	Cyprus (9.44), Luxembourg (6.81), Lithuania (4.76), Denmark (4.57), Latvia (4.40)
Milling and starch	0.62	0.85	0.22	13.	Bulgaria (2.95), Lithuania (1.76), Cyprus (1.33), France (1.26), Hungary (1.22)
Bakery and pasta	1.65	2.45	0.80	3.	Italy (4.06), Bulgaria (3.27)
Sugar	1.76	1.15	-0.61	7.	Croatia (4.21), Portugal (1.82), Slovakia (1.81), France (1.53), Latvia (1.45)
Confectionery	1.99	3.21	1.21	2.	Netherlands (3.25)
Coffee and tea	2.46	2.77	0.31	2.	Luxembourg (2.83)
Concentrates	1.17	1.76	0.59	6.	Malta (4.07), Denmark (4.01), Croatia (3.97), Ireland (3.89), Netherlands (2.61)
Feedstuffs	0.99	1.34	0.36	13.	Lithuania (4.41), Hungary (4.22), Netherlands (3.93), Denmark (3.41), France (2.85)
Spirit	0.49	0.55	0.07	17.	Latvia (21.55), Great Britain (8.62), Cyprus (7.59), Estonia (6.42), France (4.81)
Wine	0.01	0.07	0.06	28.	France (8.49), Portugal (6.97), Italy (6.23), Spain (5.21), Lithuania (3.97)
Brewing	0.28	0.69	0.41	19.	Croatia (3.50), Portugal (3.44), Belgium (3.41), Netherlands (3.01), Czech Republic (2.00)
Non-alcoholic beverages	2.59	2.45	-0.14	4.	Cyprus (6.33), Austria (6.12), Netherlands (2.56)
Tobacco	0.65	6.28	5.63	5.	Cyprus (19.17), Lithuania (8.32), Luxembourg (7.87), Romania (6.58)
Food industry in total	1.30	1.85	0.55	7.	Denmark (2.80), Latvia (2.33), Cyprus (2.24), Netherlands (2.04), Lithuania (2.00)

[a] when Poland occupied a place further than sixth, the number of the mentioned countries with the RCA index higher than that of Poland was limited to five

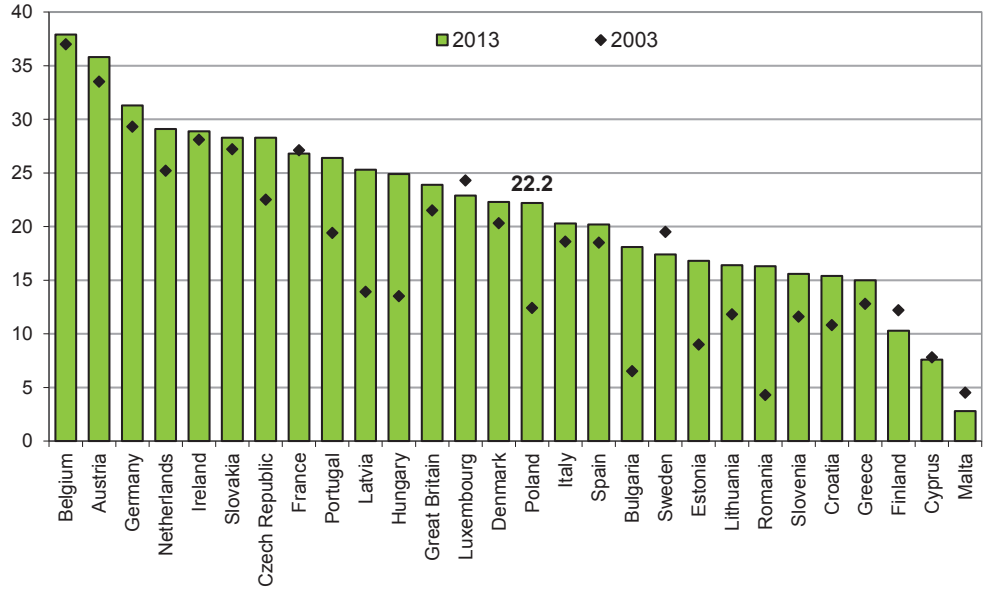
Source: own calculations based on WITS-Comtrade data.

2.3.2. Grubel-Lloyd index of intra-industry trade[63]

Another indicator used is the Grubel-Lloyd index of intra-industry trade (GL). Intra-industry trade between two countries means the simultaneous export and import of products coming from the same industry. The GL index informs what part of trade is of intra-industry nature. The higher is the value of this index, the more important is intra-industry trade. The GL indices were calculated in bilateral relations of the EU countries at the four-digit level of aggregation of trade data according to the HS classification and then they were aggregated to the level of total agri-food trade or of trade in products of the individual food industries.

Despite the clear growth in the intensity of intra-industry trade in agri-food products during the EU membership, in 2013 Poland, with regard to the GL index value, occupied a place somewhere in the middle of the list including all EU Member States. Intra-industry trade accounted for a little more than 22% of trade in agri-food products of Poland (Chart 2.10). Therefore, it was of less importance than in some new EU Member States (i.e. the Czech Republic, Hungary and Slovakia) and in many EU-15 countries (*inter alia*, Belgium, Austria, Germany, the Netherlands, Ireland, France, Portugal, Great Britain and Denmark).

Chart 2.10. Indices of intra-industry trade in agri-food products of the individual EU countries, in percent



Source: own calculations based on WITS-Comtrade data.

[63] The Grubel-Lloyd index of intra-industry trade (GL) has been discussed in detail in Chapter 4.1.

The intra-industry index informs about the degree of the intra-industry specialisation in trade of the given country. The intra-industry specialisation allows to gain bigger benefits from trade than the inter-industry specialisation, both from the point of view of producers and consumers. Each country participating in trade may reduce the number of varieties of produced goods, but produce them on a greater scale, which leads to reducing the production costs, and, consequently, to lower prices. For consumers, this type of trade means, in turn, the increased number of varieties of produced goods available in the domestic market, offered by both domestic and foreign producers. The bigger choice in the market enables the greater satisfaction of the increasingly diversified consumer needs[64].

The highest indices of intra-industry trade in agri-food products have been recorded in Belgium and Austria (more than 35%), Germany (more than 30%) and in the Netherlands and Ireland (nearly 30%). These countries are characterised by a high level of income *per capita* (measured by the GDP level *per capita*), which – according to the theory – is one of the factors for the development of intra-industry trade[65]. The greater is the purchasing power of the population, the higher is the tendency to purchase various goods. Moreover, in the above listed countries food industry products are relatively important in trade. When compared to agricultural products, more or less processed food products provide higher possibilities to diversify them, and thus the potential for the development of intra-industry trade is higher.

The clear differentiation of indices of intra-industry trade among the EU countries also took place at the level of the individual food industries (Table 2.3, Annex 2.4 and 2.5). In most of those countries, the higher than average GL indices were characteristic of trade in products of the confectionery, concentrates, bakery and pasta, non-alcoholic beverages, dairy and foodstuffs industries and, to a lower extent, also trade in products of the fruit and vegetable, and meat industries.

The indices of intra-industry trade in products of certain food industries in Poland were among the highest in the EU countries. This applied to, *inter alia*, products of the coffee and tea industry (Poland was ranked third with regard to the GL index value, being inferior only to Great Britain and Latvia), concentrates and brewing industries (sixth place among the EU countries), and the fish and feedstuffs industries (seventh place). Whereas, in trade in products of the wine, non-alcoholic beverages, meat and sugar industries, Poland recorded one of the lowest GL indices among the remaining EU countries.

[64] Ł. Ambroziak, I. Szczepaniak, *Monitoring i ocena konkurencyjności polskich producentów żywności (4). Pozycja konkurencyjna*, op. cit., p. 75.
[65] E. Czarny, *Teoria i praktyka handlu wewnątrzgałęziowego (Theory and practice of intra-industry trade)*, SGH, Warszawa 2002, pp. 173-176.

Table 2.3. GL indices in the Polish export of food industry products, by individual sectors

Food industries	GL index value in %		Change in 2003-2013, in pp	Position of Poland among the EU countries with regard to the GL index value	Countries with the GL index value higher than that of Poland[a]
	2003	2013			
Meat	10.8	13.6	2.7	23.	Austria (41.8), Belgium (40.7), Germany (36.7), Netherlands (35.7), Latvia (33.8)
Fish	9.0	23.1	14.1	7.	Belgium (38.2), Portugal (32.7), Netherlands (28.4), Latvia (26.7), Germany (25.7)
Fruit and vegetable	7.6	19.6	12.0	16.	Austria (42.4), Portugal (35.2), Belgium (32.7), France (32.3), Spain (30.7)
Fats	0.8	14.2	13.4	14.	Slovakia (36.8), Belgium (31.2), Austria (30.6), Portugal (29.8), Czech Republic (25.6)
Dairy	9.2	33.1	23.9	13.	Belgium (53.6), Germany (44.5), Austria (41.8), Netherlands (41.8), Spain (38.9)
Milling and starch	4.2	24.7	20.5	10.	Netherlands (42.4), Estonia (39.3), Germany (36.3), Spain (35.2), Belgium (35.0)
Bakery and pasta	31.2	51.2	20.1	15.	Austria (66.9), Ireland (66.3), Netherlands (64.1), Belgium (63.9), Slovakia (61.1)
Sugar	12.1	11.4	-0.7	20.	Netherlands (52.8), Latvia (50.8), Belgium (46.5), Sweden (41.5), Germany (38.8)
Confectionery	30.8	40.1	9.3	13.	Ireland (61.3), Denmark (57.5), Slovakia (51.8), Austria (51.0), Czech Republic (50.2)
Coffee and tea	21.3	40.9	19.6	3.	Great Britain (46.6), Latvia (41.5)
Concentrates	26.5	42.5	16.0	6.	Belgium (57.5), Austria (50.9), Germany (50.1), Czech Republic (44.6), France (43.8)
Feedstuffs	28.4	52.0	23.6	7.	Ireland (68.6), Great Britain (62.9), Austria (57.2), Germany (55.6), Belgium (53.4)
Spirit	29.8	26.8	-2.9	10.	Netherlands (47.6), Austria (43.6), Denmark (43.6), Belgium (42.2), Italy (40.2)
Wine	0.5	2.2	1.7	27.	Luxembourg (28.8), Croatia (27.9), Romania (20.0), Slovenia (19.5), Czech Republic (18.6)
Brewing	4.2	25.5	21.4	6.	Latvia (57.4), Estonia (47.6), Lithuania (46.4), Luxembourg (46.4), Great Britain (41.6)
Non-alcoholic beverages	8.5	21.9	13.4	24.	Czech Republic (59.4), Slovakia (54.4), Ireland (54.3), Croatia (45.6), Hungary (43.6)
Tobacco	0.4	8.2	7.8	18.	Belgium (47.3), Latvia (43.7), Luxembourg (38.4), Hungary (30.4), Great Britain (24.6)
Food industry in total	13.4	25.1	11.7	13.	Belgium (41.8), Austria (39.5), Germany (36.8), Netherlands (33.6), Slovakia (32.7)

[a] when Poland occupied a place further than sixth, the number of the mentioned countries with the GL index higher than that of Poland was limited to five

Source: own calculations based on WITS-Comtrade data.

2.3.3. Herfindahl-Hirschman index of concentration (HHI)

Another index, which was used to evaluate the position of Poland in agri-food trade of the EU is the Herfindahl-Hirschman index of concentration (HHI). This index allows to measure the concentration of both the geographical and commodity structure, in the export or import. The essence of this index will be presented on an example of the commodity structure. The HHI index was calculated according to the formula:

$$HHI = \frac{\sum_{i=1}^{n} s_i^2 - \frac{1}{n}}{1 - \frac{1}{n}}$$

where:

HHI – Herfindahl-Hirschman index of concentration,

s_i – share of the value of the i^{th} commodity group in the export (import) of the given country (here: six-digit HS classification),

n – number of commodity groups in the export (import) of the given country.

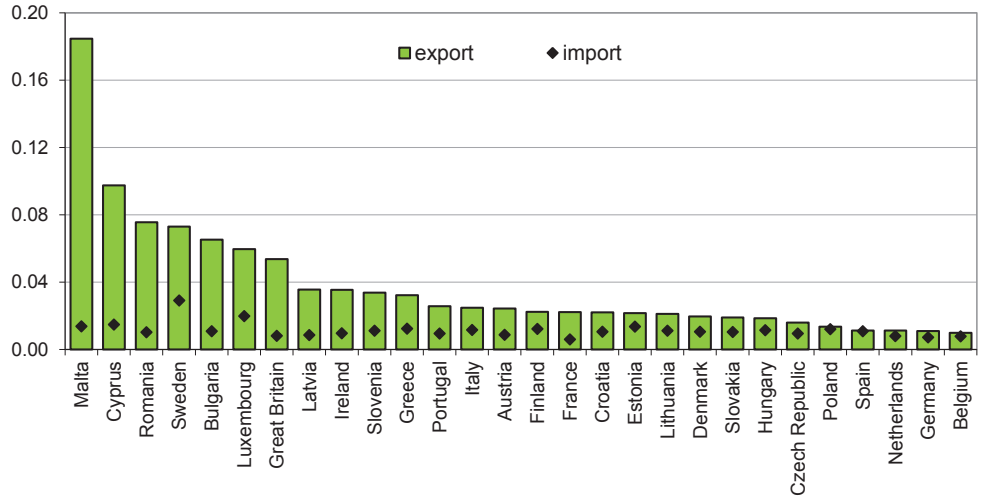
The index value depends, first and foremost, on the distribution of the individual product groups in the export (import), i.e. to what extent they are evenly distributed and how many groups are in the export (import). For the purposes of the calculations, product groups were distinguished by HS subheading, i.e. the six-digit HS classification code. The HHI index takes the value of 1 if the export (import) is focused on one product group. When the share of individual product groups in the export (import) is relatively even, the HHI index is close to zero.

An identical interpretation is applied to the HHI index of geographical concentration. If this index takes the value of 1, the export (import) is concentrated on one country. When the share of individual countries in the export (import) is relatively even, the HHI index is close to zero.

Over the analysed period, the index of commodity concentration in the agri-food export of Poland belonged to the lowest among the EU countries (Chart 2.11, Annex 2.6). This means that the share of individual product groups in the Polish agri-food export was relatively even. The high degree of the commodity diversification is a beneficial phenomenon, because it allows to minimise the risk related to perturbations in individual food markets. In 2013, only four EU Member States, i.e. Spain, the Netherlands, Germany and Belgium, recorded the index of commodity concentration lower than in Poland. The progressive commodity diversification of the Polish agri-food export is also shown by the fact that in 2003-2013, the number of product groups in the export, according to the six-digit HS classification, increased from 400 to 648.

The index of commodity concentration in the import of the EU countries was lower than in the export. In most countries, the value of that index decreased in 2003-2013, which indicates the progressive commodity diversification of the import. Nevertheless, when compared to other EU Member States, in Poland that index remained at a relatively high level.

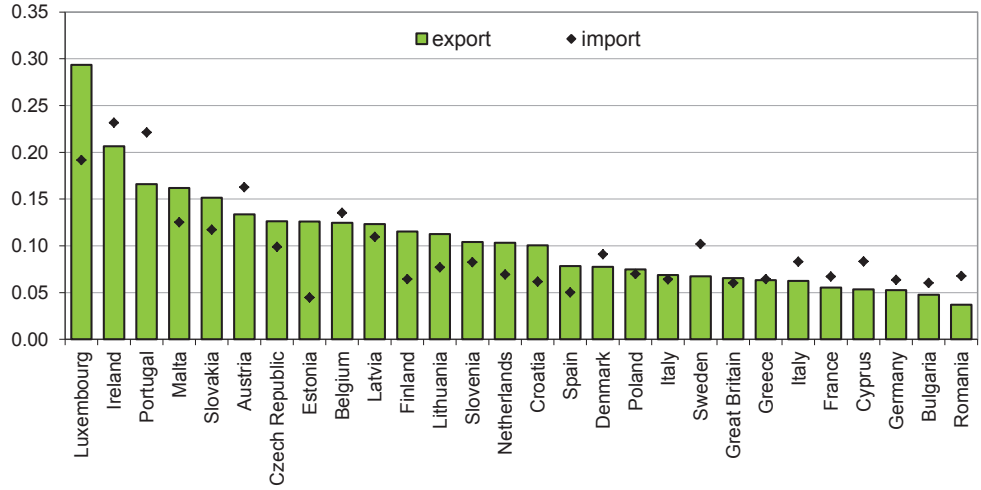
Chart 2.11. HHI indices of concentration in the agri-food export and import of the individual EU countries in 2013



Source: own calculations based on WITS-Comtrade data.

The index of geographical concentration of the Polish agri-food export in 2013 was among the lowest indices in the EU countries. The degree of the geographical diversification of foreign sales of Polish food products was high, which is a beneficial phenomenon. The index lower than that of Poland was recorded by Germany, France, Greece, Great Britain, Sweden and Italy, and also Bulgaria, Romania, Hungary and Cyprus (Chart 2.12 and Annex 2.6).

Chart 2.12. HHI indices of geographical concentration in the agri-food export and import of the individual EU countries in 2013



Source: own calculations based on WITS-Comtrade data.

In 2013, with regard to the value of the index of geographical concentration, Poland occupied a similar place in the import as in the export (Chart 2.12 and Annex 2.6). However, over the analysed period, the value of that index in the import increased which means an increase in the concentration among suppliers of agri-food products to Poland.

2.3.4. Finger-Kreinin index of similarity in trade between two countries

The last index used in the analysis is the Finger-Kreinin index of similarity in trade between two countries (FK). This index may measure the similarity of both the commodity and geographical structure, in the export or import of two countries. The essence of this index will be presented on an example of the commodity structure in the export. The FK index was calculated according to the formula:

$$FK_{jk} = \left(\sum_{i=1}^{n} \min(x_{ij}, x_{ik}) \right) * 100$$

where:

FK_{jk} – Finger-Kreinin index of similarity in trade structure,

x_{ij} – share of the value of the i^{th} commodity group in the export (import) of the j^{th} country (here: six-digit HS classification),

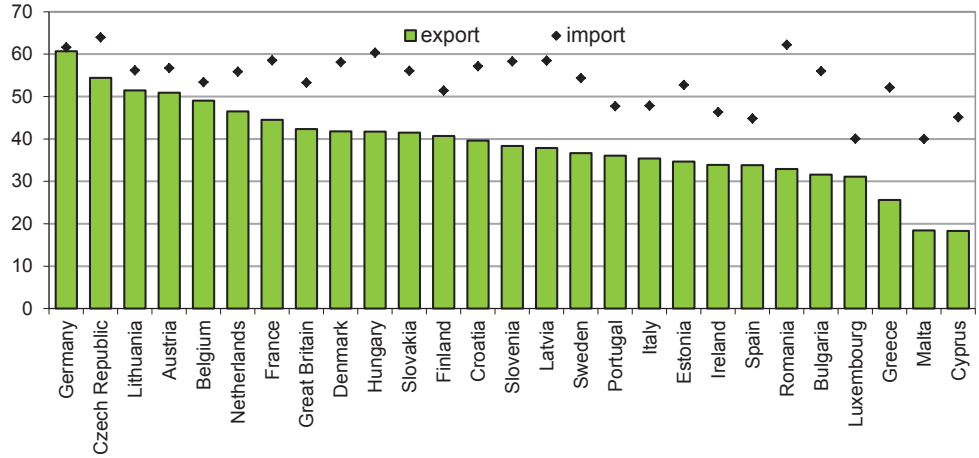
x_{ik} – share of the value of the i^{th} commodity group in the export (import) of the k^{th} country (here: six-digit HS classification),

n – number of commodity groups in the export (import) of the given country.

The value of the FK index is a sum of lower shares of the given product group in the export of two countries. Just like in the case of the HHI index, the individual subheadings according to the six-digit HS classification were adopted as a product group. The FK index takes the value of 100 if the commodity structure of the export or import of two countries is the same. The FK index equal to zero means that the commodity structure of the export or import of two countries is different. An identical interpretation is applied to the similarity of the geographical structure.

In 2013, the commodity structure of the Polish agri-food export was the most similar to the structure of the German, Czech, Lithuanian, Austrian, Belgian and Dutch export (Chart 2.13 and Annex 2.7). Over the analysed period, the similarity of the commodity structure of the Polish export to that of other EU countries increased. On the one hand, the increase in the similarity of the commodity structure means that Poland and other EU countries increasingly compete in foreign markets in the same product groups. On the other, the fact that the structures become similar to each other creates possibilities of the development of intra-industry trade, covering the simultaneous export and import of products coming from the same industries.

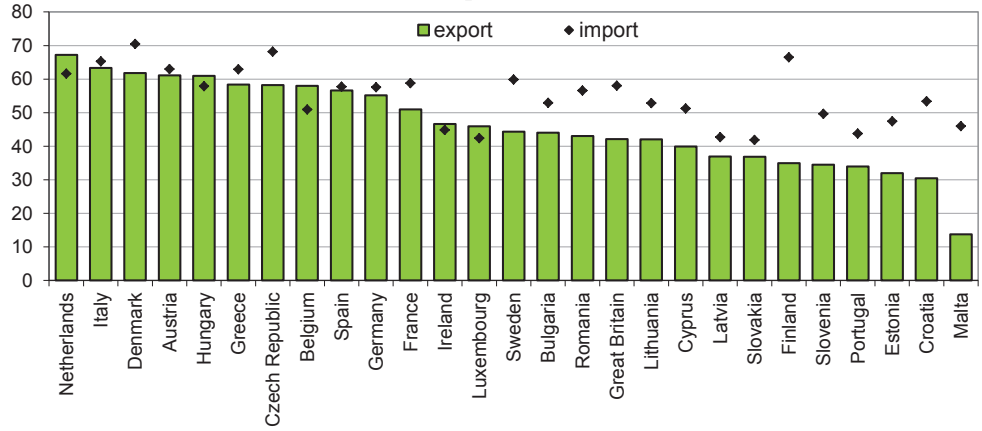
Chart 2.13. FK indices of similarity of the commodity structure in the agri-food export and import of Poland and the individual EU countries in 2013, in percent



Source: own calculations based on WITS-Comtrade data.

The FK index of similarity of the commodity structure in the import of Poland and other EU countries was higher than that in the export, and over the analysed period it increased for almost all surveyed countries. The countries whose structure was most similar to that of the Polish import were: the Czech Republic, Romania, Germany, Hungary, France, Latvia and Slovenia.

Chart 2.14. FK indices of similarity of the geographical structure in the agri-food export and import of Poland and the individual EU countries in 2013, in percent



Source: own calculations based on WITS-Comtrade data.

The highest indices of similarity of the geographical structure were characteristic of the agri-food export of Poland and the export of countries such as the Netherlands, Italy, Denmark, Austria and Hungary (Chart 2.14 and Annex 2.7). This resulted

mainly from the great importance of Germany as a recipient of food from those countries. The indices of similarity of the geographical structure in the agri-food import of Poland and the EU countries were usually higher than those in the export. The geographical structures of the Polish import were most similar to those of countries such as Denmark, the Czech Republic, Finland, Italy and Austria.

2.4. Summary

During the EU membership, the importance of Poland in the EU trade in agri-food products has significantly increased. In 2013, Poland was ranked eighth with regard to the value of the agri-food export. Its value accounted for 4.4% of the EU food export (intra- and extra-export), when compared to 1.7% in 2003. Poland also managed to obtain the fourth-largest surplus in trade in those products in the EU (USD 7.5 billion in 2013). This was possible because of the dynamic growth of the export of food industry products, which significantly dominated the Polish food export (they accounted for more than 80% of its value), and their share was among the highest in the EU countries. The high share of food industry products in the export is beneficial for the Polish economy and confirms the thesis about the export-oriented nature of the food industry development. The export of processed products is a source of greater benefits than the export of raw materials required for their production. Processing of food intended for export also enables the better use of resources and thus allows to derive higher economies of scale of the production.

In 2003-2013, the competitive position of Poland in the export of agri-food products, as measured by the revealed comparative advantages (RCA) index, became stronger. In 2013, the value of that index in the Polish export (RCA = 1.52) was among the highest in the new EU Member States. In 2013, Poland had a strong competitive position in the export of products of such food industries as: tobacco, meat, confectionery, bakery and pasta, fruit and vegetables, dairy, and, to a lesser extent, also fish and concentrates.

During the EU membership, the share of intra-industry trade in Polish trade in agri-food products also increased significantly, which indicates the growing intra--industry specialisation that is more beneficial – both for producers and consumers – than the inter-industry specialisation. In most EU countries, the higher than average GL indices were characteristic of trade in products of the confectionery, concentrates, bakery and pasta, non-alcoholic beverages, dairy and feedstuffs industries and, to a lesser extent, also trade in products of the fruit and vegetables, and meat industries.

In 2013, the index of commodity concentration in the Polish export of agri-food products was among the lowest in the EU countries. The index of geographical concentration in the agri-food export of Poland was also low, when compared to other EU countries. This indicates the high degree of diversification of both the commodity structure and the geographical structure of the Polish agri-food export, which is a beneficial phenomenon, because it allows to minimise the risk related to dealing with foreign sale.

After accession to the EU, the similarity between the commodity structure of the agri-food export of Poland and that of other EU countries has clearly increased. This resulted from, *inter alia*, extension by Polish exporters of the range of products offered (at that time, the number of product groups increased from 400 to 648, according to the six-digit HS codes). The increased similarity of structures means that Poland and other EU countries increasingly compete in foreign markets in the same product groups. However, this situation also creates possibilities of the development of intra-industry trade, including the simultaneous export and import of products coming from the same industries.

Despite clear development of the Polish agri-food export in the first decade of the EU membership, our country still has great economic potential with regard to expansion into foreign markets. However, it is required for food producers to take decisive actions which will improve the use of this potential. One of them is the further diversification of the geographical structure of the Polish export, so as to minimise, as much as possible, the risk associated with the collapses of demand of major recipients. But this task is not easy as the competition in food markets is very strong even now.

3. Evaluation of the Polish competitive position in foreign trade in agri-food products with the European Union

This chapter describes the changes in the Polish competitive position in trade in agri-food products in the European Union market (EU-28), including a clear distinction between the EU-15 and the EU-13 countries. For the evaluation of the competitive position, the following four indicators were selected: (1) export specialisation index (SI), (2) trade coverage index (TC), (3) B. Balassa revealed comparative advantage index (RCA), and (4) Lafay index (LFI). The SI and RCA indices are based on the export, while the TC and LFI indices refer to the import-export relationships. The above-mentioned indicators point to the inter-industry specialisation in trade in the given product group. This type of trade is usually identified with a country that has comparative advantages in the production of such products. The specialisation in the production and export of specific products is reflected, *inter alia*, in the growing surplus of trade in these products. The discussion of changes in the individual indices was concluded by a summary evaluation of the competitive position of Polish food producers in the European Union market, based on all four indices.

An analysis of the above-mentioned indices – just like in the previous chapter – was carried out based on the trade data from the WITS – World Integrated Trade Solution database (Comtrade, HS – Harmonised System 2002 and 1996), expressed in USD. Similarly, the analysed period covers the years 2003-2013. The analysis applies both to total trade between Poland and the European Union (EU-28), and separately to trade with the EU-15 countries and with the new Member States (EU-13).

3.1. Export specialisation index (SI)

The export specialisation index (SI) allows to compare the share of the given product group in the export of the given country to the specific market, to the share of this product group in the export of the given country to the world market. This index may be expressed by the formula:

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

where:

SI_{ij} – specialisation index in the Polish export of the i^{th} product group to the j^{th} market,

X_{ij} – Polish export of the i^{th} product group to the j^{th} market,

X_{iw} – Polish export of the i^{th} product group to the world market,

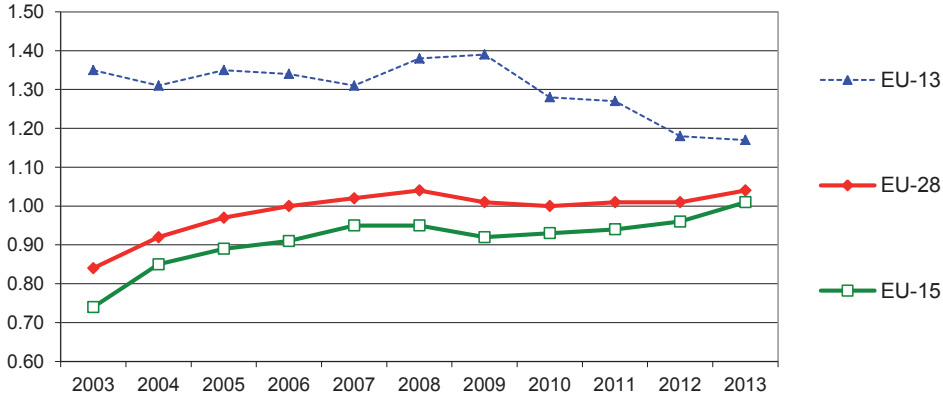
N – number of product groups (here: total export).

In this paper, the specialisation index was used to compare the structure of the Polish export of agri-food products to the European Union Member States (EU-28 and, separately, EU-15 and EU-13), to the structure of the total agri-food export of Poland, by HS chapters.

The value of the index above 1 informs about the fact that Poland specialises in the export of the given product group to the specific market. If the value of this index is below 1, this means that Poland does not have such specialisation.

The specialisation index in the Polish export of agri-food products to the EU-28 countries clearly increased in the first five years of Poland's membership in the EU (Chart 3.1). Since 2006, Poland has already specialised in the export of those products to the EU market. In the following years, the SI index slightly decreased and oscillated around the value of 1. As late as in 2013, it increased again, to the level of 1.04. During the membership, Poland recorded much higher SI indices in the export to the EU-13 countries rather than to the EU-15. Despite a clear decline in the value of the indicator in the export to the new EU Member States, its value in 2013 was still higher than 1 (SI = 1.17). Whereas, not before 2013 did Poland manage to become specialised in the export to the EU-15 countries (SI = 1.01).

Chart 3.1. Specialisation indices in the Polish agri-food export to the European Union



Source: own calculations based on WITS-Comtrade data.

Chart 3.2 shows the SI indices in 2013 and their changes in 2003-2013 in the agri-food export of Poland to the EU-28 countries, by HS chapter (HS chapters 01-24). The horizontal axis of the chart shows the SI index values in 2013, while the vertical axis – the changes in the values of this index in 2003-2013. The combination of these two values allows to divide the chart area into four fields:

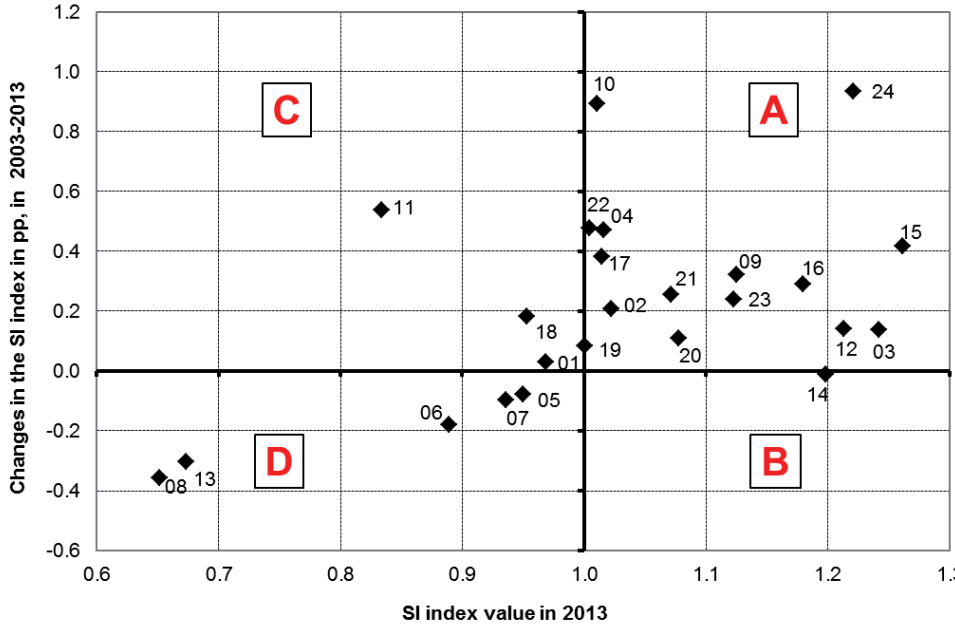
A – SI index > 1 in 2013 and its improvement in 2003-2013,

B – SI index > 1 in 2013 and its deterioration in 2003-2013,

C – SI index < 1 in 2013 and its improvement in 2003-2013,

D – SI index < 1 in 2013 and its deterioration in 2003-2013.

Chart 3.2. SI indices in the export of agri-food products of Poland to the EU-28 in 2013 and their changes in 2003-2013, by HS chapters



Source: own calculations based on WITS-Comtrade data.

Field A contains these chapters where in 2003-2013 the specialisation index improved and in 2013 they were specialised in the export of those commodity groups to the EU countries. Field B contains product groups, which recorded a decline in the specialisation index over the discussed period, yet they managed to maintain specialisation in their export. Field C, however, contains the chapters which, despite the improvement, failed to achieve the specialisation during the EU membership. In turn, Field D contains these commodity groups, where the specialisation index deteriorated and in 2013 they had no specialisation in the export.

In 2003-2013, Poland managed to increase the specialisation index in the export to the EU-28 countries for the greater number of product groups (by HS chapters). This allowed it to achieve the specialisation in many HS chapters. In 2013, Poland achieved the highest specialisation indices in exporting to the EU-28 such product groups as: animal or vegetable fats and oils (15), tobacco and tobacco products (24), fish and seafood (03), oil seeds and oleaginous fruits (12), meat and fish preparations (16), coffee, tea and spices (09), residues and prepared animal fodder (23), fruit and vegetable preparations (20), and miscellaneous edible preparations (21). The clear increase in the specialisation during the EU membership applied also to cereals (10), beverages and spirits (22), dairy products (04), and sugars and confectionery (17). Poland achieved the specialisation in the export of those products, however, the SI indices were only slightly above the value of 1.

Despite the clear increase in the value of the SI indices after accession, Poland failed to achieve the specialisation in selling products of the milling sector (11) and cocoa and cocoa preparations (18) to the EU market. The most unfavourable situation, in terms of the evaluation of the competitive position, applied to several HS chapters. They were: vegetables (07), fruit (08), other animal products (05), live plants and cut flowers (06), and vegetable extracts (13). Before accession, Poland did not reach the specialisation in the export of those products to the EU market, and during the EU membership, the value of the specialisation indices in those product groups deteriorated.

Table 3.1. Export specialisation indices (SI) in the agri-food export of Poland to the European Union, by HS chapters

Number and description of the HS chapter		EU-28		EU-15		EU-13	
		2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp
01	Live animals	0.97	0.03	0.95	-0.13	1.05	0.85
02	Meat and edible meat offal	1.02	0.21	0.97	0.13	1.20	0.53
03	Fish and seafood	1.24	0.14	1.54	0.35	0.22	-0.43
04	Dairy products	1.02	0.47	0.86	0.43	1.55	0.39
05	Other animal products	0.95	-0.08	1.07	-0.14	0.55	0.45
06	Live plants and cut flowers	0.89	-0.18	1.03	-0.17	0.41	0.00
07	Vegetables	0.94	-0.10	0.99	0.04	0.76	-0.74
08	Fruit and nuts	0.65	-0.36	0.73	-0.32	0.37	-0.38
09	Coffee, tea and spices	1.13	0.32	0.90	0.68	1.89	-1.97
10	Cereals	1.01	0.89	1.23	1.11	0.27	0.13
11	Milling products, malt and starches	0.83	0.54	0.85	0.61	0.79	0.19
12	Oil seeds and oleaginous fruits	1.21	0.14	1.43	0.38	0.45	-0.72
13	Vegetable extracts	0.67	-0.30	0.59	-0.51	0.96	0.66
14	Other vegetable products	1.20	-0.01	1.27	-0.10	0.94	0.57
15	Animal or vegetable fats and oils	1.26	0.42	0.68	0.37	3.28	-0.40
16	Meat and fish preparations	1.18	0.29	1.24	0.32	0.97	0.22
17	Sugars and confectionery	1.01	0.38	0.74	0.33	1.97	0.16
18	Cocoa and cocoa products	0.95	0.18	0.95	0.49	0.96	-1.45
19	Preparations of cereals and pastrycooks' products	1.00	0.08	0.88	0.49	1.43	-2.24
20	Fruit and vegetable preparations	1.08	0.11	1.10	0.17	1.02	-0.16
21	Miscellaneous edible preparations	1.07	0.25	0.90	0.57	1.67	-1.73
22	Beverages and spirits	1.00	0.48	0.70	0.20	2.05	1.37
23	Residues and prepared animal fodder	1.12	0.24	1.03	0.18	1.43	0.38
24	Tobacco and tobacco products	1.22	0.94	1.28	1.22	1.01	-0.46
Agri-food products		1.04	0.20	1.01	0.26	1.17	-0.18

Source: own calculations based on WITS-Comtrade data.

In the majority of the product groups which were most important in the Polish export to the EU-28, the higher SI indices were characteristic of supplies to the new EU Member States rather than to the EU-15 countries (Table 3.1). The exception were fish and seafood, tobacco and tobacco products, vegetables, fruit, fruit and vegetable preparations, as well as meat or fish preparations. In those product groups, Poland achieved the higher specialisation indices in the export to the EU-15 countries rather than to the EU-13 countries.

3.2. Trade coverage index (TC)

One of the basic indicators of the given country's export competitiveness in foreign markets is the trade coverage index (TC). It determines the extent to which expenses on imported goods are covered by the revenue from their export. The TC index is used to study the relationship between the export and the import at the level of entire trade, sector or product. It was calculated according to the formula:

$$TC_{ij} = \frac{X_{ij}}{M_{ij}} \cdot 100$$

where:

TC_{ij} – trade coverage index in trade in the i^{th} product group with the j^{th} country/group of countries,

X_{ij} – export of the i^{th} product group to the j^{th} country/group of countries,

M_{ij} – import of the i^{th} product group from the j^{th} country/group of countries.

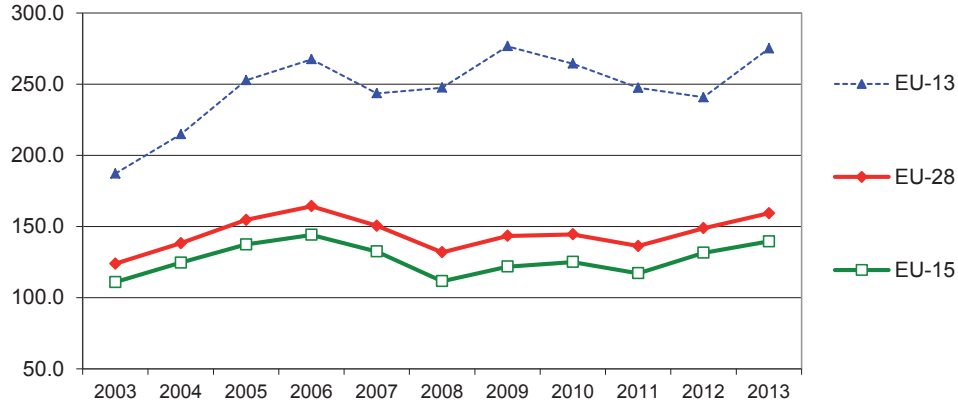
The TC index value greater than 100% means that the given country has the relative internal advantage over partners, because the export value exceeds the import value.

In the paper, TC indices in Polish agri-food trade with the European Union Member States (EU-28 and, separately, EU-15 and EU-13) were determined, by HS chapters.

In 2003-2013, the trade coverage index in Polish agri-food trade with the European Union Member States was higher than 100%, which indicated a constant surplus in trade in those products. The clear increase in the TC index in 2004-2006 resulted from the higher growth in the export than the import in the first years of the EU membership (Chart 3.3). In 2007-2008, the TC index value decreased, then, until 2011, it remained virtually unchanged. In the last two years of the study (2012-2013), the extent of coverage of expenses for the import of agri-food products with revenues from their export increased again. In 2013, the value of the export of agri-food products of Poland to the EU-28 was higher than the value of their import by 59%. Therefore, that index was higher than before accession to the EU (by 35 pp, but lower than in the record-breaking year of 2006 (by 5 pp).

During Poland's membership in the EU, the TC indices in Polish agri-food trade with the EU-13 countries were nearly twice higher than in trade with the EU-15 countries. In 2013, the value of the export of agri-food products of Poland to the new EU Member States was higher by 175% than the value of their import, while the value of the Polish agri-food export to the EU-15 countries exceeded the import from those countries by less than 40%.

Chart 3.3. TC trade coverage indices in trade in agri-food products of Poland with the European Union, in percent



Source: own calculations based on WITS-Comtrade data.

Chart 3.4 shows the TC indices in 2013 and their changes in 2003-2013, in agri--food trade of Poland with the EU-28 countries, by HS chapters (HS chapters 01-24). The horizontal axis of the chart shows the TC index values in 2013, while the vertical axis – the changes in the values of this index in 2003-2013. The combination of these two values allows to divide the chart area into four fields:

A – TC index > 100% in 2013 and its improvement in 2003-2013,

B – TC index > 100% in 2013 and its deterioration in 2003-2013,

C – TC index < 100% in 2013 and its improvement in 2003-2013,

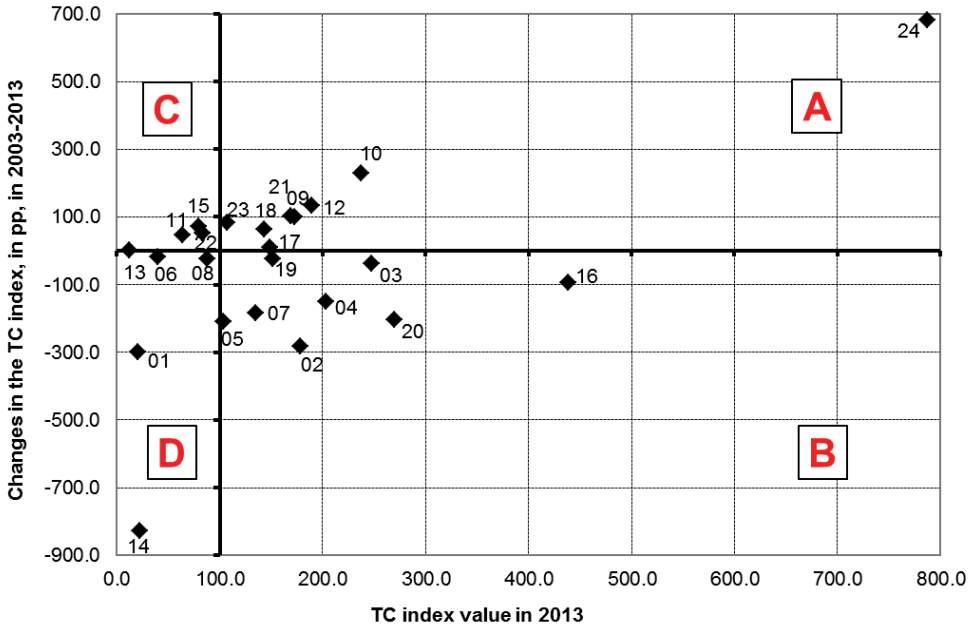
D – TC index < 100% in 2013 and its deterioration in 2003-2013.

Field A contains these chapters in which, during the EU membership, there was an improvement in the relation between revenues from the export of agri-food products and expenses for their import and in 2013 they had the relative internal advantage in trade in those products. Field B contains product groups whose competitive position deteriorated over the discussed period, yet they managed to maintain a surplus of the export over the import (TC > 100%). Whereas, Field C contains the chapters which, despite the strengthening of the competitive position during the EU membership, failed to achieve a surplus in foreign trade in agri-food products. In turn, Field D contains these commodity groups, where the competitive position deteriorated, with the existing trade deficit in 2013.

In 2013, the highest trade coverage indices in Polish trade with the EU countries were characteristic of trade in tobacco and tobacco products (24), meat or fish preparations (16), fruit and vegetable preparations (20), and fish and seafood (03) – Chart 3.4 and Table 3.2. In 2003-2013, the competitive position strengthened only in trade in tobacco and tobacco products, and it weakened, to a varying extent, in the rest of the

listed groups. The great improvement in the competitiveness of trade in tobacco and tobacco products resulted from improved trade coverage in trade with the EU-15 countries, while the TC index clearly decreased in trade with the new EU Member States. The opposite trends applied to trade in meat or fish preparations – the competitive position weakened in trade with the EU-15 countries, and improved in trade with the EU-13 countries.

Chart 3.4. TC indices in trade in agri-food products of Poland with the EU-28 in 2013 and their changes in 2003-2013, by HS chapters



Source: own calculations based on WITS-Comtrade data.

During the membership, Poland managed to achieve competitive advantages in the EU market, as measured by the TC index, in many product groups. They were: cereals (10), miscellaneous edible preparations (21), cocoa and cocoa products (18), coffee, tea and spices (09), oil seeds and oleaginous fruits (12), and residues and prepared animal fodder (23). Despite the deterioration of the competitive position, in 2013 a surplus was still recorded (TC > 100%) in trade in dairy products (04), meat and edible meat offal (02), vegetables (07) and other animal products (5). In case of meat and edible meat offal, a clear decline in the TC index resulted from the deterioration of trade coverage in trade with the EU-15 countries, while that index improved in trade with the EU-13 countries. In addition, competitive commodities in the EU market were sugars and confectionery (17) and their competitive position during the EU membership has slightly improved.

Table 3.2. Trade coverage indices (TC) in agri-food trade of Poland and the European Union, by HS chapters, in %

Number and description of the HS chapter		EU-28		EU-15		EU-13	
		2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp
01	Live animals	20.4	-299.1	19.5	-338.3	23.7	-53.8
02	Meat and edible meat offal	178.1	-281.8	135.0	-284.9	1,688.7	432.4
03	Fish and seafood	247.6	-37.0	248.8	-32.7	221.4	-96.3
04	Dairy products	203.1	-151.2	166.5	-163.3	349.6	-63.5
05	Other animal products	103.7	-208.6	94.6	-231.9	292.6	211.8
06	Live plants and cut flowers	39.7	-16.8	36.1	-18.1	290.1	128.5
07	Vegetables	134.6	-182.6	116.6	-160.8	431.2	-168.5
08	Fruit and nuts	87.5	-23.9	80.7	-21.1	209.6	-160.2
09	Coffee, tea and spices	168.8	103.1	115.8	98.9	679.4	200.6
10	Cereals	237.4	228.5	467.6	453.1	27.2	23.8
11	Milling products, malt and starches	64.2	47.8	106.9	68.7	26.0	18.5
12	Oil seeds and oleaginous fruits	189.6	134.4	266.1	196.9	46.0	17.7
13	Vegetable extracts	12.4	0.4	8.7	-3.3	138.8	127.1
14	Other vegetable products	22.3	-826.7	47.7	-952.3	6.4	-205.9
15	Animal or vegetable fats and oils	79.8	72.6	38.4	36.0	346.3	290.6
16	Meat and fish preparations	438.9	-94.1	393.4	-131.3	894.7	302.1
17	Sugars and confectionery	149.0	8.8	118.1	28.2	225.5	-195.8
18	Cocoa and cocoa products	143.4	63.9	122.9	71.7	335.5	157.0
19	Preparations of cereals and pastrycooks' products	151.2	-24.2	125.2	44.5	268.7	-237.9
20	Fruit and vegetable preparations	269.9	-204.5	265.2	-377.2	289.3	61.2
21	Miscellaneous edible preparations	172.9	100.3	128.5	100.1	478.3	155.3
22	Beverages and spirits	83.4	52.9	54.2	22.5	230.2	203.5
23	Residues and animal fodder	106.8	82.2	98.1	74.8	137.3	104.8
24	Tobacco and tobacco products	786.9	682.2	788.5	769.5	780.1	-2,325.1
Agri-food products		159.3	35.4	139.6	28.6	274.9	87.8

Source: own calculations based on WITS-Comtrade data.

After accession, the competitive position improved in trade in such products as: milling products (11), beverages and spirits (22), animal or vegetable fats and oils (15), and fish and seafood (03). However, a deficit was still recorded in trade in those products (TC < 100%). Two groups of products, with the strong competitive position in the EU market before accession, i.e. live animals (01) and other vegetable products (14) lost that position during Poland's membership in the EU.

3.3. Balassa revealed comparative advantage index (RCA)

Another indicator of the level of competitiveness in trade are the Balassa revealed comparative advantage indices (RCA). Their essence is to determine whether the share of the given commodity group in the export of the country in question is higher/lower than the share of this commodtiy group in the world export to the specific market. The RCA indices were calculated according to the formula:

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

where:

RCA_{ij} – revealed comparative advantage index in the Polish export of the i^{th} product group to the j^{th} market,

X_{ij} – Polish export of the i^{th} product group (here: agri-food products in total and by HS chapters) to the j^{th} market,

X_{iw} – world export of the i^{th} product group to the j^{th} market,

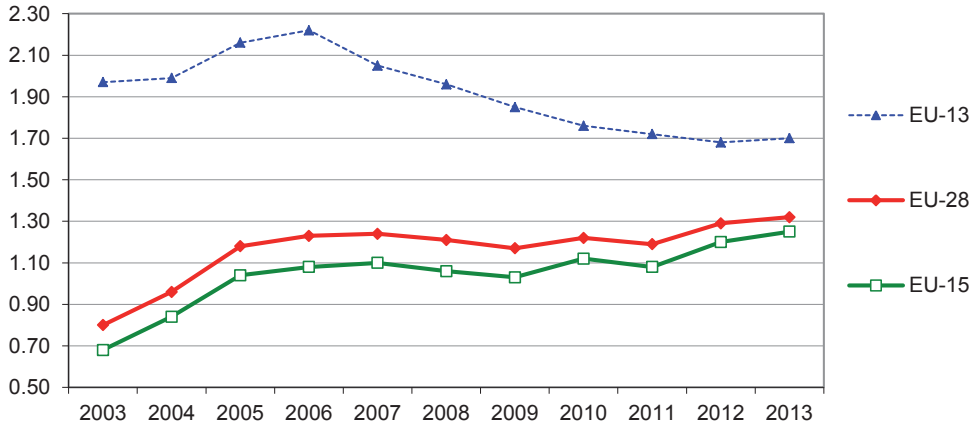
N – number of product groups (here: total export).

When the index is greater than 1 (the share of the given commodity group in the export of the country in question is higher than the respective share in the world export) – the analysed country has revealed comparative advantage in the export to the specific market. Otherwise, when the index is lower than 1 (the share of the given commodity group in the export of the country in question is lower than the share of this product group in the world export) – the analysed country does not have revealed comparative advantages in the export to the specific market.

Thus, the possession or lack of revealed comparative advantages will be determined by the fact whether or not the share of the given product in the export of the analysed country is higher or lower than the respective share of this product in the export of all countries of the world to this market.

In this analysis, the RCA indices in the agri-food export of Poland to the European Union (EU-28 and, separately, EU-15 and EU-13) were determined, by HS chapters.

Chart 3.5. Revealed comparative advantage indices (RCA) in the agri-food export of Poland to the European Union



Source: own calculations based on WITS-Comtrade data.

In 2003-2013, the RCA index value in the Polish export of agri-food products to the European Union clearly increased (Chart 3.5). In 2005, Poland managed to achieve revealed comparative advantages in the export of agri-food products to the market of the EU-28 countries. In 2013, the share of those products in the Polish export to the European Union was by 32% higher than the share of agri-food products in the world export to the EU-28 countries. Despite the fact that during the EU membership, the RCA index values in the Polish export to the EU-13 countries decreased, they were still clearly higher than in the export to the EU-15 countries.

Chart 3.6 shows the RCA indices in 2013 and their changes in 2003-2013 in the agri-food export of Poland to the EU-28, by HS chapters (HS chapters 01-24). The horizontal axis of the chart shows the RCA index values in 2013, while the vertical axis – the changes in the values of this index in 2003-2013. The combination of these two values allows to divide the chart area into four fields:

A – RCA index > 1 in 2013 and its improvement in 2003-2013,

B – RCA index > 1 in 2013 and its deterioration in 2003-2013,

C – RCA index < 1 in 2013 and its improvement in 2003-2013,

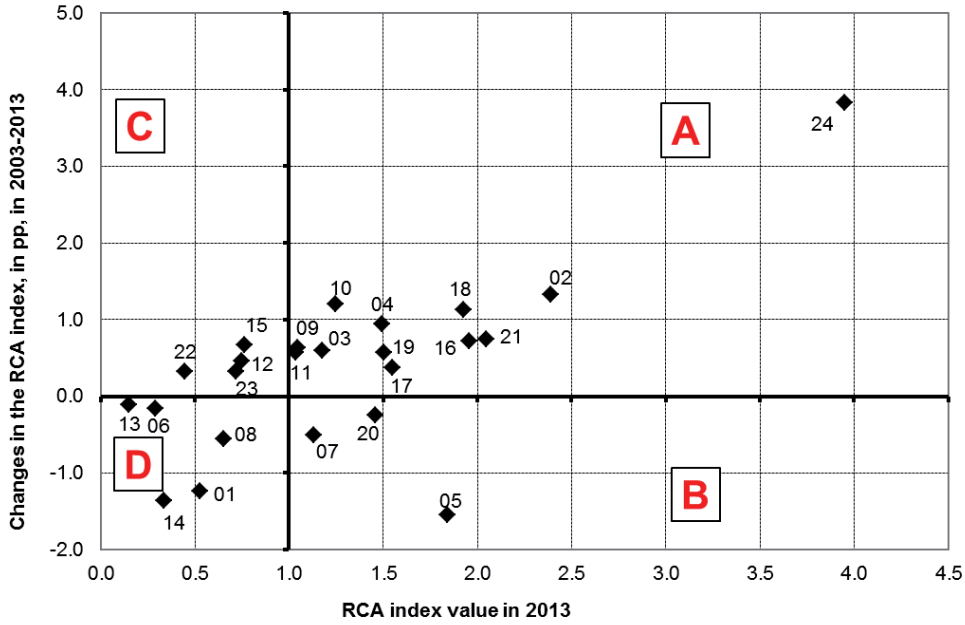
D – RCA index < 1 in 2013 and its deterioration in 2003-2013.

Field A contains those chapters in which in 2003-2013, the competitive position strengthened and in 2013 they had revealed comparative advantage in the export of those commodity groups to the EU-28 countries. Field B contains product groups whose competitive position deteriorated over the discussed period, yet they managed to maintain revealed comparative advantages in the export. Whereas, Field C contains the chapters which, despite the strengthening of the competitive position during the EU membership, failed to achieve revealed comparative advantages. In turn, Field D contains these commodity groups, where the competitive position deteriorated, with the absence of comparative advantages in 2013.

In the Polish agri-food export to the European Union, the highest RCA indices in 2013 were recorded in such product groups as: tobacco and tobacco products (24), meat and edible meat offal (02), miscellaneous edible preparations (21), meat and fish preparations (16), cocoa and cocoa products (18) other animal products (05) and sugars and confectionery (17) – Chart 3.6 and Table 3.3. The share of tobacco and tobacco products in the Polish export to the EU market was nearly four and a half times higher than in the world export to that market. The RCA index in the rest of the listed product groups was within the range of 1.5-2.5.

With the exception of other animal products, in 2003-2013 the competitive position of product groups with the highest comparative advantages in the Polish export to the EU countries strengthened, which in the case of cocoa and cocoa products and preparations of cereals and pastrycooks' products allowed to achieve revealed comparative advantages. The RCA indices in the export of tobacco and tobacco products (by 3.83 pp), meat and edible meat offal (by 1.32 pp) and cocoa and cocoa preparations (by 1.13 pp) have increased the most.

Chart 3.6. RCA indices in the agri-food export of Poland to the EU-28 in 2013 and their changes in 2003-2013, by HS chapters



Source: own calculations based on WITS-Comtrade data.

In 2013, comparative advantages (although slightly weaker) were also visible in the Polish export of dairy products (04), fruit and vegetable preparations (20), cereals (10), fish and seafood (03), vegetables (07), coffee, tea and spices (09) and milling products (11). Over the analysed period, the competitive position of vegetables and fruit and vegetable preparations weakened. Whereas, the RCA indices in the export of other product groups increased, which allowed to achieve revealed comparative advantages in the export to the European Union, as before accession there were no such advantages in those product groups.

Despite the improved competitiveness in the EU market during the EU membership, Poland still did not manage to achieve comparative advantages in several product groups. They were: residues and prepared animal fodder (23), beverages and spirits (22), animal or vegetable fats and oils (15), and oil seeds and oleaginous fruits (12).

In terms of the competitiveness of trade, the most adverse changes applied to fruit (08), live animals (01), other vegetable products (14), live plants and cut flowers (06), and vegetable extracts (13). In the export of those last two groups, Poland did not have comparative advantages before accession and during the EU membership the competitive position of those products deteriorated. In the other three product groups, Poland was competitive in the EU market before accession, however, after accession to the EU it lost its comparative advantages in that market.

Table 3.3. Revealed comparative advantage indices (RCA) in the agri-food export of Poland to the European Union, by HS chapters

Number and description of the HS chapter		EU-28		EU-15		EU-13	
		2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp
01	Live animals	0.53	-1.24	0.53	-1.41	0.48	-0.35
02	Meat and edible meat offal	2.39	1.32	2.27	1.23	2.84	0.74
03	Fish and seafood	1.18	0.59	1.43	0.84	0.24	-0.60
04	Dairy products	1.49	0.94	1.21	0.81	3.21	-0.48
05	Other animal products	1.84	-1.55	2.10	-2.14	0.97	0.77
06	Live plants and cut flowers	0.29	-0.16	0.31	-0.16	0.22	-0.16
07	Vegetables	1.13	-0.50	1.14	-0.27	1.28	-3.27
08	Fruit and nuts	0.66	-0.56	0.71	-0.51	0.48	-0.95
09	Coffee, tea and spices	1.05	0.64	0.83	0.72	1.82	-0.20
10	Cereals	1.25	1.20	1.45	1.40	0.46	0.40
11	Milling products, malt and starches	1.03	0.57	1.09	0.72	0.80	0.16
12	Oil seeds and oleaginous fruits	0.75	0.45	0.84	0.57	0.41	-0.22
13	Vegetable extracts	0.15	-0.11	0.13	-0.15	0.27	0.18
14	Other vegetable products	0.33	-1.37	0.44	-1.39	0.12	-0,84
15	Animal or vegetable fats and oils	0.77	0.66	0.40	0.37	2.25	1.72
16	Meat and fish preparations	1.96	0.72	1.93	0.73	2.74	0.11
17	Sugars and confectionery	1.55	0.37	1.21	0.48	2.09	-1.22
18	Cocoa and cocoa products	1.93	1.13	1.93	1.46	1.91	-1.21
19	Preparations od cereals and parstrycooks' products	1.51	0.57	1.29	0.90	2.51	-2.54
20	Fruit and vegetable preparations	1.46	-0.25	1.41	-0.15	2.12	-1.59
21	Miscellaneous edible preparations	2.05	0.75	1.77	1.24	2.62	-0.95
22	Beverages and spirits	0.45	0.33	0.30	0.20	1.15	0.84
23	Residues and prepared animal fodder	0.72	0.32	0.67	0.29	0.85	0.41
24	Tobacco and tobacco products	3.95	3.83	4.13	4.10	3.38	2.52
Agri-food products		1.32	0.52	1.25	0.57	1.70	-0.27

Source: own calculations based on WITS-Comtrade data.

The RCA indices were diversified in the Polish export to the EU-15 and EU-13 countries (Table 3.3). In 2013, in the export to the EU-15 countries Poland had revealed comparative advantages in fourteen HS chapters, while in the export to other new Member States – in thirteen chapters. Those products accounted for, respectively, 89.5% of the Polish agri-food export to the EU-15, and 82.5% of the export to the EU-13 countries. In most product groups, Poland had the stronger competitive position, as measured by the RCA index, in the export to the EU-13 countries rather than to the EU-15 countries. This applied to, *inter alia*, animal or vegetable fats and oils and beverages and spirits. The reverse situation took place in the export of fish and seafood, cereals and milling products. Poland had comparative advantages in the export of those products to the EU-15 countries, while it did not have such advantages in the export to the EU-13 countries.

3.4. Lafay index (LFI)

Lafay index (LFI) is another frequently used index of competitiveness of foreign trade. It is based on the export and import of the given country, and in particular on the nature of the trade balance. The trade surplus of the given commodity group is identified with having competitive advantages in the export of commodities from this group, while the deficit – with the absence of such advantages. The Lafay index is calculated according to the following formula:

$$LFI_{ij} = 100\left(\frac{X_{ij} - M_{ij}}{X_{ij} + M_{ij}} - \frac{\sum_{i=1}^{n}\left(X_{ij} - M_{ij}\right)}{\sum_{i=1}^{n}\left(X_{ij} + M_{ij}\right)}\right)\frac{X_{ij} + M_{ij}}{\sum_{i=1}^{n}\left(X_{ij} + M_{ij}\right)}$$

where:

LFI_{ij} – Lafay index in trade in the i^{th} product group (here: HS chapters) with the j^{th} country/group of countries,

X_{ij} – export of the i^{th} product group to the j^{th} country/group of countries,

M_{ij} – import of the i^{th} product group from the j^{th} country/group of countries,

n – number of agri-food product groups (here: HS chapters 01-24).

The index shall be interpreted as follows: if it is greater than 0, it means that the analysed country has the competitive advantage over the foreign countries in the export of products belonging to the i^{th} group. But, if the value of the calculated index is lower than 0, the reverse situation occurs, namely the analysed country does not have the competitive advantage over the foreign countries in the export of the given product or product group[66].

In this paper, the Lafay indices in agri-food trade of Poland with the European Union countries (EU-28 and, separately, EU-15 and EU-13) were determined, by HS chapters.

Chart 3.6 shows the Lafay indices in 2013 and their changes in 2003-2013 in agri-food trade of Poland with the EU-28 countries, by HS chapters (HS chapters 01-24). The horizontal axis of the chart shows the Lafay index values in 2013, while the vertical axis – the changes in the values of this index in 2003-2013. The combination of these two values allows to divide the chart area into four fields:

A – LFI index > 0 in 2013 and its improvement in 2003-2013,

B – LFI index > 0 in 2013 and its deterioration in 2003-2013,

C – LFI index < 0 in 2013 and its improvement in 2003-2013,

D – LFI index < 0 in 2013 and its deterioration in 2003-2013.

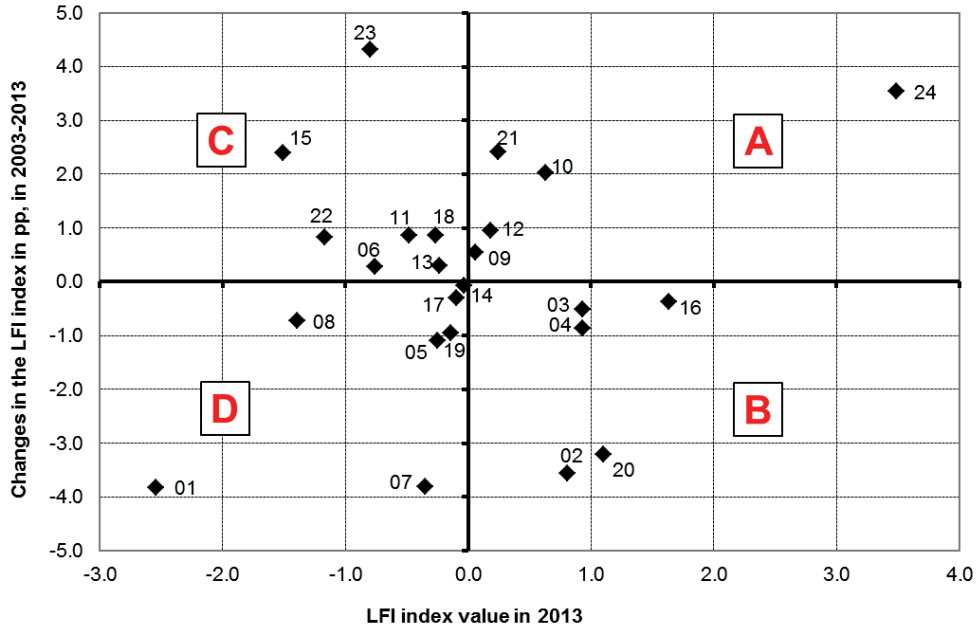
Field A contains those chapters in which, during the EU membership, the competitive position strengthened and in 2013 they had competitive advantages in trade in products from those chapters. Field B contains product groups whose competitive

[66] G. Lafay, *The Measurement of Revealed Comparative Advantages*, [in:] M.G. Dagenais, P.A. Muet (eds.), *International Trade Modeling*, Chapman & Hill, London 1992.

position deteriorated over the discussed period, yet they managed to remain competitive. On the other hand, Field C contains the chapters which, despite the strengthening of the competitive position during the EU membership, failed to achieve competitive advantages in trade. In turn, Field D contains these commodity groups, where the competitive position deteriorated, with the absence of competitive advantages in 2013.

In 2013, the highest Lafay indices were characteristic of Polish trade in tobacco and tobacco products (24), meat or fish preparations (16), fruit and vegetable preparations (20), dairy products (04), fish and seafood (03), and meat and edible meat offal (02) – Chart 3.7 and Table 3.4. In 2003-2013, the competitive position strengthened only in trade in tobacco and tobacco products, while in trade in other product groups – it weakened, especially in the group of meat and edible meat offal, and fruit and vegetable preparations.

Chart 3.7. LFI indices in agri-food trade of Poland with the European Union in 2013 and their changes in 2003-2013, by HS chapters



Source: own calculations based on WITS-Comtrade data.

After accession, the Lafay index also clearly decreased in trade in vegetables (07) and live animals (01), which meant the loss of competitive advantages of Poland in the EU market. A similar situation applied to fruit (08), preparations of cereals and pastrycooks' products (19), other animal products (5) and other vegetable products (14). In 2003-2013, the Lafay indices increased significantly in trade in cereals (10), miscellaneous edible preparations (21), coffee, tea and spices (09), and oil seeds and oleaginous fruits (12), which allowed Poland to achieve competitive advantages in trade in

those product groups. The competitive position in trade in cereals is, however, closely related to the volume of its production and it shows great fluctuations every year.

Despite the clear strengthening of the competitive position in 2003-2013, Poland failed to achieve competitive advantages in trade in such products as: residues and prepared animal fodder (23), cocoa and cocoa products (18), milling products (11), beverages and spirits (22), live plants and cut flowers (06) and vegetable extracts (13).

Table 3.4. Lafay indices (LFI) in agri-food trade of Poland with the European Union, by HS chapters

Number and description of the HS chapter		EU-28		EU-15		EU-13	
		2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp	2013	Change in 2003-2013 in pp
01	Live animals	-2.54	-3.82	-2.38	-4.28	-3.15	-2.80
02	Meat and edible meat offal	0.81	-3.56	-0.26	-5.45	5.54	3.17
03	Fish and seafood	0.93	-0.51	1.51	-0.39	-0.08	-0.44
04	Dairy products	0.94	-0.86	0.63	-1.00	1.05	-0.80
05	Other animal products	-0.25	-1.10	-0.26	-1.51	0.01	0.11
06	Live plants and cut flowers	-0.76	0.27	-0.89	0.27	0.00	0.03
07	Vegetables	-0.35	-3.82	-0.42	-3.97	0.42	-2.85
08	Fruit and nuts	-1.40	-0.73	-1.49	-0.85	-0.22	-1.46
09	Coffee, tea and spices	0.06	0.54	-0.19	0.75	0.79	-0.12
10	Cereals	0.63	2.03	1.73	2.51	-3.42	0.64
11	Milling products, malt and starches	-0.48	0.86	-0.11	0.25	-2.17	3.50
12	Oil seeds and oleaginous fruits	0.18	0.95	0.68	1.10	-1.58	0.61
13	Vegetable extracts	-0.23	0.31	-0.28	0.34	-0.02	0.13
14	Other vegetable products	-0.03	-0.08	-0.01	-0.07	-0.12	-0.12
15	Animal or vegetable fats and oils	-1.51	2.40	-2.28	2.21	0.60	2.02
16	Meat and fish preparations	1.63	-0.38	1.85	-0.57	1.07	0.21
17	Sugars and confectionery	-0.09	-0.31	-0.19	0.12	-0.43	-2.07
18	Cocoa and cocoa products	-0.26	0.86	-0.34	1.25	0.32	0.49
19	Preparations of cereals and pastrycooks' products	-0.14	-0.95	-0.28	0.22	-0.06	-4.04
20	Fruit and vegetable preparations	1.10	-3.21	1.38	-3.90	0.09	-0.64
21	Miscellaneous edible preparations	0.25	2.42	-0.24	3.78	1.55	-1.53
22	Beverages and spirits	-1.17	0.83	-1.50	0.26	-0.37	2.51
23	Residues and prepared animal fodder	-0.79	4.31	-0.67	4.56	-1.52	2.60
24	Tobacco and tobacco products	3.48	3.54	4.02	4.38	1.72	0.85

Source: own calculations based on WITS-Comtrade data.

Lafay indices were clearly differentiated in Polish agri-food trade with the EU-15 and EU-13 countries. In 2013, in trade with the EU-15 countries Poland had the positive Lafay indices in seven agri-food product groups, which accounted for less than 35% of the Polish export to those markets. In supplies to the new EU Member States, Poland was competitive in twelve product groups, which in 2013 generated 64% of revenue from the agri-food export to those markets (Table 3.4). The biggest differences in the index values for those two markets applied to meat and edible meat offal, fish and seafood, cereals, vegetable or animal fats, and oils and miscellaneous edible preparations. In 2013, Poland had the strong competitive position in the export of meat and edible meat offal, vegetable or animal fats, and oils and miscellaneous edible

preparations to the EU-13 and the weak position in the export to the EU-15 countries. Then again, fish and seafood, and cereals were competitive in the markets of the EU-15 countries, while in the export of those products to the new EU Member States there were no competitive advantages.

3.5. Summary evaluation of the Polish competitive position in trade in agri-food products with the European Union on the basis of selected indices

The summary evaluation of the competitiveness of Polish agri-food products in the market of the EU countries (EU-28 and, separately, EU-15 and EU-13) was carried out based on the comparison of values of four indices, i.e. export specialisation index (SI), trade coverage index (TC), revealed comparative advantage index (RCA) and Lafay index (LFI). This comparison allows to single out sixteen variants of the situation (Table 3.5). From the point of view of the analysis, the most important are, however, two variants in which the values of all four indices give the same conclusions as to the competitive position in the export of the given product group. These two above--mentioned situations are:

- possession by the country of comparative advantages in the export of the given product group to the selected market, confirmed by the SI index (SI > 1), TC index (TC > 100%), RCA index (RCA > 1) and Lafay index (LFI > 0);
- absence of comparative advantages of the given country in the export of the given product group to the selected market, confirmed by the SI index (SI < 1), TC index (TC < 100%), RCA index (RCA < 1) and Lafay index (LFI < 0).

The other variants do not point to a clear evaluation of the competitiveness of the agri--food export in the selected markets, since the results of the selected indices are divergent. Sometimes, however, they may be an important complement to the analysis.

The evaluation of the Polish competitive position in trade in agri-food products of Poland in the EU-28 market, including the EU-15 and EU-13, was carried out for the individual HS chapters. The analysis concerns the competitive position in 2013 and its changes in 2003-2013, but generally those cases in which the directions of changes in the values of the analysed indices were divergent, were omitted.

The summary evaluation of the competitive position of Polish agri-food trade with the European Union Member States, carried out on the basis of the SI, TC, RCA and LFI indices showed that in 2003-2013 Poland had comparative advantages in the market of the EU-28 countries in trade in the following product groups: meat and edible meat offal (02), fish and seafood (03), dairy products (04) – except for 2003, meat and fish preparations (16), preparations of cereals and pastrycooks' products (19) – except for 2003 and 2012, and fruit and vegetable preparations (20). This is proved by the values of at least three indices (in Table 3.6 this situation was shown graphically in the form of three or four pluses). From the comparison of the values of these indices it results that the comparative advantages of these chapters in the market of the EU-28 countries are relatively stable.

Table 3.5. Summary evaluation of the competitive position in foreign trade in the selected markets, by SI, TC, RCA and LFI indices

Value of the index in the given year				SI index			
				> 1.0		< 1.0	
				RCA index			
				> 1.0	< 1.0	> 1.0	< 1.0
TC index	>100%	LFI index	> 0.0	++++			
			< 0.0				
	<100%		> 0.0				
			< 0.0				– – – –

Source: own elaboration.

Throughout that period, Polish food producers did not have any comparative advantages in trade with the EU-28 countries in the following groups of products: vegetable extracts (13), and beverages and spirits (22). This is proved by the values of all four indices (in Table 3.6 this was shown graphically in the form of four minuses). For the greater part of the analysed period, there were no comparative advantages for producers of live plants and cut flowers (06) – except for 2003 and 2006, fruit (08) – permanently since 2009, milling products (11) – to 2011, and residues and prepared animal fodder (23) – until 2009. In those chapters, only in some years the values higher than the threshold values of the selected indices have been recorded. The competitive position of Poland in trade in products from these chapters is weak.

In some chapters, in 2003-2013, changes in the indices were so great that producers achieved or lost comparative advantages in trade with the EU-28 countries. The chapters whose competitive position improved substantially were: tobacco and tobacco products (24) – since 2006, miscellaneous edible preparations (21) – since 2008, cereals (10) – since 2012, as well as coffee, tea and spices – in 2013. The clear deterioration in the competitive position applied to live animals (01) – since 2008 and vegetables (07) and other vegetable products (14) – since 2010.

In the case of other chapters, the evaluation of the competitive position in the EU-28 market is not unambiguous, i.e. in all or most years, the level of some indices is satisfactory, and the level of others is lower than the threshold values. Those chapters included: other animal products (05), oil seeds and oleaginous fruits (12), animal or vegetable fats and oils (15), sugars and confectionery (17), and cocoa and cocoa products (18).

The analysis of changes in the individual indices, carried out between 2003 and 2013 (Table 3.6) draws attention to the chapters in which there were no comparative advantages for the major part of the analysed period, but in which all four indices increased. They were: coffee, tea and spices (09), cereals (10), milling products (11), oil seeds and oleaginous fruits (12), animal or vegetable fats and oils (15), cocoa and cocoa products (18), beverages and spirits (22), and residues and prepared animal fodder (23). We may hope that in the future the competitive position of these chapters will improve.

Table 3.6. Summary evaluation of the Polish competitive position in agri-food trade with the EU-28 countries, based on the SI, TC, RCA and LFI indices (pluses or minuses in the individual fields of the table correspond to the indices in the presented order), by HS chapters

HS chapter	Description of the chapter	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change in 2003-2013
01	Live animals	−+++	−+++	++++	++++	++++	−++−	−−+−	+−+−	+−−−	−−−−	−−−−	↑↓↓↓
02	Meat and edible meat offal	−+++	−+++	++++	++++	++++	++++	+++−	++++	−+++	−+++	++++	↑↓↑↓
03	Fish and seafood	++−+	++−+	++−+	++−+	++−+	++−+	++−+	++++	++++	++++	++++	↑↓↑↓
04	Dairy products	−+−+	−+++	−+++	++++	−+++	++++	++++	++++	−+++	++++	++++	↑↓↑↓
05	Other animal products	++++	−+++	−++−	−++−	+++−	+++−	+−+−	−−+−	−++−	+++−	−++−	↓↓↓↓
06	Live plants and cut flowers	+−−−	−−−−	−−−−	+−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	↓↓↓↑
07	Vegetables	++++	++++	++++	++++	++++	++++	++++	−++−	−++−	−++−	−++−	↓↓↓↓
08	Fruit and nuts	+++−	−++−	−+−−	++−−	−−−−	+−−−	−−−−	−−−−	−−−−	−−−−	−−−−	↓↓↓↓
09	Coffee, tea and spices	−−−−	−−−−	−−−−	−−−−	−−−−	++−−	++−−	+−−−	++−−	++−−	++++	↑↑↑↑
10	Cereals	−−−−	−−−−	++−−	−−−−	−−−−	−−−−	−+−+	++−−	+−−−	++++	++++	↑↑↑↑
11	Milling products, malt and starches	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−+−	−−+−	↑↑↑↑
12	Oil seeds and oleaginous fruits	+−−−	++−−	+−−−	+−−−	++−+	++−−	++−−	++−−	+−−−	+−−−	++−+	↑↑↑↑
13	Vegetable extracts	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	↓↑↓↑
14	Other vegetable products	++++	++++	++++	++++	++++	++++	+++−	+−−−	+−−−	+−−−	+−−−	↓↓↓↓
15	Animal or vegetable fats and oils	−−−−	+−−−	+−−−	+−−−	+−−−	+−−−	+−−−	+−−−	+−−−	+−−−	+−−−	↑↑↑↑
16	Meat and fish preparations	−+++	−+++	++++	++++	++++	++++	++++	++++	++++	++++	++++	↑↓↑↓
17	Sugars and confectionery	−+++	−+++	−+++	−++−	−++−	−+++	−−+−	−++−	−++−	−++−	+++−	↑↑↑↓
18	Cocoa and cocoa products	−−−−	−++−	−++−	−−+−	−−+−	−−+−	−++−	−++−	−++−	−++−	−++−	↑↑↑↑
19	Preparations of cereals and pastrycooks' products	−+−+	−+++	++++	−+++	++++	++++	++++	++++	++++	−++−	+++−	↑↓↑↓
20	Fruit and vegetable preparations	−+++	−+++	−+++	++++	++++	++++	++++	++++	++++	++++	++++	↑↓↓↓
21	Miscellaneous edible preparations	−−+−	−−+−	−−+−	−−+−	−++−	+++−	+++−	+++−	++++	+++−	++++	↑↑↑↑
22	Beverages and spirits	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	+−−−	↑↑↑↑
23	Residues and prepared animal fodder	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	−−−−	+−−−	+−−−	+−−−	++−−	↑↑↑↑
24	Tobacco and tobacco products	−+−−	−+−−	−+−−	−+++	−+++	++++	++++	++++	++++	++++	++++	↑↑↑↑

Source: own calculations based on WITS-Comtrade data.

Table 3.7. Summary evaluation of the Polish competitive position in agri-food trade with the EU-15 countries, based on the SI, TC, RCA and LFI indices (pluses or minuses in the individual fields of the table correspond to the indices in the presented order), by HS chapters

HS chapter	Description of the chapter	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change in 2003-2013
01	Live animals	++++	++++	++++	++++	++++	−−+−	−−+−	----	----	----	----	↓↓↓↓
02	Meat and edible meat offal	−+++	−+++	++++	++++	++++	++++	+++−	−++−	−+++	−++−	−++−	↑↓↑↓
03	Fish and seafood	++−+	++−+	++++	++++	++++	++++	++++	++++	++++	++++	++++	↑↓↑↓
04	Dairy products	−+−+	−+++	−+++	−+++	−+++	−+++	−+++	−+++	−+++	−+++	−+++	↑↓↑↓
05	Other animal products	++++	++++	++++	+++−	++++	+++−	+−+−	+−+−	+++−	+−+−	+−+−	↓↓↓↓
06	Live plants and cut flowers	+−−−	+−−−	+−−−	+−−−	+−−−	----	+−−−	----	----	----	+−−−	↓↓↓↑
07	Vegetables	−+++	++++	++++	++++	++++	++++	++++	−++−	−++−	−++−	−++−	↑↓↓↓
08	Fruit and nuts	+++−	----	----	----	----	----	----	----	----	----	----	↓↓↓↓
09	Coffee, tea and spices	----	----	----	----	----	----	----	----	----	----	−+−−	↑↑↑↑
10	Cereals	----	----	++−+	----	+−−−	+−−−	++++	++−+	++−+	++++	++++	↑↑↑↑
11	Milling products, malt and starches	----	----	----	----	----	----	----	----	----	−−+−	−++−	↑↑↑↑
12	Oil seeds and oleaginous fruits	+−−−	++−+	+−−−	++−−	++++	++−+	++−+	++−+	+−−−	++−−	++−+	↑↑↑↑
13	Vegetable extracts	+−−−	+−−−	----	----	----	----	----	----	----	----	----	↓↓↓↑
14	Other vegetable products	++++	++++	++++	++++	−+++	−+−+	+−+−	+−−−	----	----	+−−−	↓↓↓↓
15	Animal or vegetable fats and oils	----	----	+−−−	+−−−	+−−−	----	----	----	----	----	----	↑↑↑↑
16	Meat and fish preparations	−+++	−+++	++++	++++	++++	++++	++++	++++	++++	++++	++++	↑↓↑↓
17	Sugars and confectionery	----	−+++	−+++	−+−−	----	−++−	----	−−+−	----	−++−	−++−	↑↑↑↑
18	Cocoa and cocoa products	----	----	----	----	----	----	----	−−+−	−−+−	−++−	−++−	↑↑↑↑
19	Preparations of cereals and pastrycooks' products	----	−+−−	−+++	−++−	−+++	−+++	−++−	−++−	−++−	−++−	−++−	↑↑↑↑
20	Fruit and vegetable preparations	−+++	−+++	−+++	−+++	++++	++++	−+++	−+++	++++	++++	++++	↑↓↓↓
21	Miscellaneous edible preparations	----	----	----	−−+−	−−+−	−−+−	−−+−	−++−	−++−	−++−	−++−	↑↑↑↑
22	Beverages and spirits	----	----	----	----	----	----	----	----	----	----	----	↑↑↑↑
23	Residues and prepared animal fodder	----	----	----	----	----	----	----	----	----	----	+−−−	↑↑↑↑
24	Tobacco and tobacco products	----	----	----	−+−−	−+++	−+++	−+++	++++	++++	++++	++++	↑↑↑↑

Source: own calculations based on WITS-Comtrade data.

Table 3.8. Summary evaluation of the Polish competitive position in agri-food trade with the EU-13 countries, based on the SI, TC, RCA and LFI indices (pluses or minuses in the individual fields of the table correspond to the indices in the presented order), by HS chapters

HS chapter	Description of the chapter	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change in 2003-2013
01	Live animals	– – – –	– + + –	– + + –	+ + + +	+ + + –	+ + + –	– + + –	+ + + –	+ – – –	+ – – –	+ – – –	↑ ↓ ↓ ↓
02	Meat and edible meat offal	– + + +	– + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	↑ ↑ ↑ ↑
03	Fish and seafood	– + – +	– + – +	– + – +	– + – –	– + – –	– + – +	– + – –	– + – –	– + – –	– + – –	– + – –	↓ ↓ ↓ ↓
04	Dairy products	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	↑ ↓ ↓ ↓
05	Other animal products	– – – –	– + – –	– + – –	– + – –	– + – –	– – – –	– + – –	– + – –	– + – –	– + – +	– + – +	↑ ↑ ↑ ↑
06	Live plants and cut flowers	– + – –	– + – –	– + – –	– + – –	– + – +	– + – +	– + – +	– + – +	– + – +	– + – +	– + – +	↑ ↑ ↓ ↑
07	Vegetables	+ + + +	+ + + +	– + + +	+ + + +	+ + + +	+ + + +	+ + + +	– + + +	– + + +	– + + +	– + + +	↓ ↓ ↓ ↓
08	Fruit and nuts	– + + +	+ + + +	– + + +	+ + + +	+ + + +	+ + + +	– + – +	– + – +	– + – –	– + – –	– + – –	↓ ↓ ↓ ↓
09	Coffee, tea and spices	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	↓ ↑ ↓ ↓
10	Cereals	– – – –	+ – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	↑ ↑ ↑ ↑
11	Milling products, malt and starches	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	↑ ↑ ↑ ↑
12	Oil seeds and oleaginous fruits	+ – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	– – – –	+ – – –	– – – –	– – – –	↓ ↑ ↓ ↑
13	Vegetable extracts	– – – –	– – – –	– – – –	+ – – –	+ + – –	+ + – –	+ + – –	+ – – –	+ – – –	+ + – –	– + – –	↑ ↑ ↑ ↑
14	Other vegetable products	– + – +	– + + +	– + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + –	+ – – –	– – – –	↑ ↓ ↓ ↓
15	Animal or vegetable fats and oils	+ – – –	+ – – –	+ – – –	+ + – –	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + –	+ + + +	↓ ↑ ↑ ↑
16	Meat and fish preparations	– + + +	– + + +	+ + + +	– + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	– + + +	↑ ↑ ↑ ↑
17	Sugars and confectionery	+ + + +	+ + + –	+ + + –	+ + + –	+ + + –	+ + + +	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	↑ ↓ ↓ ↓
18	Cocoa and cocoa products	+ + + –	+ + + +	+ + + +	+ + + –	+ + + +	+ + + –	+ + + –	+ + + +	+ + + +	+ + + +	– + + +	↓ ↑ ↓ ↑
19	Preparations of cereals and pastrycooks' products	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + –	↓ ↓ ↓ ↓
20	Fruit and vegetable preparations	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	– + + +	+ + + +	↓ ↑ ↓ ↓
21	Miscellaneous edible preparations	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	↓ ↑ ↓ ↓
22	Beverages and spirits	– – – –	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	+ + + –	↑ ↑ ↑ ↑
23	Residues and prepared animal fodder	+ – – –	– – – –	+ – – –	+ + – –	+ + – –	+ – – –	+ – – –	+ – – –	+ + – –	+ + – –	+ + – –	↑ ↑ ↑ ↑
24	Tobacco and tobacco products	+ + – +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	↓ ↓ ↑ ↑

Source: own calculations based on WITS-Comtrade data.

The summary evaluation of the Polish competitive position in agri-food trade with the European Union countries, carried out based on the SI, TC, RCA and LFI indices showed that Polish food producers' competitive position in the markets of the EU-13 countries was stronger than in the case of the markets of the EU-15 countries, and this position was more stable (Table 3.7 and 3.8).

During the EU membership, Poland has had permanent competitive advantages in the market of the EU-13 countries in twelve (of 24) product groups, by HS chapters. They were: meat and edible meat offal, dairy products, vegetables, coffee, tea and spices, meat and fish preparations, sugars and confectionery, cocoa and cocoa products, preparations of cereals and pastrycooks' products, fruit and vegetable preparations, miscellaneous edible preparations, beverages and spirits as well as tobacco and tobacco products. In 2013, they accounted for nearly 90% of the Polish export of agri-food products to those countries. Over the analysed period, only the producers of four product groups, which in 2013 accounted for more than 34% of the Polish export to those markets, were competitive in the export to the EU-15 countries. They were: fish and seafood, dairy products, meat and fish preparations and fruit or vegetable preparations.

3.6. Summary

The adoption of as many as four competitive position indices, i.e. specialisation index (SI), trade coverage index (TC), revealed comparative advantage index (RCA) and Lafay index (LFI) allowed for a reliable evaluation of the Polish competitive position in foreign trade in agri-food products in the European Union market. From the analysis carried out it resulted that during the EU membership, the share of the chapters with the competitive advantages in the EU market, as measured by the SI, TC, RCA and LFI indices, increased. According to the SI, TC and RCA indicators, in 2013 more than 80% of Polish food products were competitive in the EU market, and according to the LFI index – a little more than 58% (Table 3.9).

Table 3.9. Polish competitive position in foreign trade in agri-food products with the European Union

Index	Year	EU-28	EU-15	EU-13	EU-28	EU-15	EU-13
		Number of competitive chapters			Share of competitive chapters in the agri-food export/trade, in %		
SI	2003	7	8	12	34.7	33.7	80.7
	2013	16	10	12	84.3	42.1	82.8
TC	2003	13	10	15	62.6	58.5	77.4
	2013	16	15	19	81.8	77.8	89.8
RCA	2003	10	8	11	69.8	68.7	89.0
	2013	15	14	13	83.3	82.5	89.5
LFI	2003	11	9	13	49.3	43.6	68.9
	2013	10	7	12	58.4	34.9	64.3
Summary index	2003	3	3	7	14.5	9.4	66.7
	2013	9	5	7	64.2	34.1	61.1

Source: own calculations based on WITS-Comtrade data.

Polish food producers had the stronger competitive position in the markets of the new EU Member States than in the markets of the EU-15 countries. Over the analysed period, that position in the markets of the EU-13 countries slightly improved, while in the markets of the EU-15 countries it significantly improved.

The summary evaluation of the Polish competitive position in trade in agri-food products with the EU-28 countries showed that in 2013 nine chapters could be regarded as definitely competitive (as indicated by all four analysed indices). In that year, the export of products from those chapters accounted for 64% of the Polish agri-food export to the EU. In the year preceding accession to the EU, there were only three chapters like that (none of them repeated in both periods), and their share in the agri-food export accounted for less than 15%.

In 2003, only three chapters were competitive in trade with the EU-15 countries (as indicated by all four analysed indices). The export of products from those chapters accounted for only 9% of the total food export. After ten years, the number of chapters that could be regarded as competitive in the market of the EU-15 countries increased to five, and their share in the agri-food export to those countries exceeded 34%.

The much better competitive position was occupied by Poland in agri-food trade with the rest of the new EU Member States. In 2013, seven chapters could be regarded as competitive (as indicated by all four analysed indices). In that year, the export of products from those chapters accounted for more than 61% of the agri-food export to the EU-13 countries. Before accession, there were also seven such chapters (in four chapters, there were comparative advantages throughout the period), and their share in the food export to the EU-13 was about 66%. The competitive position of Poland in the markets of the new EU Member States may, therefore, be evaluated as stable.

In 2013, the most competitive in the EU market were such Polish products as tobacco and tobacco products, meat and edible meat offal, meat and fish preparations, dairy products, fruit and vegetable preparations, and fish and seafood. However, despite the improvement in the competitive position, during the EU membership, Poland failed to achieve competitive advantages in the markets of the EU-28 countries in the export of, *inter alia*, beverages and spirits, residues and prepared animal fodder, cocoa and cocoa preparations, vegetable or animal fats, and oils and milling products. In some product groups, Poland lost its competitive advantages in the EU market, over the analysed period. This applied to, above all, live animals, vegetables and fruit. In other groups, there was a chance to improve the competitive position (e.g. in the group of cocoa and cocoa products, beverages and spirits, animal or vegetable fats and oils, and residues and prepared animal fodder).

4. Intra-industry trade in agri-food products of Poland with the European Union

Intra-industry trade between two countries means the simultaneous export and import of products coming from the same industry. Intra-industry trade indices inform about the intra-industry specialisation. As opposed to the inter-industry specialisation (which is measured by such indices as: SI, TC, RCA, LFI), countries participating in the intra-industry specialisation compete in foreign markets with products or varieties of products within the same sector (and not with product groups, in which they have comparative advantages over partners). Thus, high indices of intra-industry trade are supported by balancing the turnover within the given product group.

Intra-industry trade is more beneficial than inter-industry trade, both from the point of view of producers and consumers. Each of the countries participating in trade may reduce the number of varieties of produced goods and produce them on a larger scale, which results in reduced production costs and, consequently, in lower prices. For consumers, this type of trade means, in turn, an increase in the number of varieties of goods available in the domestic market, offered by both domestic and foreign producers. The wider choice in the market allows to meet the increasingly diversified needs of consumers to a greater extent.

In the theory of intra-industry trade, we distinguish trade in products differentiated vertically and horizontally[67]. The term of vertically differentiated products means products different with regard to their quality, e.g. curd and hard cheese. Horizontally differentiated products are products of similar quality, but differentiated with regard to other characteristics which may be relevant to the consumer (e.g. country of origin, colour, taste, type of packaging).

Trade of vertically differentiated products may be explained by traditional theories of comparative advantages, i.e. by differences in factor endowments between two countries. The country relatively rich in capital will become specialised in the production and export of product varieties of relatively higher quality, while the country relatively rich in labour – in the production and export of product varieties of relatively lower quality. On the contrary, trade in horizontally differentiated products may not be explained by traditional theories of comparative advantages. This trade is usually identified with the monopolistic competition, *inter alia*, with increasing returns to scale.

[67] H.G. Grubel, P.J. Lloyd, *Intra-Industry Trade: the Theory and Measurement of Intra-Industry Trade in Differentiated Products*, Macmillan, London 1975.

4.1. Measurement method

For the purposes of the paper, indices of intra-industry trade were calculated based on bilateral trade data of Poland with the European Union. Here, the simple Grubel-Lloyd index of intra-industry trade (GL)[68] was used, and then aggregated according to the following formula:

$$GL = 1 - \frac{\sum_{j=1}^{J}\sum_{i=1}^{n}\left|X_{ij} - M_{ij}\right|}{\sum_{j=1}^{J}\sum_{i=1}^{n}(X_{ij} + M_{ij})}$$

where:

GL – index of intra-industry trade,

X_{ij} – export of the i^{th} product group from Poland to the j^{th} country/group of countries,

M_{ij} – import of the i^{th} product group to Poland from the j^{th} country/group of countries,

n – number of product groups/industries (according to the four-digit HS classification) in trade in agri-food products,

J – number of trading partners in the individual groups of countries, i.e. EU-28, EU-15 and EU-13.

In turn, the division into intra-industry trade in horizontally differentiated products (offering various products of the same quality) and intra-industry trade in vertically differentiated products (offering the same products or very similar substitutes of different quality) was made in accordance with the concept developed by D. Greenaway, R.C. Hine and C. Milner[69], and slightly modified by L. Fontagné and M. Freundenberg[70]. The criterion of dividing intra-industry trade into horizontal and vertical type is based on the ratio between the so-called unit values of individual products in export and import. An assumption behind this concept is that price differences reflect quality differences. According to D. Greenaway, R.C. Hine and C. Milner, when assuming perfect information, a product variety sold at a higher price must be of higher quality than a variety sold at a lower price[71].

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[68] This index is based on the concept of trade overlap and means the share of the absolute value of intra-industry trade in trade of the given industry, cf. H.G. Grubel, P.J. Lloyd, *Intra-Industry Trade…*, op. cit.

[69] D. Greenaway, R.C. Hine, C. Milner, *Country Specific Factors and the Pattern of Horizontal and Vertical Intra-Industry Trade in the United Kingdom*, "Weltwirtschaftliches Archiv" 1994, Vol. 130, No. 1, pp. 77-100.

[70] L. Fontagné, M. Freundenberg, *Intra-Industry Trade: Methodological Issues Reconsidered, CEPII Document de Travail*, No. 97-01, Paris 1997.

[71] J.E. Stiglitz is of the opinion that even in conditions of imperfect information, the product price reflects its quality. According to N. Oulton, only in a short term may consumers purchase products at the price higher (lower) than it results from their quality and a reason for that may be an omission, inertness of habits or a high cost of changing a supplier. Cf. J.E. Stiglitz, *The Causes and Consequences of the Dependence of Quality Price*, "The Journal of Economic Literature" 1987, Vol. 25, pp. 1-48; N. Oulton, *Quality and Performance in United Kingdom Trade 1978-1987*, NIESR Discussion Paper, No. 197, London 1990.

Horizontal intra-industry trade (HIIT) is the one meeting the following criteria[72]:

$$\frac{1}{1+\alpha} \leq \frac{UV_{ij}^{x}}{UV_{ij}^{m}} \leq 1+\alpha$$

while vertical intra-industry trade (VIIT) is the one meeting the following requirements:

$$\frac{UV_{ij}^{x}}{UV_{ij}^{m}} < \frac{1}{1+\alpha} \quad \text{or} \quad \frac{UV_{ij}^{x}}{UV_{ij}^{m}} > 1+\alpha$$

where:

$\frac{UV_{ij}^{x}}{UV_{ij}^{m}}$ – ratio between the unit value in the Polish export of the i^{th} product group to the j^{th} country and the unit value in the Polish import of the i^{th} product group from the j^{th} country,

α – rate of deviation of relative unit values of the export $(\frac{UV_{ij}^{x}}{UV_{ij}^{m}})$. Usually it is assumed that $\alpha = 0.15$[73].

In line with the above method, intra-industry trade may be divided into four types:

- VIIT low quality – intra-industry trade in vertically differentiated products of relatively lower quality in export than in import; relation of export prices to import prices is lower than 0.87 (the given country exports commodities of relatively lower quality and imports commodities of relatively higher quality);
- HIIT – intra-industry trade in horizontally differentiated products, i.e. relation of export prices to import prices is within the range of <0.87; 1.15>;
- VIIT high quality – intra-industry trade in vertically differentiated products of relatively higher quality in export than in import; relation of export prices to import prices is greater than 1.15 (the given country exports commodities of relatively better quality and imports commodities of relatively lower quality);
- IIT undefined – intra-industry trade with undefined relation of export prices to import prices[74].

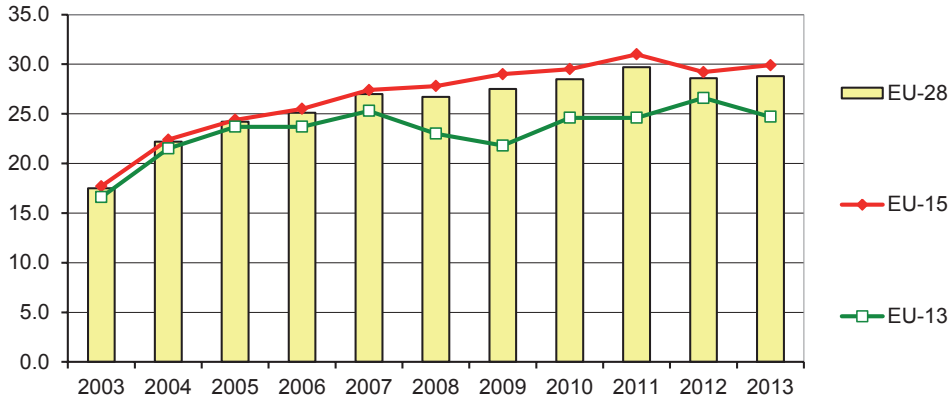
[72] D. Greenaway, R.C. Hine, C. Milner, *Country Specific Factors…*, op. cit.
[73] Some authors, e.g. Fontagné and Freundenberg (*Intra-Industry Trade…*, op. cit.) adopt the value of 0.25.
[74] This may result from the lack of data in physical units for the export, for the import or for both trade flows at the same time. As it appears from analyses, in the recent years this problem has grown stronger. Cf. Ł. Ambroziak, *Wpływ bezpośrednich inwestycji zagranicznych na handel wewnątrzgałęziowy państw Grupy Wyszehradzkiej (The impact of the foreign direct investment on the intra-industry trade of the Visegrad Countries)*, IBRKK, Warszawa 2013.

An analysis of the GL indices in 2003-2013 has also been carried out based on data from the WITS-Comtrade database expressed in USD. The analysis applies to both total Polish trade with the European Union (EU-28), and separately with the EU-15 and the EU-13 countries.

4.2. Indices of intra-industry trade with the European Union

In the first period after accession, indices of intra-industry trade in Polish trade in agri-food products with the European Union countries were increasing on a regular basis (Chart 4.1). This increase applied to trade both with the EU-15 countries and the new EU Member States. In 2003-2007, the share of intra-industry trade in Polish agri--food trade with the EU-28 increased by as much as 11.3 pp, to the level of 27.0%. In 2008-2011, indices of intra-industry trade continued to increase, but their growth rate decreased. This was due to the decrease in the intensity of intra-industry trade with the new EU Member States, which took place in 2008-2009, i.e. during the global financial and economic crisis, and directly prior to it. In contrast to Polish agri-food trade with the EU-13, intra-industry trade with the EU-15 countries proved resistant to crisis phenomena. In 2011, the share of intra-industry trade in trade with the EU-15 countries exceeded 30%. In 2012-2013, the intensity of intra-industry trade with the European Union slightly weakened, mainly due to the decline in the importance of this type of trade in trade with the EU-15 countries.

Chart 4.1. Indices of intra-industry trade in Polish agri-food trade with the European Union, in percent



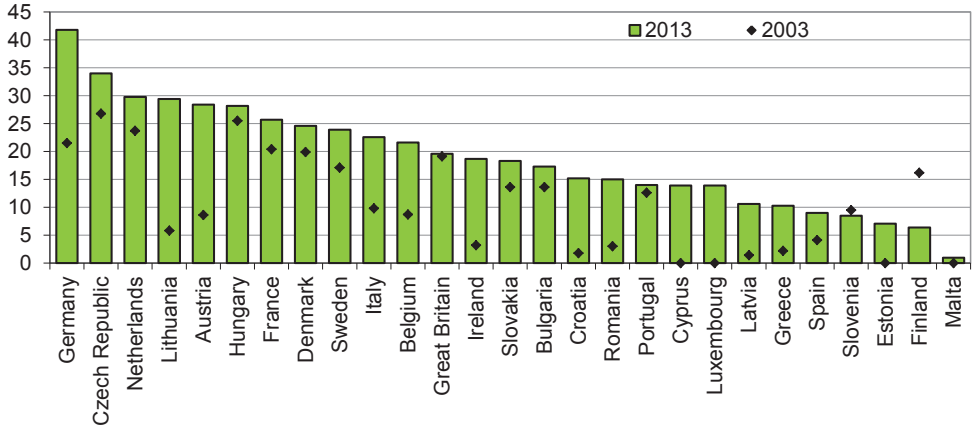
Source: own calculations based on WITS-Comtrade data.

In 2013, almost 29% (by over 11 pp more than in 2003) of Polish trade with the EU-28 countries was of intra-industry nature. Intra-industry trade was more intense in trade with the EU-15 countries than with the new EU Member States. It accounted for, respectively, 30% and 25% of Polish trade in agri-food products with those groups of countries.

4.3. Indices of intra-industry trade in bilateral terms

Over the analysed period, the importance of intra-industry trade in Polish trade in agri-food products with almost all the EU Member States increased (except for Slovenia and Finland) – Chart 4.2 and Annex 4.1. The share of this type of trade in agri-food trade with the biggest recipient of Polish food – Germany, nearly doubled in 2003-2013 (by more than 20 pp), to the level of 41.8% in 2013. The intensity of intra-industry trade increased the most in 2004 (the year of accession) and 2009 (economic and financial crisis). During Poland's membership in the EU, there was also a significant increase in the importance of intra-industry trade in trade with some EU-15 countries, i.e. Austria (an increase by 20 pp), Ireland (by nearly 16 pp), and Italy and Belgium (by 13 pp). Basically, the intensity of intra-industry trade in agri-food products with Great Britain did not change after accession. This seems quite surprising given the scale of the Polish emigration to this country, which created trade in agri-food products, both from Poland to Great Britain and the other way round. Also, intense trade as part of networks, *inter alia*, Tesco should contribute to an increase in intra-industry trade.

Chart 4.2. Indices of intra-industry trade in Polish agri-food trade with the European Union, in percent



Source: own calculations based on WITS-Comtrade data.

In 2003 indices of intra-industry trade in agri-food products with the new EU Member States from Central Europe (i.e. the Czech Republic, Hungary and, to a lesser extent, Slovakia) were among the highest. After accession, those indices increased, however, by a few percentage points only. The intensity of intra-industry trade with the majority of other new Member States significantly increased, the most in trade with Lithuania (by nearly 24 pp), Croatia (by more than 13 pp), Romania (by 12 pp) and Latvia (by more than 9 pp). Just like in the case of the EU-15 countries, this increase may be associated with the total liberalisation of Polish trade in agri-food products with those countries, as well as with increasing *per capita* income, which is related to an increase in tendencies to diversity.

In 2013, intra-industry trade was the most important in agri-food trade of Poland with Germany, where nearly 42% of the value of trade was of intra-industry nature. The high GL index was also characteristic of Polish agri-food trade with the Czech Republic (34.0%), the Netherlands (29.8%) and Lithuania (29.4%), Austria and Hungary (slightly more than 28%). About 1/4 of trade in food products was of intra--industry nature also in trade with France, Denmark and Sweden. Of low intensity was intra-industry trade with such countries as Finland, Estonia, Slovenia, Spain and Greece, and in trade with Malta – that type of trade was practically non-existent.

4.4. Indices of intra-industry trade in commodity terms

The intensity of intra-industry trade in Polish trade in individual groups of agri--food products with the European Union was very diversified. In 2013, the highest indices of intra-industry trade were recorded in trade in such products as: other animal products (59.9%), miscellaneous edible preparations (56.7%), preparations of cereals and pastrycooks' products (51.2%), cocoa and cocoa products (49.1%), coffee, tea and spices (48.2%), and residues and prepared animal fodder (44.3%) – Table 4.1, Chart 4.3. In many chapters, indices of intra-industry trade were within the ranges of 30-40%. Those chapters were, e.g.: dairy products, sugars and confectionery, live plants and cut flowers, milling products, malt and starches as well as meat and fish preparations. With very few exceptions, the most intense intra-industry trade took place in differentiated product groups with the relatively high level of processing. The more processed are trading products, the greater are possibilities for their differentiation. This differentiation consists in giving these products such characteristics, which will ensure that they will be perceived by consumers as different. The lowest GL indices (below 15%) were recorded in the product groups of marginal importance in Polish agri-food trade, i.e. in the group of other origin products and vegetable extracts, as well as trade in tobacco and tobacco products, live animals, meat and meat edible offal, cereals and fruit. They were mostly low processed products, or even agricultural raw materials, as well as products in which Poland had the inter-industry specialisation in the export to the European Union (e.g. tobacco and tobacco products).

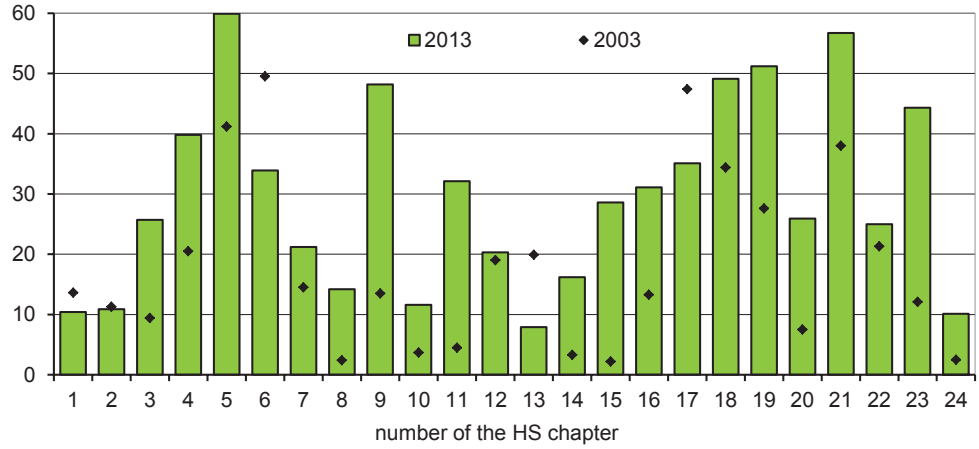
During Poland's membership in the European Union, the importance of intra--industry trade increased in nineteen (out of 24 HS chapters) and decreased – in just five chapters. The largest increase in the share of intra-industry trade was in Polish trade with the EU-28 countries with such groups of agri-food products as coffee, tea and spices (by 37.7 pp), residues and prepared animal fodder (by 32.1 pp), milling products, malt and starches (by 27.6 pp), animal or vegetable fats and oils (by 26.4 pp), preparations of cereals and pastrycooks' products (by 23.6 pp), dairy products (about 19.3 pp), miscellaneous edible preparations, fruit and vegetable preparations and other animal products (by nearly 19 pp). On the contrary, the share of that type of trade decreased in trade in: live plants (by 15.6 pp), sugars and confectionery (by 12.3 pp), vegetable extracts (by 12 pp), live animals (by 3.2 pp), and meat and edible meat offal (by 0.3 pp).

Table 4.1. Indices of intra-industry trade in Polish agri-food trade with the European Union, in percent

Number and description of the HS chapter		EU-28		EU-15		EU-13	
		GL index in 2013, in %	Change in 2003-2013 in pp	GL index in 2013, in %	Change in 2003-2013 in pp	GL index in 2013, in %	Change in 2003-2013 in pp
01	Live animals	10.4	-3.2	10.0	-3.7	11.7	0.6
02	Meat and edible meat offal	10.9	-0.3	11.0	-1.6	10.4	9.4
03	Fish and seafood	25.7	16.3	25.4	15.2	31.1	29.6
04	Dairy products	39.8	19.3	47.6	20.2	21.2	14.8
05	Other animal products	59.9	18.6	62.0	20.1	37.8	23.3
06	Live plants and cut flowers	33.9	-15.6	34.6	-16.4	17.4	7.8
07	Vegetables	21.2	6.6	20.9	6.2	22.8	8.9
08	Fruit and nuts	14.2	11.8	13.5	11.4	21.3	16.4
09	Coffee, tea and spices	48.2	34.7	56.8	43.3	25.2	11.7
10	Cereals	11.6	7.9	9.2	3.1	21.2	20.1
11	Milling products, malt and starches	32.1	27.6	43.5	31.1	15.3	15.0
12	Oil seeds and oleaginous fruits	20.3	1.3	16.2	-5.8	39.7	28.3
13	Vegetable extracts	7.9	-12.0	6.8	-13.4	25.2	10.4
14	Other vegetable products	16.2	12.9	27.8	24.3	6.0	6.0
15	Animal or vegetable fats and oils	28.6	26.4	29.4	27.4	26.7	23.1
16	Meat and fish preparations	31.1	17.8	33.9	19.1	16.9	13.8
17	Sugars and confectionery	35.1	-12.3	41.7	-12.6	24.1	-9.1
18	Cocoa and cocoa products	49.1	14.7	51.2	9.0	39.0	19.5
19	Preparations of cereals and pastrycooks' products	51.2	23.6	55.1	22.0	40.5	18.5
20	Fruit and vegetable preparations	25.9	18.5	26.0	20.1	25.5	12.8
21	Miscellaneous edible preparations	56.7	18.7	67.5	29.3	27.5	-10.3
22	Beverages and spirits	25.0	3.7	23.0	0.2	29.7	13.4
23	Residues and prepared animal fodder	44.3	32.1	43.3	33.8	47.2	20.4
24	Tobacco and tobacco products	10.1	7.6	8.9	4.5	15.5	15.5
Agri-food products		28.8	11.4	29.9	12.2	24.7	8.1

Source: own calculations based on WITS-Comtrade data.

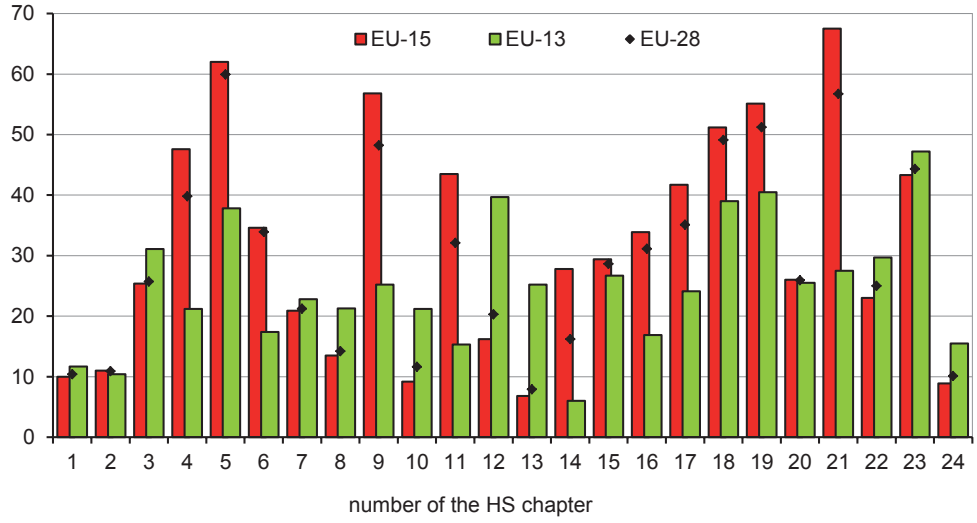
Chart 4.3. Indices of intra-industry trade in agri-food products of Poland with the EU-28, by HS chapters, in percent



Source: own calculations based on WITS-Comtrade data.

In trade with the EU-15 countries and other new EU Member States, there were large differences in the level of intensity of intra-industry trade in individual commodity groups (Chart 4.4). In 2013, the share of intra-industry trade in trade in most of the product groups with the EU-15 Member States was clearly higher (even more than twice) than trade with the EU-13 countries. These products included, *inter alia*, miscellaneous edible preparations, other animal products, coffee, tea and spices, preparations of cereals and pastrycooks' products, cocoa and cocoa preparations, dairy products, milling products, sugars and confectionery, and meat and fish preparations. In 2013, more than 60% of Polish trade in miscellaneous preparations and other animal products with the EU-15 countries was of intra-industry nature. This type of trade was also dominant in Polish trade in coffee, tea and spices, preparations of cereals and pastrycooks' products as well as cocoa and cocoa products with that group of countries. In several product groups, the clearly higher GL indices were characteristic of Polish trade with the EU-13 rather than with the EU-15 countries. This applied to, *inter alia*, residues and prepared animal fodder, oil seeds and oleaginous fruits, fish and seafood, beverages and spirits, vegetable extracts, fruit, cereals, and tobacco and tobacco products. Nearly half of Polish trade in residues and prepared animal fodder with the EU-13 countries was of intra-industry nature. In the group of oil seeds and oleaginous fruits, the GL indices exceeded 40%, and in the groups of fish and seafood, and beverages they were close to 30%. In case of the latter, the relatively high GL indices resulted from the large importance of intra-industry trade in non-alcoholic beverages in Polish trade with the Czech Republic, Slovakia and Hungary, and in beer – in trade with the Czech Republic and Lithuania.

Chart 4.4. Indices of intra-industry trade in agri-food products of Poland with the European Union in 2013, by HS chapters, in percent



Source: own calculations based on WITS-Comtrade data.

Table 4.2. Items[a] in agri-food trade of Poland with the European Union with the index of intra-industry trade intensity of more than 40% in 2013

HS heading number	Description of the HS heading	GL index in trade with the EU, in %	Countries with the highest GL index in Polish trade in products from the given group[b]
0504	Guts, bladders and stomachs of animals (other than fish), whole and in pieces thereof, fresh, chilled, frozen, salted, in brine, dried or smoked	68.3	Great Britain (90%), Germany (78%)
1704	Sugar confectionery (including white chocolate), not containing cocoa	66.3	Czech Republic (95%), Germany, Hungary, Italy (89%), Netherlands (76%)
2106	Food preparations not elsewhere specified or indicated	66.2	Sweden, Germany (96%), Ireland, France (86%)
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen	63.7	Germany (87%), Denmark (81%), Netherlands (79%), Sweden (77%)
1905	Bread, pastry, cakes and biscuits and other bakers' wares	60.5	Bulgaria (99%), Portugal (94%), Croatia (90%), Slovakia (88%)
0901	Coffee, whether or not roasted or decaffeinated; coffee husks and skins; coffee substitutes containing coffee in any proportion	59.1	Great Britain (94%), Lithuania (81%), Finland (76%)
2309	Preparations of a kind used in animal feeding	58.4	Netherlands (96%), Great Britain (90%), Ireland (88%)
2101	Extracts, essences and concentrates of coffee, tea or maté and preparations with a basis of these products or with a basis of coffee	56.6	Great Britain (97%), Germany (73%), France (60%)
1806	Chocolate and other food preparations containing cocoa	55.3	Italy, Lithuania (90%), France (83%), Netherlands (81%)
0405	Butter and other fats and oils derived from milk; dairy spreads	52.2	Estonia (87%), France (83%), Netherlands (82%), Austria (77%)
2103	Sauces and preparations therefor; mixed condiments and mixed seasoning; mustard flour and meal and prepared mustard	50.7	Belgium (97%), Germany (90%), Austria (59%)
2008	Fruit, nuts and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar	49.8	Austria (93%), Netherlands (78%), Bulgaria and Germany (75%)
0406	Cheese and curd	49.2	Denmark (99%), Ireland (84%), Germany (81%), Netherlands (73%)
0602	Other live plants (including their roots), cuttings and slips; mushroom spawn	45.0	Italy (100%), Denmark (95%)
2403	Other manufactured tobacco and manufactured tobacco substitutes; "homogenised" or "reconstituted" tobacco; tobacco extracts and essences	43.9	Germany (69%), France (62%), Romania (45%)
1517	Margarine; edible mixtures or preparations of animal or vegetable fats or oils	43.1	Great Britain (99%), Sweden (86%), Germany (64%)
1904	Prepared foods obtained by the swelling or roasting of cereals or cereal products; cereals in grain form or in the form of flakes	41.8	France (86%), Hungary (82%)
1514	Rape (canola), colza or mustard oil and fractions thereof, whether or not refined, but not chemically modified	40.3	Czech Republic (56%), Germany (55%)
0404	Whey and products consisting of natural milk constituents	40.1	Lithuania (45%)

[a] The selection has been made from among HS headings (according to the four-digit HS classification), in case of which the share of intra-industry trade in total trade in agri-food products of Poland with the EU was in 2013 higher than 0.2%; [b] countries with the highest GL index in the given product group were selected from among the countries in trade with which the share of intra-industry trade in the given product group exceeded 0.5% of agri-food trade of these countries.

Source: own calculations based on WITS-Comtrade data.

An analysis of the intra-industry trade intensity in agri-food products at the level of product groups (HS items according to the four-digit codes) indicates that in 2013, in some groups of agri-food products, intra-industry trade accounted for more than half of Polish trade with the European Union (Table 4.2). In most cases, the simultaneous export and import applied to differentiated products, with the relatively high degree of processing, including such as: sugar confectionery not containing cocoa and other food preparations (66%), pastry, cakes and biscuits and other bakers' wares (61%), feed for animals (58%), coffee- or tea-based preparations (57%), chocolate and chocolate products (55%), butter and other dairy spreads (52%), sauces and processed spices (51%), and jams and other fruit preparations (50%). The high intensity of intra-industry trade (over 40%) was also characteristic of: cheese and curd (49%), tobacco products, including cigarettes (44%), margarine and other edible fats and oils (43%), cereals and muesli (42%) as well as whey and other products of natural milk (40%). Those products were generally very close substitutes, mainly due to their value in use. Their purchase by consumers was determined by individual, specific characteristics such as: origin, taste, shape or packaging.

Intra-industry trade also took place within agricultural raw materials and agri--food products with the low degree of processing. One such example in Poland were: animal guts, bladders and stomachs; rape, colza or mustard oil; cuttings; fish fillets; and coffee (whether or not roasted).

In 2013, indices of intra-industry trade in Polish trade in certain groups of agri--food products at the level of the HS items in bilateral relations with the EU countries sometimes exceeded 90%. Those product groups included:

- sugar confectionery, not containing cocoa (1704) in Polish trade with the Czech Republic,
- other food preparations (2106) in Polish trade with Sweden and Germany,
- pet food (2309) in Polish trade with the Netherlands,
- chocolate and other chocolate products (1806) in Polish trade with Italy and Lithuania,
- sauces and processed spices (2103) in Polish trade with Belgium and Germany,
- bread, pastry, cakes and biscuits and other bakers' wares (1905) in Polish trade with Bulgaria, Portugal and Croatia,
- margarine and other edible fats and oils (1507) in Polish trade with Great Britain,
- cheese and curd (0406) in Polish trade with Denmark.

4.5. The structure of the intra-industry trade

We talk about the horizontal product differentiation when individual varieties are of the same quality, but differ with respect to other characteristics, often defined as visible (the colour of wine) or perceptible (the taste of cognac, yoghurt). The horizontal

product differentiation occurs also when products are identical, but buyers consider them to be different. What is important then, is the subjective attitude of the buyer towards products[75]. In addition, buyers often treat differently the same products coming from different countries, which is partially due to psychological reasons (e.g. tradition, prejudice). Intra-industry trade in horizontally differentiated products is usually considered in the context of two clearly different consumer behaviours. Firstly, consumers like variety (love of variety) and want to buy not one but as many varieties of a given commodity as possible (the so-called neo-Chamberlinian models). Secondly, consumers purchase commodities due to their specific characteristics and not for the sake of just having them. If all commodities from the given group are available and have the same unit price, the consumer will seek to purchase one favourite variety (love of characteristics), which is most similar to the "perfect product" (the so-called neo-Hotelling models).

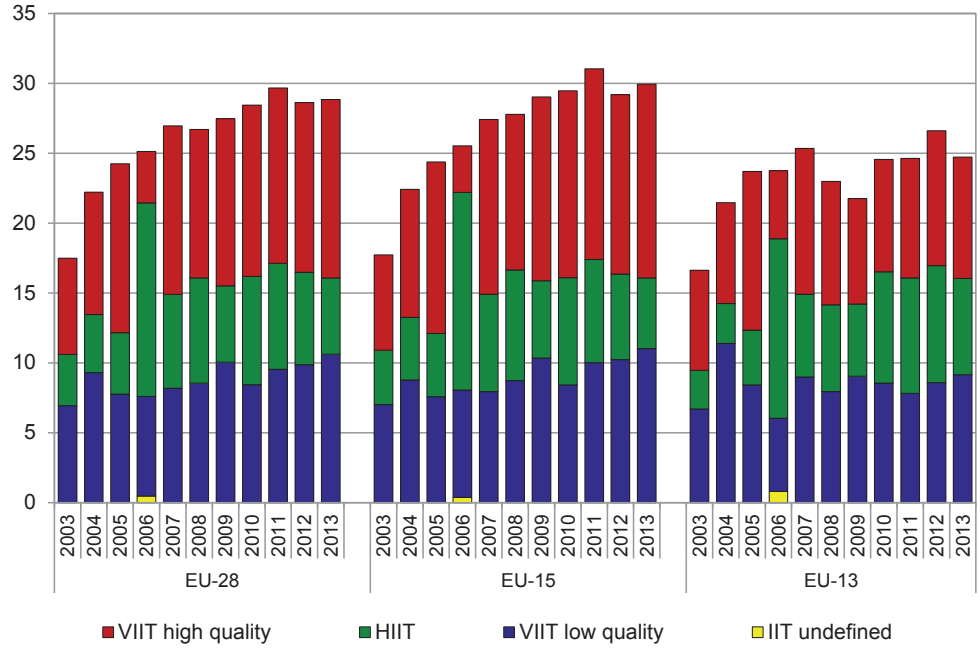
The vertical product differentiation means that one variety, when compared to the other, shows a greater intensity of certain characteristics or has additional properties. Vertical varieties are associated with the supply side of the market, as the improvement in the product quality requires incurring additional expenses and this results in a rise in the unit price of this product. As opposed to the horizontal product differentiation, here, consumers have identical tastes. However, in view of the fact that the price rises with an increase in the commodity quality and everyone wants to have a product with the highest achievable quality, the choice of the specific variety of the product is determined by the level of income of the buyer. Therefore, it does not result from the love of variety but from differences in income levels. Consumers choose the variety of the best quality from among the varieties available for them in financial terms.

During Poland's membership in the EU, the dynamic increase in the intensity of intra-industry trade in agri-food products with the European Union was not accompanied by any significant changes in the structure of this type of trade (cf. Chart 4.5 and 4.6). There were no clear trends in the evolution of the structure and it was often unstable. The analysis should ignore the year of 2006, as the structure of intra-industry trade was definitely different than in other years. As it results from previous studies, it followed from inaccurate data on trade[76].

[75] E. Czarny, *Teoria i praktyka*…, op. cit., pp. 37-38.

[76] We may assume that the clear change in the structure of intra-industry trade in 2006 may result from the imperfect data from the Comtrade database. This is confirmed by the fact that the structure of intra-industry trade of Poland in 2005 and 2006, calculated based on the Eurostat-Comext data, was basically the same.

Chart 4.5. Share of individual types of intra-industry trade[a]
in Polish agri-food trade with the European Union, in percent



[a] Description of designations in Chapter 4.1.

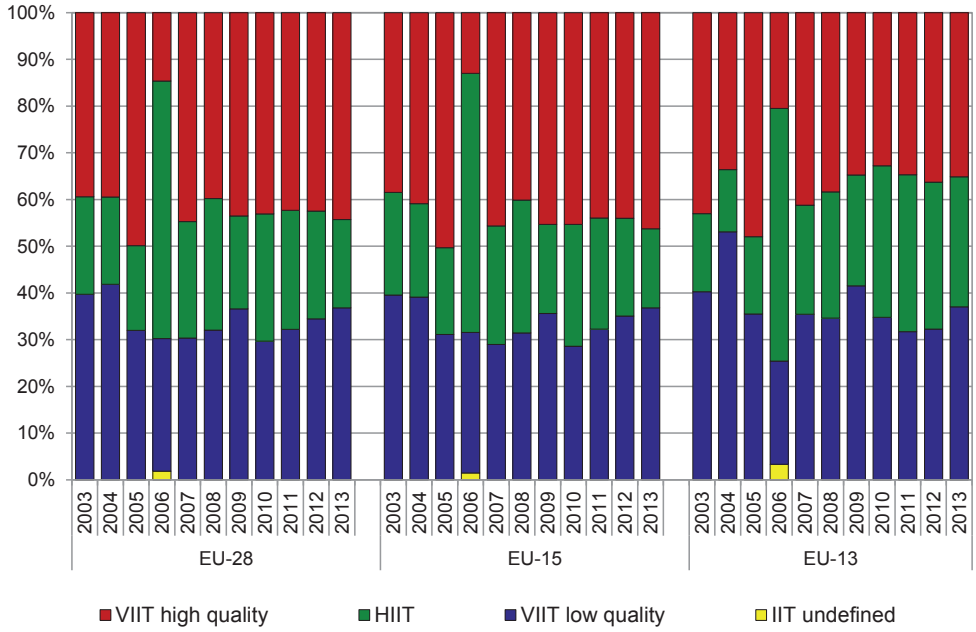
Source: own calculations based on WITS-Comtrade data.

After accession, intra-industry trade in agri-food products of Poland with the European Union was dominated by trade in vertically differentiated products. This means that differences in unit prices in the export and import were so significant that they indicated differences in the quality of traded products. The majority of vertical trade was trade in products with relatively higher quality, i.e. Poland exported products of relatively better quality and imported products of relatively lower quality (Chart 4.6). Over the analysed period, the share of that type of trade in Polish intra-industry trade in agri-food products with the EU-28 countries was stable and oscillated at the level slightly above 40% (44.2% in 2013)[77]. It was a beneficial phenomenon and proved that Polish producers were able to compete in foreign markets with product ranges of relatively high quality. Slightly less important in trade with the EU was vertical intra--industry trade in low quality products i.e. export of products of relatively lower quality and import of products of relatively higher quality. In 2003-2013, the share of that type of trade reduced slightly and over the analysed period oscillated mostly within the range of 30-35%. The importance of intra-industry trade in horizontally differentiated

[77] When compared to the structure of intra-industry trade for entire Polish trade with the European Union, this share was nearly twice higher. Cf. Ł. Ambroziak, *Wpływ bezpośrednich inwestycji zagranicznych…*, op. cit.

products was quite unstable. In 2013, the share of that type of intra-industry trade in agri-food trade of Poland with the European Union accounted for 18.9%. The high intensity of this type of trade is usually characteristic of the countries with the high level of economic development, i.e. with high income of the population. The higher is the level of income of the population, the greater is their love for variety and, consequently, the greater potential for the development of trade in horizontally differentiated products.

Chart 4.6. Structure of Polish intra-industry trade[a] in agri-food products with the European Union, in percent of intra-industry trade

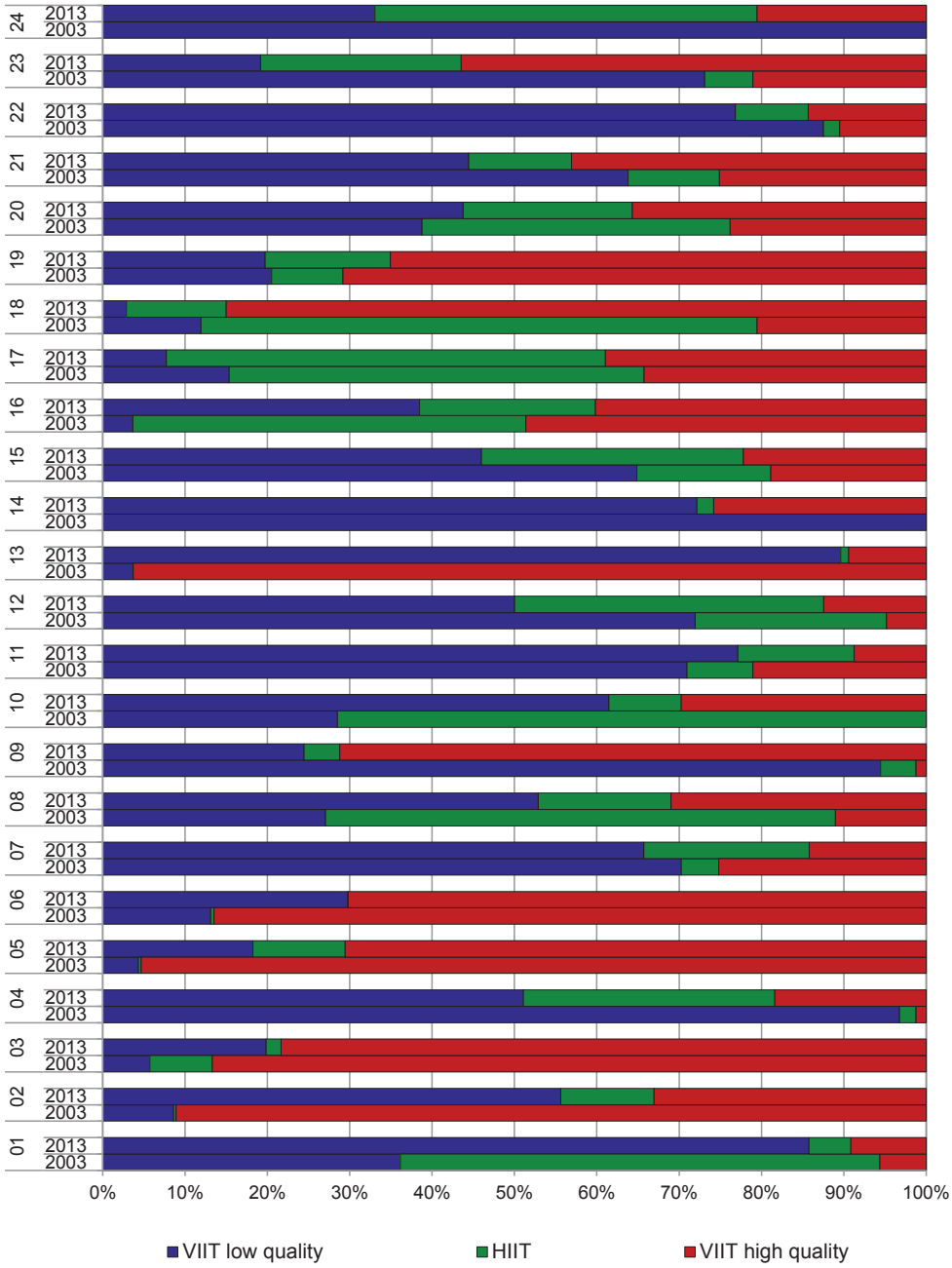


[a] Description of designations in Chapter 4.1.

Source: own calculations based on WITS-Comtrade data.

The structures of intra-industry trade in agri-food products of Poland with the EU-15 countries and the new EU Member States were slightly different. After accession, the importance of intra-industry trade in horizontally differentiated products in Polish trade with the EU-13 countries clearly increased. In 2013, the share of that type of intra-industry trade accounted for 27.8% of Polish intra-industry trade with this group of countries. The high share of horizontal intra-industry trade indicated the great similarity between income of the Polish population and of other new EU Member States. In trade with the EU-15 countries, that type of trade was clearly lower and in 2013 it accounted for 16.9%. Higher than in the EU-13 countries was the share of intra-industry trade in vertically differentiated products, of the relatively higher quality in the export than in the import (more than 46% in 2013).

Chart 4.7. Structure of Polish intra-industry trade[a] in agri-food products with the European Union, by HS chapters, in percent of intra-industry trade



[a] Description of designations in Chapter 4.1; Chart does not include IIT undefined due to the absence of that type of trade in those years.

Source: own calculations based on WITS-Comtrade data.

The structure of intra-industry trade of Poland with the European Union in the individual product groups by HS chapters was clearly differentiated (Chart 4.7). In 2013, intra-industry trade in vertically differentiated products of relatively higher quality in the export than in the import was of the greatest importance in those product groups which have been produced on the basis of imported raw material. They were, *inter alia*, fish and seafood (import of raw salmon and export of smoked salmon), coffee, tea and spices (import of unroasted coffee and export of roasted coffee), cocoa and chocolate products (import of cocoa bean and non-defatted cocoa paste, chocolate semi-finished products for the production and export of finished chocolate products). Over the analysed period, this type of trade amounted to as much as about 80-90% of intra-industry trade in fish and seafood. The importance of intra-industry trade in vertically differentiated products of the relatively higher quality in the export than in the import clearly increased in the following groups: coffee, tea and spices, and cocoa and chocolate products. This proves the progressive specialisation of Poland in processing based on imported raw material and then the export of manufactured products. The high share of vertical intra-industry trade of the higher quality in the export than in the import was also characteristic of cereal products and pastry (nearly 70% in 2013).

Adverse changes in the generic structure of intra-industry trade of Poland with the European Union took place in such product groups as: live animals, meat and edible meat offal, and meat and fish preparations. The importance of vertical intra-industry trade of lower quality in the export than in the import increased. In 2003, more than 90% of intra-industry trade in meat and meat edible offal was trade in products of the relatively higher quality in the export than in the import, while in 2013 the share of that type of trade decreased to just more than 30%, mainly in favour of low quality vertical trade. This was mainly due to the specialisation of Poland in the production and export of poultry meat, which is cheaper than other types of meat. In 2003-2013, vertical intra-industry trade in products of the lower quality in the export than in the import accounted for more than half of intra-industry trade in such product groups as: milling products, oil seeds and oleaginous fruits as well as beverages and spirits. The great importance of this type of trade (about 40-50%) was also characteristic of fruit and vegetable preparations, miscellaneous edible preparations and vegetables.

Intra-industry trade in horizontally differentiated products in 2013 played the greatest role in Polish trade with the European Union in sugars and confectionery, tobacco and tobacco products, dairy products, and fruit and vegetable preparations. This means that Poland exported products of similar quality as imported products. In the eyes of consumers, they differed in terms of other properties than the quality, e.g. the country of origin, packaging, taste, colour. The importance of this type of trade indicates the high level of competitiveness of these products. Polish producers and exporters competed in foreign markets not only with the quality of products, but also with other characteristics.

4.6. Summary

When Poland became the member of the European Union, the importance of intra-industry trade in agri-food products with the European Union substantially increased. Liberalisation of agri-food trade within the Community, growing GDP level *per capita* and, consequently, the increase in the purchasing power of the population and its tendency to diversity as well as development of the food industry, resulting, *inter alia*, in an extension of the range of produced commodities and the persistently high demand of the EU buyers, contributed to the development of Polish agri-food trade (especially export), including an increase in the intensity of two-way trade.

In 2013, almost 29% of trade in agri-food products of Poland with the European Union was of intra-industry nature. When compared to 2003, that share increased by more than 11 pp. The dominant part of intra-industry trade accounted for trade in commodities differentiated under the given industry with relatively high degree of processing. Less intense was intra-industry trade in differentiated commodities with the low degree of processing, including agricultural raw materials as well as uniform commodities. The share of intra-industry trade in Polish trade with the EU-15 countries was in 2013 by about 5 pp higher than in trade with the new EU Member States and, respectively, accounted for nearly 30% and 25%.

The intensity level of intra-industry trade in different groups of agri-food products, as measured by the GL index was, however, differentiated. It was the highest (GL > 40%) in trade in other animal products, miscellaneous edible preparations, preparations of cereals and pastrycooks' products, cocoa and cocoa preparations and coffee, tea and spices, and the lowest (GL < 15%) – in trade in tobacco and tobacco products, meat and meat edible offal, live animals and fruit.

The dynamic development of intra-industry trade in agri-food products proves the strengthening competitive position of manufacturers of these products. Poland competed in foreign markets with varieties of individual products from the given group. This is a slightly different type of competition than in case of the inter-industry specialisation, where the country specialises in the export of commodities in the production of which it has comparative advantages over foreign countries. Particularly positive is vertical intra-industry trade in products with the higher quality in the export than in the import. The development of this type of trade proves positive changes which have taken place in the food industry during Poland's membership in the EU, i.e. increase in the production characterised by a high level of technological involvement and, consequently, competing in foreign markets with the quality of sold products.

5. Quality and price competition strategies in trade in agri-food products of Poland with the European Union

This part of the paper, attempts to identify basic competition strategies applied by Polish food producers in the European Union market, in other words, to answer the question, what the international competitiveness of the Polish agri-food sector has been based on so far. Whether the basic competition instruments were lower production costs allowing to offer lower product prices; hence producers applied the cost leadership strategy, or just the opposite – entities applied rather non-price competition instruments, including the widely understood product quality, i.e. they applied the differentiation strategy. It is tantamount to investigating whether Poland applied mainly its advantage in production costs and exported lower quality but affordable commodities or, due to the strong trade connections with the EU countries, it tried to compete in high quality segments, regarding them as more promising. In addition, this chapter shows the direction in which competition strategies evolve.

5.1. Description of the method

One of the methods for analysing the competitiveness, applied in the recent years in the European Union, is the quality and price method proposed by K. Aiginger[78] using the so-called "weight-price" index[79], which, in fact, is the method for analysing how to compete in the international market. This method consists in investigating the characteristics of trade from the point of view of absolute, not comparative, advantages of the country over foreign countries in various fields of the economy, in particular in the field of industrial production[80].

The basic substantive assumption of the analysis is the existence of intra-industry trade. In practice, this means the presence, in trade, of various products (different in the import and in the export), but coming from the same production industries and, therefore, classified in the statistics of international trade into the same commodity groups. Individual products differ in terms of their quality and price and thus analysis at the level of commodity grups (here – HS chapters) means the use of average values. For example, concluding that in the given product groups (HS chapter) export prices exceed import prices means that various commodities, characterised by one and the

[78] K. Aiginger, *Unit Values…*, op. cit., pp. 93-121; K. Aiginger, *The Use…*, op. cit., pp. 571-592.
[79] M. Olczyk, *Konkurencyjność. Teoria i praktyka*, op. cit., pp. 76-77.
[80] W. Burzyński, *Analiza konkurencyjności polskiego eksportu do Unii Europejskiej przeprowadzona metodą jakościowo-cenową (Analysis of competitiveness of the Polish export to the European Union, carried out using the quality and price method)*, [in:] J. Kotyński (ed.), *Korzyści i koszty członkostwa Polski w Unii Europejskiej. Tom I (Benefits and costs of Poland's membership in the European Union. Vol. I)*, IKCHZ, Warszawa 2000, p. 304.

other price relationships, may be traded. Similarly, the reason for the positive or negative quantitative balance of trade in commodity groups may be the different volume of the demand for individual goods in countries – trading partners[81].

In order to analyse the forms of competition in the international market, K. Aiginger suggested the application of two competitiveness indicators, i.e. relationship of average export prices to average import prices and foreign trade balance in quantitative terms[82].

For the purposes of this analysis, these indicators were determined as follows[83]:

1. Relationship of average export prices to average import prices, calculated according to the formula:

$$UV_{kk'} = \frac{\sum_{j=1}^{m}\sum_{i=1}^{n}\frac{V_{ij}^{ex}}{Q_{ij}^{ex}}\cdot\frac{V_{ij}^{ex}}{\sum_{j=1}^{m}\sum_{i=1}^{n}V_{ij}^{ex}}}{\sum_{j=1}^{m}\sum_{i=1}^{n}\frac{V_{ij}^{im}}{Q_{ij}^{im}}\cdot\frac{V_{ij}^{im}}{\sum_{j=1}^{m}\sum_{i=1}^{n}V_{ij}^{im}}}$$

where:

$UV_{kk'}$ – relationship of average export prices to average import prices of the k^{th} commodity group (here: HS chapter or sum of HS chapters 01-24) in Polish trade with the k' group of countries (here: EU-28, EU-15 and EU-13 countries),

V_{ij}^{ex}, Q_{ij}^{ex} – respectively, value and volume of the Polish export of the i^{th} product to the j^{th} country,

V_{ij}^{im}, Q_{ij}^{im} – respectively, value and volume of the Polish import of the i^{th} product from the j^{th} country,

i – product at the six-digit level of the HS classification,

n – number of products in the k^{th} product group,

j – country,

m – number of countries in the k' group of countries.

The range of price relationship values – from the mathematical point of view – starts from zero and there is no upper limit. From the point of view of the applied method of analysis, the only essential thing is whether this relationship is greater than or equal to 1, or lower than 1.

[81] Ibidem, p. 304.
[82] K. Aiginger, *Unit Values*..., op. cit.; K. Aiginger, *The Use*..., op. cit.
[83] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (2)*, op. cit., pp. 71-90.

2. Foreign trade balance (*Sq*) in quantitative terms, in physical units, calculated according to the following formula:

$$Sq_{kk'} = Q^{ex}_{kk'} - Q^{im}_{kk'}$$

where:

$Sq_{kk'}$ – trade balance in quantitative terms – for the k^{th} commodity group (here: HS chapter or sum of HS chapters 01-24) in Polish trade with the k' group of countries (here: EU-28, EU-15 and EU-13 countries),

$Q^{ex}_{kk'}$ – volume of export of Poland, for the k^{th} commodity group, with the k' group of countries,

$Q^{im}_{kk'}$ – volume of import of Poland, for the k^{th} commodity group, with the k' group of countries,

k – commodity group,

k' – group of countries.

It should be stressed that what is interesting in the applied method is only the sign of the trade balance, i.e. in practice – if it is positive, equal to zero or negative.

The common application of both these indicators, also known as the "weight--price" index, may be presented graphically in the form of the so-called matrix of competitiveness. The price relationship (*UV*) may be, in fact, greater than or equal to 1 ($UV \geq 1$) or less than 1 ($UV < 1$). The quantitative turnover balance (*Sq*) may be positive or equal to 0 ($Sq \geq 0$) or negative ($Sq < 0$). Based on a comparison of the values of both these indicators of competitiveness, we may divide commodities subject to foreign trade of the given country into four segments (Table 5.1):

1. Segment I – includes these commodity groups, for which the relationship of export prices to import prices is greater than or equal to 1 and the trade balance in physical units is positive or equal to zero, which implies the **effective quality competition strategy**;
2. Segment II – includes these product groups, for which the relationship of export prices to import prices is lower than 1 and the trade balance in physical units is positive or equal to zero, which implies the domination of the **effective low price competition strategy**;
3. Segment III – includes these commodity groups, for which the relationship of export prices to import prices is greater than or equal to 1 and the trade balance in physical units is negative, which implies the **potentially effective quality competition strategy**;
4. Segment IV – includes these product groups, for which the relationship of export prices to import prices is lower than 1 and the trade balance in physical units is negative, which implies the advantage of the **ineffective low price competition strategy**.

Table 5.1. Competition strategies by K. Aiginger

	$UV < 1$	$UV \geq 1$
$Sq \geq 0$	**II. Effective low price competition strategy**	**I. Effective quality competition strategy**
$Sq < 0$	**IV. Ineffective low price competition strategy**	**III. Potentially effective quality competition strategy**

Source: own elaboration based on: K. Aiginger, Unit Values to Signal the Quality Position of CEECs, [in:] The Competitiveness of Transition Economies (coordinator Y. Wolfmayr), OECD proceedings, WIFO, WIIW, OECD 1998, pp. 93-121.

An analysis of the competitiveness of the given country in terms of assigning exported products to one of four segments in the above matrix allows to conclude on the foundations of competitiveness of this country, as the value of the *UV* indicator informs about the adopted competition strategy, while the sign of the *Sq* indicator provides information about the effectiveness of the adopted form of competition[84].

An analysis of quality and price competition strategies in Polish trade in agri-food products with the European Union (EU-28 and, separately, EU-15 and EU-13) in 2003--2013 was based on the trade data from the WITS-Comtrade database, expressed in USD.

5.2. Quality and price competition strategies in trade in agri-food products of Poland with the EU-28 countries[85]

Effective quality competition strategy

From the analysis of the matrix of competitiveness created for agri-food trade of Poland with the European Union (Table 5.2) it results that in 2003 the number of chapters, allowing for effective competition in quality terms in the EU market, was reduced to just five of twenty-four chapters. Products competitive for foreign recipients in quality terms were: meat and edible meat offal (02), meat, fish and seafood preparations (16), preparations of cereals and pastrycooks' products (19), fruit and vegetable preparations (20), and tobacco and tobacco products (24). Polish trade in those chapters was characterised by higher export prices than import prices, with the greater quantities of commodities exported from Poland than imported to Poland.

[84] N. Daszkiewicz (ed.), *Konkurencyjność. Poziom makro, mezo i mikro (Competitiveness. Macro-, meso- and micro-level)*, Wydawnictwa Naukowe PWN, Warszawa 2008, p. 107.

[85] Accurate data on the relation of average export prices to average import prices and on the value of quantitative balance of trade in agri-food products of Poland with the EU-28, EU-15 and EU-13 (by HS chapters) were included in the statistical annex (cf. Annex 5.1-5.2).

Table 5.2. Competition strategies in agri-food trade of Poland with the European Union (EU-28), by HS chapters

HS chapter		2003	2005	2007	2009	2011	2012	2013
01	Live animals	II	II	II	IV	IV	IV	III
02	Meat and edible meat offal	I	I	I	I	I	I	I
03	Fish and seafood	III	III	I	I	I	III	I
04	Dairy products	II	II	II	II	II	II	II
05	Other animal products	IV	IV	II	II	II	II	II
06	Live plants and cut flowers	III	IV	III	III	III	III	III
07	Vegetables	II	I	I	I	III	I	I
08	Fruit and nuts	III	III	III	III	III	III	III
09	Coffee, tea and spices	III	III	III	III	III	III	I
10	Cereals	IV	II	IV	II	IV	II	II
11	Milling products, malt and starches	III	III	III	IV	III	III	III
12	Oil seeds and oleaginous fruits	IV	II	II	II	IV	II	II
13	Vegetable extracts	III	III	III	III	IV	IV	IV
14	Other vegetable products	II	II	II	III	III	III	IV
15	Animal or vegetable fats and oils	IV	IV	II	IV	IV	IV	IV
16	Meat and fish preparations	I	II	I	I	I	II	II
17	Sugars and confectionery	II	II	I	III	I	I	II
18	Cocoa and cocoa products	III	III	III	III	III	I	I
19	Preparations of cereals and pastrycooks' products	I	I	I	I	I	I	I
20	Fruit and vegetable preparations	I	II	I	II	I	I	II
21	Miscellaneous edible preparations	IV	II	II	II	II	II	II
22	Beverages and spirits	IV	IV	IV	IV	IV	IV	IV
23	Residues and prepared animal fodder	III	III	III	I	III	III	I
24	Tobacco and tobacco products	I	II	I	I	I	I	I
Agri-food products		IV	IV	IV	III	III	III	I

Note: description of the competition strategy is included in Table 5.1.
Source: own calculations based on WITS-Comtrade data.

In 2013, the number of chapters competitive in quality terms in Polish agri-food trade with the EU amounted to as many as eight. The following were added to the above-mentioned chapters, which generally remained competitive throughout the analysis period (except for meat and fish preparations and fruit and vegetable preparations which stopped being competitive in quality terms, respectively, in 2012 and 2013) thus proving the stable, qualitative grounds for their competitiveness: fish and seafood (03), vegetables (07), coffee, tea and spices (09), cocoa and cocoa preparations (18), and residues and prepared animal fodder. Poland managed to achieve the positive weight balance in trade in those products, with the higher price of products in the export rather than in the import, continuing for several years. In 2003-2013, large fluctuations were shown by the relationship of the average export price to the average import price for fruit and vegetable preparations, which resulted in variable, over the individual years, methods to compete in trade with these products (alternately, the effective quality competition strategy and effective low price competition strategy). Even more variable were competition strategies in trade in vegetables (alternatively, the effective quality competition strategy, effective low price competition strategy and potentially effective quality competition strategy).

Potentially effective quality competition strategy

The number of chapters, whose products were sold in the EU market at a higher price, but in insufficient (to achieve a positive balance) quantity (Table 5.2) has been slightly higher. The HS chapters with the potentially effective quality competition strategy in 2003 include the following commodity groups: live plants and cut flowers (06), fruit and nuts (08), coffee, tea and spices (9), milling products (11), fish and seafood (03), vegetable extracts (13), cocoa and cocoa preparations (18), and residues and prepared animal fodder (23). Prices in the Polish export of those commodities were higher than in the import, with the smaller quantities exported from Poland than imported into our country. Such a competition strategy is typical of trade in products in which a large role is played by the re-export, resulting from the Polish specialisation in processing based on imported raw material. The export of these products is characterised by high import intensity which is a reason why every increase in foreign sales entails an increase in the import of raw materials and intermediates for the export production.

The first four of those chapters have maintained their potentially qualitatively effective nature almost throughout the analysed period. In other cases, the potentially effective quality competition strategy was periodically replaced by the effective quality competition strategy (in the chapter of fish and seafood – in 2006-2011 and 2013, cocoa and cocoa preparations – in 2004 and 2012-2013) or ineffective price competition strategy (in the chapter of vegetable extracts – since 2010). In 2003-2013, the large variation was shown by competition strategies applied in trade in residues and prepared animal fodder (alternatively, the potentially effective quality competition strategy and effective and ineffective low price competition strategy).

Effective low price competition strategy

Special attention should be paid to the chapters in which Poland achieved success in the EU market, mainly due to low export prices offered (Table 5.2). Prior to the membership (in 2003), the effective low price competition strategy was a basis for trade in the following commodity groups: live animals (01), dairy products (04), vegetables (07), other vegetable products (14), and sugars and confectionery (17). Trade in those chapters was characterised by lower prices in the export than in the import, with the greater quantities of commodities exported from Poland than imported to Poland. In other words, achieving the positive weight balance of trade within the above product groups was possible through competing with the price of exported products.

However, the stability, i.e. the effective price competitiveness over the analysed period, has been maintained by only one of those chapters, i.e. dairy products. In other four cases, the effective price competition strategy was replaced periodically by the ineffective price competition strategy (in the chapter of live animals – in 2008-2012, other vegetable products – in 2009 and 2011-2012), potentially effective quality competition strategy (in the chapter of vegetables – in 2010-2011, other vegetable products – in 2009 and 2011-2012) or the effective quality competition strategy (in the chapter of sugars and confectionery – in 2007-2008 and 2010-2012).

Ineffective low price competition strategy

In 2003, the ineffective low price competition strategy characterised Polish trade with the EU in the following commodity groups (Table 5.2): other animal products (05), cereals (10), oil seeds and oleaginous fruits (12), fats and oils (15), miscellaneous edible preparations (21), and beverages and spirits (22). Trade in those commodities was characterised by lower prices in the Polish export than in the import, with the negative weight balance of trade.

In case of fats and oils, and beverages and spirits, the situation was adverse in this sense that the ineffective low price competition strategy in the export of those products was relatively stable as it occurred almost throughout the analysed period (2003-2013). These two chapters in the subsequent years were joined by two other chapters: live animals (01), where in 2008-2012 the ineffective low price competition strategy replaced the effective low price competition strategy, and vegetable extracts (13), where from 2010 ineffective low price competition strategy replaced the potentially effective quality competition strategy. In other chapters, we dealt with multidirectional changes in applied strategies.

Changes in competition strategies in Polish trade in agri-food products with the EU-28 in 2003-2013[86]

In 2003-2013, beneficial changes in competition strategies in trade in agri-food products of Poland with the EU (Table 5.2) took place in the following product groups (HS chapters):

- fish and seafood (03) – change from the potentially effective quality competition strategy (III) to the effective quality competition strategy (I);
- other animal products (05) – change from the ineffective price competition strategy (IV) to the effective price competition strategy (II);
- sugars and confectionery (17) – change from the effective low price competition strategy (II) to the effective quality competition strategy (I) or potentially effective quality competition strategy (III);
- miscellaneous edible preparations (21) – change from ineffective price competition strategy (IV) to the effective price competition strategy (II);
- tobacco and tobacco products (24) – after two years of changes in strategies (II, III), return to the effective quality competition strategy (I) in 2006.

[86] Only those changes which are permanent have been included, i.e. the groups of exported products, for which competition strategies used to change frequently, were ignored. As the beneficial change in the competition strategy we mean such change, which results from the improvement in at least one of two competitiveness indicators (the relation of average export prices to average import prices and/or quantitative balance of trade). But then, the unfavourable change in the competition strategy means the change in the strategy, which results from the deterioration of at least one of two above competitiveness indicators.

The change in the competition strategy in the export of fish and seafood should be especially noted. Although over the entire period, prices of those products in the export were higher than in the import, i.e. that was the quality competition, the positive weight balance in trade in these products was achieved only after 2006 and thus competing with quality became effective. A significant change in the competition strategy also took place in the export of sugars and confectionery. While by 2006, the positive weight balance of trade in those products resulted from competing with lower prices of exported products, in 2007-2008 and 2010-2012 it resulted from competing with quality of exported products. In case of other animal products, and miscellaneous edible preparations, lower prices of exported commodities have become a source of the positive balance of trade in those products since 2007 and 2004, respectively.

Adverse changes in the competition strategy of trade in agri-food products of Poland with the EU over the analysed period (Table 5.2) have been recorded in the following product groups (HS chapters):

- live animals (01) – change from the effective low price competition strategy (II) to the ineffective low price competition strategy (IV);
- vegetable extracts (13) – change from the potentially effective quality competition strategy (III) to the ineffective low price competition strategy (IV).

It should be stressed that in 2008-2012, the price competition in the export of live animals became ineffective to achieve the positive weight balance of trade. In addition, since 2010 the existence of the negative weight balance of trade in vegetable extracts ceased to apply to the export of products potentially competitive in quality terms, and resulted from the export of products uncompetitive in price terms.

So, although after accession of Poland to the EU changes in the competition strategy in trade in agri-food products with the EU were multidirectional, the changes beneficial to Polish producers prevailed therein.

5.3. Quality and price competition strategies in trade in agri-food products of Poland with the EU-15 and EU-13 countries

From an analysis of quality and price indices in Polish trade in agri-food products with the EU-15 countries and the new EU Member States, it results that in 2013, only in the case of five HS chapters competition strategies in trade with those groups of countries were the same as those in agri-food trade with the European Union (Table 5.3). They were the following chapters: live animals (strategy III), fish and seafood (I), preparations of cereals and pastrycooks' products (I), miscellaneous edible preparations (II), and tobacco and tobacco products (I). In other product groups, there were clear differences in competition strategies applied in the individual markets.

Table 5.3. Competition strategies in agri-food trade of Poland with the EU-28, EU-15 and EU-13 countries in 2003 and 2013, by HS chapters

HS chapter		EU-28		EU-15		EU-13	
		2003	2013	2003	2013	2003	2013
01	Live animals	II	III	II	III	IV	III
02	Meat and edible meat offal	I	I	I	I	II	II
03	Fish and seafood	III	I	III	I	II	I
04	Dairy products	II	II	II	II	I	I
05	Other animal products	IV	II	IV	II	III	I
06	Live plants and cut flowers	III	III	III	III	II	II
07	Vegetables	II	I	I	I	II	II
08	Fruit and nuts	III	III	III	III	I	II
09	Coffee, tea and spices	III	I	III	III	I	II
10	Cereals	IV	II	IV	II	IV	IV
11	Milling products, malt and starches	III	III	III	II	III	III
12	Oil seeds and oleaginous fruits	IV	II	II	II	III	III
13	Vegetable extracts	III	IV	III	IV	IV	II
14	Other vegetable products	II	IV	II	IV	III	III
15	Animal or vegetable fats and oils	IV	IV	III	IV	III	I
16	Meat and fish preparations	I	II	I	I	II	II
17	Sugars and confectionery	II	II	II	II	II	I
18	Cocoa and cocoa products	III	I	III	III	II	I
19	Preparations of cereals and pastrycooks' products	I	I	III	I	I	I
20	Fruit and vegetable preparations	I	II	I	II	I	I
21	Miscellaneous edible preparations	IV	II	IV	II	I	II
22	Beverages and spirits	IV	IV	IV	II	IV	IV
23	Residues and prepared animal fodder	III	I	III	II	IV	I
24	Tobacco and tobacco products	I	I	III	I	I	I
Agri-food products		IV	I	IV	I	III	III

Note: description of the competition strategy is included in Table 5.1.

Source: own calculations based on WITS-Comtrade data.

As the share of the EU-15 countries in Polish trade in agri-food products with the EU is dominant (75% of the export and 85% of the agri-food import of Poland to/from the EU in 2013), competition strategies in trade with the EU-28 were most similar to those applied in Polish agri-food trade with the EU-15 countries. The convergence of the competition methods took place in case of as many as eighteen HS chapters.

Changes in competition strategies in trade in agri-food products with the EU-15 and EU-13 countries in 2003-2013

From the analysis of quality and price indices in Polish agri-food trade with the EU-15 and EU-13 countries it results that during Poland's membership in the EU, there has been a beneficial change in competition strategies in the following commodity groups (Table 5.4-5.5):

a) in trade with the EU-15 countries – fish and seafood (03), other animal products (05), cereals (10), sugars and confectionery (17), miscellaneous edible preparations (21), beverages and spirits (22), tobacco and tobacco products (24);

b) in trade with the EU-13 countries – live animals (01), other animal products (05), cereals (10), vegetable extracts (13), other vegetable products (14), fats and oils (15), residues and prepared animal fodder (23).

Table 5.4. Competition strategies in agri-food trade of Poland with the EU-15 countries, by HS chapters

HS chapter		2003	2005	2007	2009	2011	2012	2013
01	Live animals	II	II	II	IV	IV	IV	III
02	Meat and edible meat offal	I	I	I	III	III	III	I
03	Fish and seafood	III	III	I	I	I	III	I
04	Dairy products	II	II	II	II	II	II	II
05	Other animal products	IV	IV	II	IV	II	II	II
06	Live plants and cut flowers	III	IV	IV	III	III	III	III
07	Vegetables	I	I	I	I	III	I	I
08	Fruit and nuts	III	III	III	III	III	III	III
09	Coffee, tea and spices	III	III	III	III	III	III	III
10	Cereals	IV	II	IV	II	II	II	II
11	Milling products, malt and starches	III	III	IV	IV	IV	II	II
12	Oil seeds and oleaginous fruits	II	II	II	II	II	II	II
13	Vegetable extracts	III	III	III	IV	IV	IV	IV
14	Other vegetable products	II	II	II	III	III	III	IV
15	Animal or vegetable fats and oils	III	IV	IV	IV	IV	IV	IV
16	Meat and fish preparations	I	II	I	I	I	I	I
17	Sugars and confectionery	II	II	I	III	I	II	II
18	Cocoa and cocoa products	III	III	III	III	III	III	III
19	Preparations of cereals and pastrycooks' products	III	III	III	III	III	III	I
20	Fruit and vegetable preparations	I	II	I	II	I	I	II
21	Miscellaneous edible preparations	IV	IV	IV	II	II	II	II
22	Beverages and spirits	IV	IV	IV	II	IV	IV	II
23	Residues and prepared animal fodder	III	III	II	I	III	II	II
24	Tobacco and tobacco products	III	IV	I	I	I	I	I
Agri-food products		IV	II	IV	I	III	I	I

Note: description of the competition strategy is included in Table 5.1.

Source: own calculations based on WITS-Comtrade data.

Table 5.5. Competition strategies in agri-food trade of Poland with the EU-13 countries, by HS chapters

HS chapter		2003	2005	2007	2009	2011	2012	2013
01	Live animals	IV	II	II	III	III	III	III
02	Meat and edible meat offal	II	II	II	II	II	II	II
03	Fish and seafood	II	I	I	I	III	I	I
04	Dairy products	I	II	I	I	I	I	I
05	Other animal products	III	II	II	II	II	I	I
06	Live plants and cut flowers	II	II	I	I	I	II	II
07	Vegetables	II	II	II	II	II	II	II
08	Fruit and nuts	I	I	II	II	II	II	II
09	Coffee, tea and spices	I	I	I	II	II	I	II
10	Cereals	IV	IV	III	III	III	III	IV
11	Milling products, malt and starches	III	III	III	III	III	III	III
12	Oil seeds and oleaginous fruits	III	III	III	III	III	III	III
13	Vegetable extracts	IV	IV	I	II	II	II	II
14	Other vegetable products	III	II	I	I	I	III	III
15	Animal or vegetable fats and oils	III	III	I	II	I	I	I
16	Meat and fish preparations	II	II	II	II	II	II	II
17	Sugars and confectionery	II	I	I	I	I	I	I
18	Cocoa and cocoa products	II	I	I	I	I	I	I
19	Preparations of cereals and pastrycooks' products	I	I	I	II	I	I	I
20	Fruit and vegetable preparations	I	I	I	I	I	I	I
21	Miscellaneous edible preparations	I	I	I	II	II	II	II
22	Beverages and spirits	IV	IV	IV	III	IV	IV	IV
23	Residues and prepared animal fodder	IV	IV	III	III	III	III	I
24	Tobacco and tobacco products	I	I	I	II	I	I	I
Agri-food products		III	III	III	III	III	III	III

Note: description of the competition strategy is included in Table 5.1.

Source: own calculations based on WITS-Comtrade data.

Adverse changes in competition strategies in Polish agri-food trade with the EU-15 and EU-13 countries in 2003-2013 have been recorded in the following commodity groups (Table 5.4-5.5):

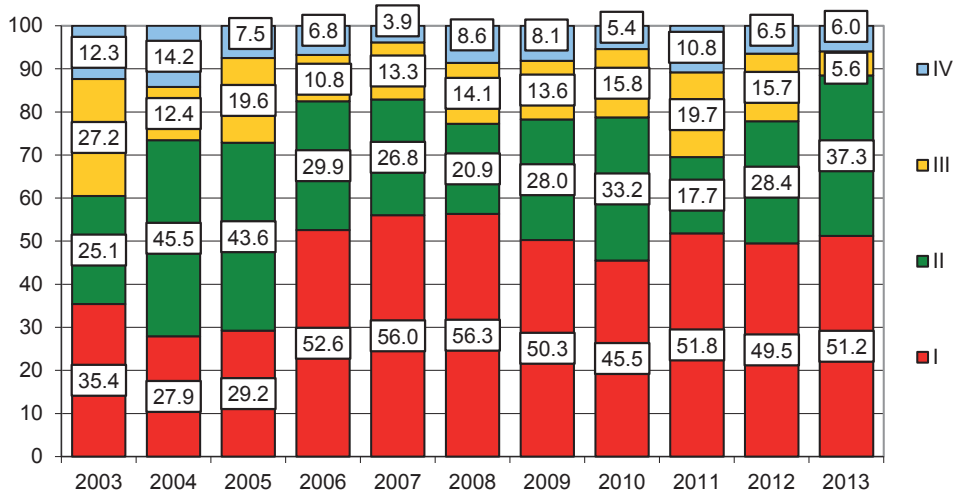
a) in trade with the EU-15 countries – live animals (01), meat and edible meat offal (02), vegetable extracts (13), other vegetable products (14), animal or vegetable fats and oils (15), residues and prepared animal fodder (23);

b) in trade with the EU-13 countries – fruit and nuts (08), coffee, tea and spices (09), miscellaneous edible preparations (21).

5.4. Structure of the Polish export of agri-food products to the European Union by competition strategy

The quality and price method may also be used to break down the flow of exported products into four groups of commodities, which are characterised by four competition strategies distinguished by this method. Chart 5.1 shows the structure of the Polish export of agri-food products to the EU in 2003-2013. Generally speaking, from an analysis of this structure it results that after accession of Poland to the EU, that structure was less stable than in the pre-accession period, whereby changes have taken place mainly in that part of the export, which was characterised by the effective quality competition strategy (I) or effective price competition strategy (II).

Chart 5.1. Structure of the Polish agri-food export to the EU-28, by applied competition strategies, in %



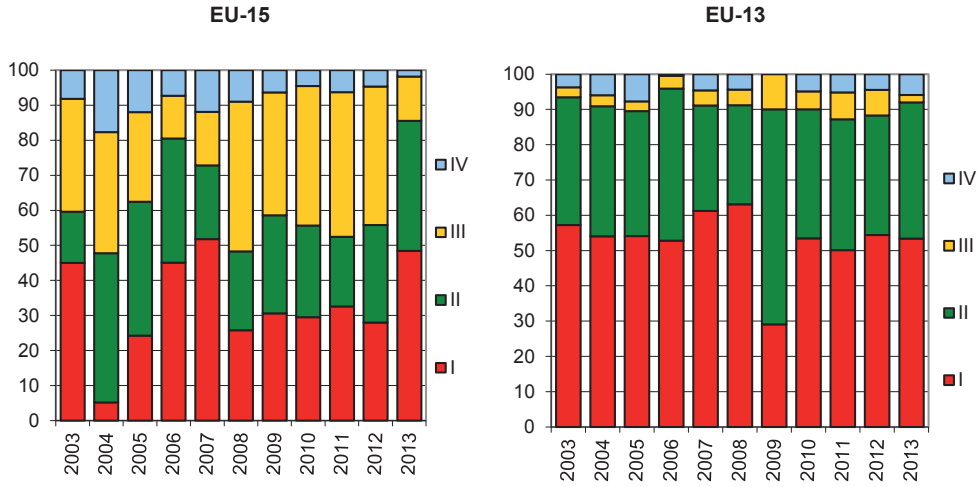
Note: description of the competition strategy is included in Table 5.1.

Source: own calculations based on WITS-Comtrade data.

In the first years after accession (2004-2005) – when compared to the pre-accession period (2003) – an increased share of the export was observed in the Polish agri-food export to the EU which resulted from the application of the effective low price competition strategy to the detriment of the effective quality competition strategy and potentially effective quality competition strategy. This means that Polish food producers, wishing to strengthen their position in the EU market, used their cost advantages skilfully. In the following years (2006-2008), the situation was different – the importance of the effective low price competition strategy clearly declined in favour of the effective quality competition strategy, which indicated significant development of the process of the Polish integration with the EU market. During the global economic crisis (2009-2010), the price competitiveness obviously regained its

importance. In 2011-2013, along with the revival of the Polish food industry, there was an increase in the importance of both the differentiation strategy, based on the effective quality competition, as well as the cost strategy, based on the effective price competition (at the expense of the other two strategies). Consequently, the share of the export of products competitive in quality and price terms in the Polish agri-food export to the EU increased. As a result of those changes, in 2013, as much as 51% of the agri-food export to the EU could be attributed to the application of the effective quality competition strategy (by 16 pp more than in 2003), and 37% – to the effective low price competition strategy (by 12 pp more than immediately before accession). The role of the other two strategies in the structure of the export to the EU has been much smaller (ca. 6% each).

Chart 5.2. Structure of the Polish agri-food export to the EU-15 and EU-13 countries, by applied competition strategies, in %



Note: description of the competition strategy is included in Table 5.1.
Source: own calculations based on WITS-Comtrade data.

There were significant differences in the geographical structure of the Polish agri-food export to the EU, by competition methods (Chart 5.2). In general, during Poland's membership in the EU, in relations with the new EU Member States, the most important was definitely the effective quality competition strategy and effective low price competition strategy (other strategies played a very small role). It was like that also in 2013, when the application of those strategies resulted in, respectively, 53% and 39% of the agri-food export to the EU-13 countries.

In relations with the EU-15 countries, the majority of the analysed period was dominated by the potentially effective quality competition strategy whose importance decreased only in 2013, primarily in favour of the effective quality competition strategy

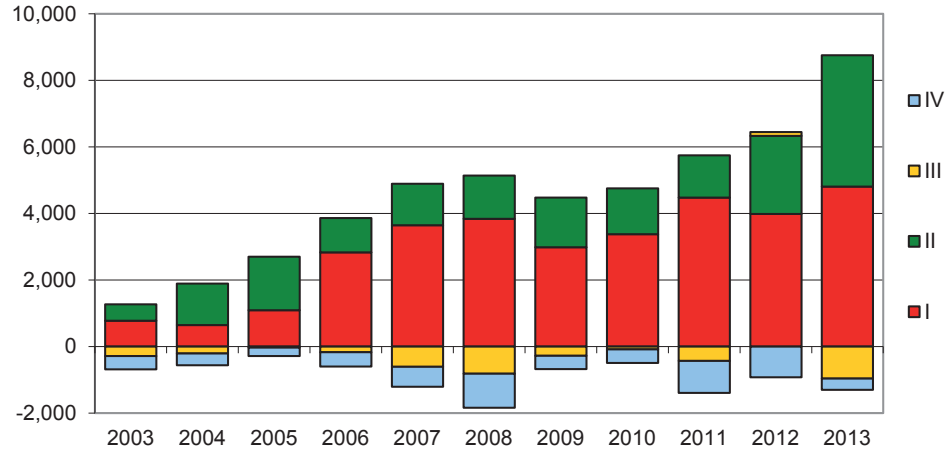
(partially also in favour of the effective low price competition strategy). As a result, in 2013, 48% of the agri-food export to the EU-15 countries could be attributed to the effective quality competition strategy, 37% – to the effective low price competition strategy and only 13% to the potentially effective quality competition strategy.

Despite the above changes, the structure of the Polish agri-food export to the EU-13 countries may be considered relatively stable. This allows to assume that the applied sales strategies in this market are relatively sustainable. The different situation is characteristic of trade in agri-food products with the EU-15 countries. The relatively unstable structure of the export to this market, characterised by large fluctuations in the share of individual competition strategies, may attest to the instability of applied strategies. In other words, it indicates the constant search for effective forms of competition in the EU-15 market.

5.5. Structure of the trade balance of Polish agri-food trade with the European Union by competition strategies

The quality and price method may also be used to analyse the foreign trade balance in terms of its division into four product groups, which are characterised by one of the competition strategies distinguished by the above method. Chart 5.3 shows the value of the balance of Polish trade in agri-food products with the EU in 2003-2013 and what part of it results from the application of the analysed forms of competition in trade in individual product groups, i.e. in particular, which of them, when traded, generate surpluses and which the negative balance.

Chart 5.3. Balance in Polish agri-food trade with the EU-28 by applied competition strategies, in USD million

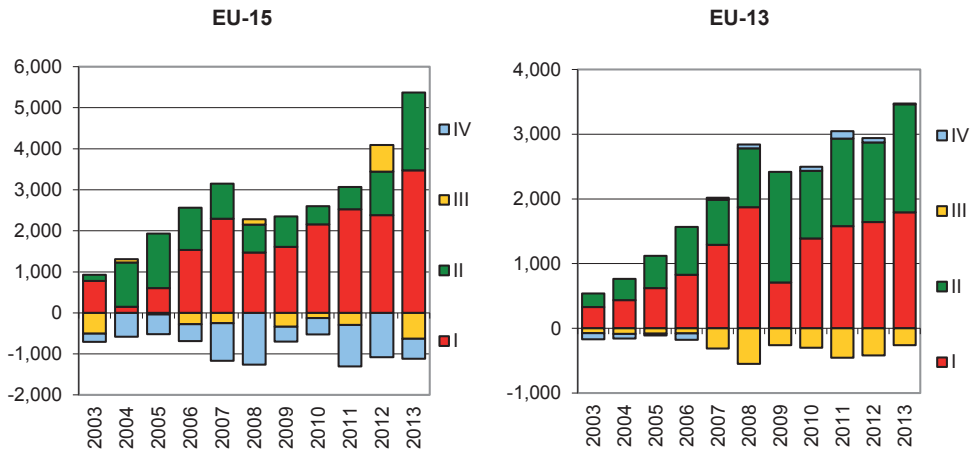


Note: description of the competition strategy is included in Table 5.1.

Source: own calculations based on WITS-Comtrade data.

Over the analysed period, the positive trade balance resulted from trade in agri--food products in the export of which the effective quality competition strategy and effective price competition strategy were applied. Trade in products which was characterised by the other two ways of competition was a source of deficit in all years. The value of the surplus in agri-food trade showed a clear upward trend in that period, mainly due to trade in products competitive in quality terms, which is definitely positive. In 2013, the chapters of the Polish agri-food export, allowing for effective competition in quality terms in the EU market, recorded the positive trade balance of more than USD 4.8 billion (six times higher than immediately before accession), and the chapters effectively competing in this market with lower prices – the surplus of USD 3.9 billion (eight times higher than in 2003). Trade using the other two forms of competition, i.e. potentially effective quality competition strategy and ineffective low price competition strategy, brought the total deficit of USD 1.3 billion (almost twice higher than before accession).

Chart 5.4. Balance in Polish agri-food trade with the EU-15 and EU-13 countries, by applied competition strategies, in USD million



Note: description of the competition strategy is included in Table 5.1.
Source: own calculations based on WITS-Comtrade data.

The geographical approach to the balance of Polish agri-food trade according to ways of competition showed its great differentiation among the individual markets (Chart 5.4). Generally speaking, the source of the surplus in this trade, both with the EU-15 and EU-13 countries, remains trade in product groups, in the export of which the effective quality competition strategy or effective low price competition strategy are applied. But while in trade with the EU-13, the amounts of surpluses resulting from the application of both these strategies are similar, in trade with the EU-15 countries the positive balance resulting from the application of the effective quality competition strategy is twice as high as the surplus resulting from the application of the effective

price competition strategy. A relatively small deficit in trade with the EU-13 countries results from trade in products potentially competitive in quality terms, while the negative balance of trade with the EU-15 countries – also from trade in products uncompetitive in price terms.

5.6. Summary

The evaluation of the competitiveness of Polish agri-food trade with the European Union, made on the basis of the quality and price method based on the concept by K. Aiginger, showed that despite multidirectional fluctuations in the importance of individual competition strategies in the Polish agri-food export to the EU, in 2011--2013, there was a clear increase in the importance of the differentiation strategy based on the effective quality competition. It manifested itself, *inter alia*, in an increase in the share of the agri-food export, resulting from the application of the effective quality competition strategy (to more than 51% in 2013) and in the improved positive trade balance generated in trade in agri-food products, in the export of which that strategy was applied (to USD 4.8 billion). Of lower importance was the cost leadership strategy consisting in the effective lower price competition, but also in this case there was an increase in the share of the export (to about 37% in 2013) and the trade balance (to USD 3.9 billion) of products to the export of which that strategy was applied. The importance of the other two strategies in the export was small, and the trade balance implied by them was negative.

During Poland's membership in the EU, achieving the surplus in trade in agri--food products resulted from the quality competition in the export of such product groups as: meat and edible meat offal, fish and seafood, vegetables, meat and fish preparations, sugars and confectionery, preparations of cereals and pastrycooks' products and tobacco products. This meant that the effective quality competition strategy has been used in those production branches.

Poland has also achieved the positive weight balance of trade in dairy products, other animal products, oil seeds and oleaginous fruits, and miscellaneous edible preparations. The surplus in trade in those products, however, was achieved thanks to lower prices of exported products, i.e. the effective low price competition strategy has been applied.

In several product groups, despite achieving higher prices in the export than in the import, Poland failed to achieve competitive advantages, expressed by the positive weight balance of trade (which attests to the potentially effective quality competition strategy). They were: live plants and cut flowers, fruit and nuts, and milling products.

The most adverse situation was characteristic of trade in vegetable extracts, other plant products, animal or vegetable fats and oils as well as beverages and spirits. Quantities of those products, imported by Poland, were larger than exported ones and, in addition, their export prices were lower than import prices. This meant the ineffective low price competition strategy.

6. Price advantages of Polish food producers in the European Union market

6.1. Introduction

The competitiveness is a universal requirement for the functioning of any company or sector of the national economy. Factors affecting achieving the competitive advantage at various levels of analysis are diversified, but undoubtedly we may always find those which are of decisive importance in the international rivalry. So far, the competitive advantages for Polish food producers functioning in the European Union market have been mostly cost and price advantages. As early as in 2005, R. Urban noted that prices in the agri-food sector in Poland were lower than in the developed EU countries, with an increase of those differences in the subsequent links of the food chain. According to calculations by R. Urban, they were the largest at the level of consumer (about 44%), smaller at the processing level (about 30%) and the smallest at the level of agriculture (about 20%)[87]. The source of those advantages was, above all, the labour rate which was several times lower in Poland, not only for farmers, but also for employees of the processing industry, with a large surplus compensating the lower labour productivity. The prices of energy, land and other production factors were also lower. Price advantages of Polish food producers allowed them to compensate for the lack of advantages resulting from the scale of production and management efficiency.

An increase in the concentration of the food industry, growing importance of foreign entities in the Polish food market and a high level of saturation of that market, slowly decreasing distance between Poland and the largest EU food producers as well as the clash with the unlimited competition in the enormous EU market and a need to seek new non-EU export markets make Polish food producers search for new sources of competitive advantages. However, prices still remain an important factor in the growth of competitiveness[88].

The economic integration is closely associated with a phenomenon of price convergence. It results from the changes taking place in integrating markets, related to the removal of trade barriers, harmonisation of tax systems, increased price transparency and reduction in the exchange rate risk. The economic integration of markets should contribute to reducing the differences in prices of the same products. The particularly strong price convergence in the integrated area takes place with regard to commercial goods in sectors which so far have been characterised by high trade and non-trade barriers. J. Wolszczak-Derlacz adds that the harmonisation of prices is

[87] R. Urban, *Polski przemysł spożywczy w Unii Europejskiej – konkurencyjność i szanse rozwojowe (Polish food industry in the European Union – competitiveness and development opportunities)*, "Zagadnienia Ekonomiki Rolnej" 2005, No. 3(304).
[88] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (3). Potencjał konkurencyjny...*, op. cit., pp. 11-60.

a source of benefits both for countries with high prices, in which the convergence results in reducing prices (benefits for consumers) and for countries with low prices, where the convergence means the rise in prices (benefits for producers)[89].

Theoretical grounds for the price convergence are based on "single price law" which states that "in the competitive market without transport costs and formal trade barriers (such as, e.g. customs duty), identical goods sold in two different countries must be sold at the same price, when prices used in these countries are expressed in one currency"[90]. This law creates the grounds for the movement of goods from countries where they are cheaper to countries where they are more expensive, but only until the moment when prices in both countries are equalised. The issues related to "single price law" may be found in the works by many economists, e.g. according to A. Marshall – the more perfect is the market, the stronger is the tendency to pay the same price for the same good in various areas of this market, while according to G.J. Stigler – the market is an area within which prices of the same goods are striving for being equalised once transport costs and various trade barriers are considered[91]. This law applies regardless of whether markets considered are in one country or different countries. If these countries have different currencies, this law implies that prices of the same goods, when converted into the same currency, should be identical[92].

In view of the fact that modern markets are more or less imperfect and very large and distant from each other, in geographical terms, the price differentiation of various types often takes place. The market segmentation is also favoured by the existence of state borders, trade barriers, functioning of the market regulation instruments, as well as the lack of single currency. Of importance is also the specific nature of individual markets, resulting from the historical or cultural considerations. Individual companies often apply also price differentiation strategies, i.e. in order to gain additional profits, they maintain different prices for the same products sold in different markets. In a situation where these markets represent individual countries, we deal with the international price differentiation[93].

The creation of the Common European Market, in which the free movement of goods, persons, services and capital had been provided, also contributed to the price convergence, while being a proof for the effective functioning of that market. As written

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[89] J. Wolszczak-Derlacz, *Wspólna Europa, różne ceny – analiza procesów konwergencji (Common Europe, different prices – analysis of convergence processes)*, Wydawnictwo Fachowe CeDeWu Sp. z o.o., Warszawa 2007.

[90] P.R. Krugman, M. Obstfeld, *Ekonomia międzynarodowa. Teoria i praktyka (International Economy. Theory and practice)*, Vol. 2, PWN, Warszawa 2007.

[91] J. Wolszczak-Derlacz, *Wspólna Europa...*, op. cit.

[92] J. Wolszczak-Derlacz, *Cenowa konkurencyjność w ujęciu międzynarodowym (Price competitiveness in international terms)*, [in:] N. Daszkiewicz (ed.), *Konkurencyjność. Poziom makro, mezo i mikro (Competitiveness. Macro-, meso- and micro-level),* Wydawnictwa Naukowe PWN, Warszawa 2008, p. 76.

[93] I. Szczepaniak, *Analiza porównawcza cen żywności w Unii Europejskiej (Comparative analysis of the food prices in the European Union)*, "Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu" 2012, Vol. XIV, book 2, pp. 152-157.

by A. Zielińska-Głębocka: "The price convergence, thus a decrease in the dispersion, is the most synthetic indicator of the market integration"[94]. On the contrary, the price differentiation among individual EU countries, which still occurs despite the progressive convergence, proves the persistent segmentation of the CEM.

The studies on the price differentiation in the European Union food sector, conducted at the IAFE-NRI, indicate the gradual reduction in price advantages of Polish food producers in the EU market resulting from the progressive convergence of prices of Polish producers with prices of producers in other EU countries[95]. This phenomenon proves the development of the integration of the Polish agri-food market with the EU market, but also the gap still existing between Poland and the most developed Union countries.

6.2. Methodological assumptions

This chapter continues the analysis of factors allowing Polish food producers to achieve the specific international competitive position and the discussion about the possibilities of their further competition in foreign markets. Referring to the previous studies on food prices in the EU market (in the subsequent links in the food chain)[96], cost and price factors are still the most important factors. An analysis of the food consumer price differentiation among individual EU countries is to evaluate what position among these countries is occupied by Poland, i.e. how competitive price advantages of Polish producers evolve in the EU food market (and thus in the last link of the food chain).

The international price comparison is a complicated undertaking, both in operational and technical terms. The correct choice of products, so that they are at least comparable, and their valuation encounter, in fact, a lot of problems. They result not only from the very physical characteristics of products, but also from different tastes of customers and different ways they position products in the market[97]. Quotations of consumer goods and services prices and the research methodology used by Eurostat in an analysis of the differentiation of these prices seem, however, adequate material to evaluate the differentiation of food prices in the European Union.

Therefore, this analysis used the data of Eurostat, which, through the national statistical offices, periodically investigates and compares prices of goods and services used in households in 37 countries, including all 28 EU Member States, 2 candidate countries (Macedonia and Turkey), 3 EFTA countries (Iceland, Norway and

[94] Statement by A. Zielińska-Głębocka placed on the website of the University of Gdańsk [as cited in: J. Wolszczak-Derlacz, *Cenowa konkurencyjność*..., op. cit., p. 86].
[95] I. Szczepaniak (ed.), *Monitoring i ocena konkurencyjności polskich producentów żywności (3). Potencjał konkurencyjny*..., op. cit.
[96] Ibidem.
[97] J. Wolszczak-Derlacz, *Cenowa konkurencyjność*..., op. cit., p. 88.

Switzerland) and 4 Western Balkan countries (Albania, Bosnia and Herzegovina, Montenegro and Serbia)[98].

From among food products, the comparative analysis in all 37 countries includes prices of about 500 comparable products. Including such a large group of products into the study allowed all countries to contain in their calculations a sufficient number of products reflecting their patterns of consumption, in other words specific to those countries. For each country, relative price level indices (PLI) for food, non--alcoholic beverages, alcoholic beverages and tobacco are calculated[99] through which it is possible to compare the price levels in the individual countries with respect to the average level of food prices in the EU. The values of the relative price level indices are calculated taking into account the relation of the purchasing power parity (PPP) to the official exchange rate of each country to the Euro (in case of the countries outside the Eurozone), which allows to compare the level of prices of the same food products in one single currency. The value of the price level index higher than 100 means that in the given country prices of the specific product group are higher than average EU prices, while the value of this index lower than 100 indicates lower prices in the given country than in the Community, and therefore competitive price advantages of food producers from this country[100].

[98] E. Borchert, S. Reinecke, *Eating, drinking, smoking – comparative price levels in 37 European countries for 2006*, Statistics in focus, Economy and Finance, No. 90, Eurostat 2007; B. Kurkowiak, *Price levels for food, beverages and tobacco across the European market differ significantly. Comparative price levels in 37 European countries for 2009*, Statistics in focus, Economy and Finance, No. 30, Eurostat 2010; B. Kurkowiak, *Significant differences in consumer price across Europe. Comparative price levels in 37 European countries for 2010*, Statistics in focus, Economy and Finance, No. 28, Eurostat 2011; B. Kurkowiak, *Major dispersion in consumer price across Europe. Comparative price levels in 37 European countries for 2011*, Statistics in focus, Economy and Finance, No. 26, Eurostat 2012; B. Kurkowiak, *Comparative price levels for food, beverages and tobacco. Significant differences in price level for food, beverages and tobacco across Europe in 2012*, Statistics in focus, Economy and Finance, No. 15, Eurostat 2013; M. Lehmuskoski, S. Reinecke, *Eating, drinking, smoking – comparative price levels in EU, EFTA and Candidate Countries for 2003*, Statistics in focus, Economy and Finance, No. 30, Eurostat 2004.

[99] In the "food" group the following sub-groups of products were also singled out: cereals, cereal products and bread; meat and meat preparations; fish and fish preparations; milk, dairy products and eggs; oils and other fats; fruit, vegetables, potatoes and potato preparations and the so-called other foods (e.g., sugar, sweets, ice cream, food concentrates). The group of non-alcoholic beverages included: mineral water, fruit and vegetable juices, and beverages, carbonated beverages, and coffee, tea and cocoa. Alcoholic beverages are both spirits and wine and beer.

[100] When comparing the relative price levels from the individual years, we need to be aware that these are the indices calculated for certain conditions from those years. The price levels being compared are not characteristic of changes in prices, but in each year they only determine the price ratios among the countries. In addition, the average price level in the EU in all years is 100, which does not mean that this value is not changed in absolute terms. Certain reservations may also be evoked by the use, for price comparison purposes, of aggregated data, since they can underestimate the value of the price dispersion as a result of the so-called aggregation error. In other words, the degree of the price convergence depends on the degree of data aggregation, e.g. the price convergence of aggregate products and large price differences at the level of individual product groups are possible (and vice versa).

To analyse the variation degree for prices of individual food product groups in the EU, the variation coefficients[101] were used, which have been calculated for individual food product groups using the Eurostat data. In this analysis, the variation coefficient for prices in the given food product group has been designated as a percentage ratio of the standard deviation of relative price indices to the average price index. The higher is the variation coefficient, the greater is the dispersion of prices in the given product group. In turn, the lower is the variation coefficient, the smaller is the price dispersion around the mean value (when it is 0%, prices are not differentiated at all).

In the following paper, the comparative analysis of the food price differentiation was limited to 28 EU Member States. The analysed period covers the years 2003-2013.

6.3. Differentiation of food product prices in the EU in 2013

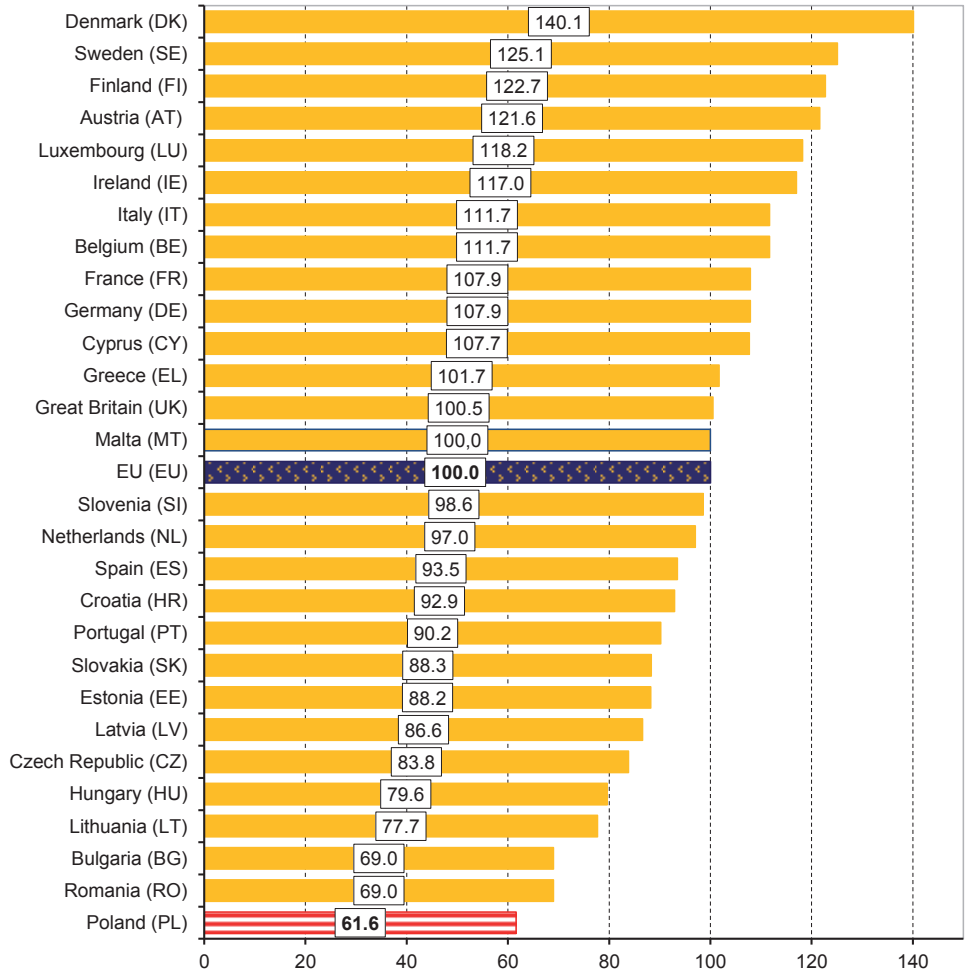
The classification of the EU Member States according to the relative price level index for food and non-alcoholic beverages (primary category among food products) indicates the large differentiation of prices of these products among the individual countries. When it comes to Poland, it is consistently placed among the countries with the lowest relative price level indices for this product group. In 2013, the lowest value of this index was recorded in Poland (61.6%) and the highest in Denmark (140.1%). This means that a comparable basket of food and non-alcoholic beverages in Denmark was more expensive than the EU-28 average by 40.1%, and in Poland it was cheaper than the EU average by 38.4%. Thus, prices of food and non-alcoholic beverages in Denmark were more than twice higher than in Poland (Chart 6.1).

The entire group of the European Union countries, depending on the value of the relative price level indices for food and non-alcoholic beverages, may be divided into four groups. In 2013, this division was as follows:

- Group I (≥ 120% of the EU average): Denmark, Sweden, Finland and Austria. This group includes the countries where the level of prices is equal to or higher than the EU average by 20%. This is the group of countries in which prices of food and non-alcoholic beverages are the highest and thus the least competitive in the EU market.
- Group II (< 120% and ≥ 100% of the EU average): Luxembourg, Ireland, Italy, Belgium, France, Germany, Cyprus, Greece, Great Britain and Malta. This group includes the countries where the level of prices of food and non-alcoholic beverages is equal to the EU average, or higher, but by less than 20%. These are the "old" EU Member States (EU-15), in which food prices also do not provide competitive advantages, but to a lesser extent than in the countries in Group I.

[101] The variation coefficient is a relative indicator of differentiation, which is the ratio of the absolute indicator of differentiation (average, standard or quartile deviation) to the average, expressed as percentages. It allows to evaluate the differentiation of two or more communities with respect to the same property or the differentiation of the same community with respect to two or more properties. Cf. B. Pułaska-Turyna, *Statystyka dla ekonomistów (Statistics for economists)*, Difin, Warszawa 2011, pp. 85-87.

Chart 6.1. Relative price level indices for food and non-alcoholic beverages in the individual EU-28 countries in 2013 (EU-28 = 100)



Source: elaboration based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

- Group III (< 100% and ≥ 80% of the EU average): Slovenia, the Netherlands, Spain, Croatia, Portugal, Slovakia, Estonia, Latvia and the Czech Republic. This group of countries achieves relative competitive price advantages (prices are lower than the EU average by up to 20%), but they are not too high. This group includes, *inter alia*, some "new" Member States (EU-13).
- Group IV (< 80% of the EU average): Hungary, Lithuania, Bulgaria, Romania and Poland. This is the group of countries in which prices of food and non-alcoholic beverages are lower than the EU average by more than 20% and, therefore, are the most competitive in terms of prices. This group includes the other "new" Member States, including Poland.

Table 6.1. Relative price indices of major food product groups in the European Union countries (EU-28) in 2013 (EU-28 = 100)

Specification	EU-15 countries														
	BE	DK	DE	IE	EL	ES	FR	IT	LU	NL	AT	PT	FI	SE	UK
Food and non-alcoholic beverages including:	111.7	140.1	107.9	117.0	101.7	93.5	107.9	111.7	118.2	97.0	121.6	90.2	122.7	125.1	100.5
Food	112.5	136.1	108.4	115.8	101.3	94.2	109.4	113.2	121.0	97.5	122.8	90.0	122.8	125.3	99.1
bread and cereals	109.9	157.5	105.4	108.6	111.4	111.6	105.2	114.1	120.2	91.8	137.2	98.6	133.7	134.8	88.1
meat	120.4	127.7	130.4	111.1	89.5	83.1	124.1	114.2	132.2	118.0	135.2	74.4	123.9	128.8	97.0
fish	122.7	125.2	110.9	109.8	112.3	88.8	108.9	114.0	127.8	104.5	126.6	77.0	117.3	115.9	93.8
milk, cheese and eggs	112.6	116.7	95.5	119.3	132.2	93.1	97.6	127.3	120.7	93.8	103.0	104.4	121.2	116.6	102.3
oils and fats	112.2	137.6	103.9	100.1	116.7	93.7	95.9	103.9	114.6	81.1	121.9	99.2	109.4	115.4	100.0
fruit, vegetables and potatoes	105.2	129.8	109.4	134.1	75.9	97.3	117.0	103.7	120.3	97.4	124.0	92.3	125.6	139.7	113.0
other food	110.9	174.3	97.2	116.2	119.4	103.3	101.1	118.1	110.0	89.7	113.7	114.2	116.2	117.0	100.4
Non-alcoholic beverages	104.6	178.1	103.8	129.5	106.9	85.9	94.5	95.0	101.8	91.8	113.9	93.3	122.4	124.2	114.1
Alcoholic beverages	99.6	139.6	81.4	169.5	127.6	87.9	90.5	100.0	90.4	99.6	96.3	90.3	173.8	159.5	138.0
Tobacco	94.1	112.8	99.4	194.5	73.9	85.0	130.4	95.0	79.9	115.0	84.9	82.8	102.2	129.3	189.2
Consumer goods and services in total	109.3	139.6	101.5	118.1	89.5	94.8	109.1	103.2	123.2	110.1	106.9	86.0	123.5	129.8	113.5

Specification	EU-13 countries												
	BG	CZ	EE	HR	CY	LV	LT	HU	MT	**PL**	RO	SI	SK
Food and non-alcoholic beverages including:	69.0	83.8	88.2	92.9	107.7	86.6	77.7	79.6	100.0	**61.6**	69.0	98.6	88.3
Food	67.9	82.5	87.6	91.2	107.1	84.7	76.2	79.2	99.0	**60.1**	68.5	99.4	86.8
bread and cereals	57.8	72.4	85.2	97.1	118.6	79.7	76.8	72.8	96.2	**58.0**	63.2	101.1	81.8
meat	59.6	72.2	80.5	73.5	87.7	74.7	62.9	72.1	83.4	**54.7**	58.9	94.7	72.6
fish	73.4	102.6	94.8	99.1	118.8	79.7	74.2	87.8	104.5	**66.6**	69.6	100.6	104.6
milk, cheese and eggs	92.3	91.0	87.0	102.8	145.1	95.6	89.0	84.8	114.3	**62.7**	94.4	101.6	97.9
oils and fats	96.0	100.7	111.2	98.0	116.0	112.2	97.8	97.2	112.3	**72.2**	92.9	118.9	117.7
fruit, vegetables and potatoes	60.8	87.7	93.8	88.2	85.6	85.9	77.4	79.4	98.8	**56.6**	61.5	96.9	92.3
other food	87.6	94.7	95.9	108.8	123.5	98.0	86.4	93.7	118.8	**72.7**	87.5	108.6	96.7
Non-alcoholic beverages	79.3	97.2	94.4	107.9	113.6	108.9	96.7	84.7	109.9	**79.3**	75.6	92.3	105.5
Alcoholic beverages	67.0	94.8	104.6	103.6	116.7	109.6	93.5	79.7	114.3	**92.1**	76.8	103.0	91.1
Tobacco	54.4	65.7	62.9	59.9	84.6	62.6	54.8	57.4	88.4	**59.3**	71.8	70.0	72.1
Consumer goods and services in total	48.4	70.6	79.9	68.5	86.2	71.2	64.6	59.7	79.5	**56.5**	57.5	83.3	70.6

Note: designation of countries as in Chart 6.1.

Source: elaboration based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

An analysis of the relative indices of food product prices shows that the level of prices for these products in the "new" EU Member States is much lower than in the "old" Member States, but in both groups of countries these prices are very differentiated. From among the EU-15 countries, in 2013, food was the most expensive in Denmark, Sweden, Finland and Austria and the least expensive in Portugal, Spain and the Netherlands (Table 6.1). In Denmark, particularly expensive were cereals, cereal products and bread, oils and other fats, and the so-called other foods. In Sweden, the most expensive were fruit, vegetables, potatoes and potato preparations as well as cereals, cereal products and breads. In Portugal and Spain, the least expensive were meat and meat preparations as well as fish and fish preparations. Non-alcoholic beverages were the most expensive in Denmark and Ireland, alcoholic beverages – in Finland, Ireland and Sweden, and tobacco – in Ireland and Great Britain. Relatively, the least expensive non-alcoholic beverages were sold in Spain, the Netherlands and Portugal, alcoholic beverages – in Germany, Spain and Portugal, and tobacco – in Greece, Luxembourg and Portugal.

From among the EU-13 countries, in 2013, the highest prices of food were in Cyprus (it was more expensive than the EU average) and Malta, whereby this applied to the vast majority of product groups, i.e. cereals, cereal products and bread, fish and fish preparations, milk and dairy products, oils and other fats and the so-called other foods (Table 6.1). Quite high were also prices of oils and other fats in Slovakia, Latvia, Slovenia and Estonia. The lowest prices of food were in Poland, Romania and Bulgaria. In Poland, the least expensive were meat and meat preparations, fish and fish preparations, milk and dairy products, oils and other fats as well as fruit, vegetables, potatoes and potato preparations. In Bulgaria, the lowest were prices of cereals and cereal products and bread. Non-alcoholic and alcoholic beverages were the most expensive in Cyprus, Malta and Latvia. Non-alcoholic beverages were the least expensive in Romania, Bulgaria and Poland, while alcoholic beverages – in Bulgaria and Romania. Tobacco was the most expensive in Malta and Cyprus, and the least expensive – in Bulgaria, Lithuania, Hungary and Poland.

In the past decade, the relative price indices of food products, despite their certain convergence among the individual countries, were relatively stable. Their important changes occurred only in few cases and did not have any significant impact on the relationships among the individual countries, i.e. the countries which were relatively the most expensive ten years ago are still in the same group, similarly, the least expensive countries remained in the same group.

It should be also noted that the food price differentiation in the EU is in line with the geographical location of the countries. The countries in Northern Europe are characterised by the highest food prices. These products may be purchased at the lowest prices in the countries of Central and Eastern Europe. The so-called core countries, which formed communities from the very beginning, are characterised by the level of food prices close to the EU average.

6.4. Analysis of price advantages of Polish food producers in the EU market

The level of prices of major food products in Poland is much lower than in the European Union. This is evidenced by an analysis of relative price indexes for these products. In 2013, prices of food and non-alcoholic beverages in Poland were by 38.4% lower than the EU-28 average, *inter alia*, food was cheaper by 39.9%, and non-alcoholic beverages by 20.7% (Table 6.2). The other two analysed food product groups, i.e. alcoholic beverages and tobacco were cheaper respectively by: 7.9% and 40.7%. When it comes to the individual sub-groups of products in the "food" group, the cheapest in Poland, when compared to the EU, were: meat and meat products (by 45.3%), fruit, vegetables, potatoes and potato preparations (by 43.4%), and cereals, cereal products and bread (by 42.0%). The least competitive prices were in the group of the so-called other foods (prices lower by 27.3%) and product group made up of oils and other fats (by 27.8%).

Table 6.2. Relative price indices of major food product groups in Poland in 2003-2013 (EU-28 = 100)

Specification	2003	2005	2007	2009	2011	2012	2013
Food and non-alcoholic beverages	55.2	64.6	68.8	63.5	64.6	61.5	61.6
including:							
Food	54.4	63.1	67.2	62.4	63.2	59.9	60.1
bread and cereals	51.0	58.4	62.2	57.8	59.3	58.1	58.0
meat	49.5	53.2	54.7	56.1	57.8	55.1	54.7
fish	55.9	67.2	68.5	69.0	68.9	67.1	66.6
milk, cheese and eggs	53.0	65.8	71.1	62.8	65.3	63.0	62.7
oils and fats	72.8	87.1	88.7	78.9	77.0	73.6	72.2
fruit, vegetables and potatoes	54.5	64.9	73.0	66.5	61.1	55.0	56.6
other food	66.4	80.7	85.2	72.1	77.8	73.1	72.7
Non-alcoholic beverages	65.7	83.1	87.6	75.6	80.2	79.1	79.3
Alcoholic beverages	87.1	88.4	91.5	89.3	94.7	93.3	92.1
Tobacco	35.8	43.2	47.7	52.7	61.5	58.2	59.3
Consumer goods and services in total	54.5	61.1	61.7	58.1	59.3	58.3	56.5

Source: elaboration based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

A comparison of the relative price indices for food products in 2003-2013 indicates a gradual reduction in price advantages of Polish food suppliers in the EU market, despite their multidirectional changes in some years (Table 6.2). In 2013, price indices in almost all analysed groups of food products were higher than in 2003: food – by 5.7 percentage points (pp), non-alcoholic beverages – by 13.6 pp, alcoholic beverages – by 5.0 pp, and tobacco – by 23.5 pp. During the same period – although to a lesser extent – Polish price advantages for all consumer goods and services also decreased (by 2.0 pp). From among individual food products, price advantages of Polish entities increased only with respect to oils and fats – by 0.6 pp.

6.5. Convergence of food product prices in the EU

Comparing the dispersion of food product prices in the European Union in 2003-2013, it shows that prices of those products in the EU become gradually equalised (this phenomenon is known as the sigma-convergence). This is evidenced by a widespread decline in the values of variation coefficients of the relative price level indices for all analysed products (Table 6.3). So far, the observed convergence process of food product prices has been the fastest in the "tobacco" and "food" groups, and the slowest in the "alcoholic beverages" group. The process of equalising of food product prices has taken place throughout the past decade, but was particularly clear until 2011. Since that time, the price convergence process has been slower and, in some cases, the observed trend of changes has even reversed.

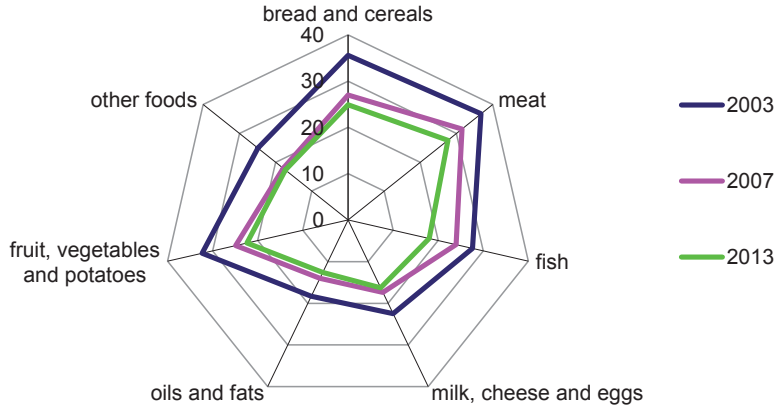
Table 6.3. Variation coefficient of relative price level indices for food products in the EU-28 in 2003-2013, in percent

Specification	2003	2005	2007	2009	2011	2012	2013
Food and non-alcoholic beverages	28.8	25.2	21.7	19.9	18.7	19.1	19.0
including:							
Food	29.4	25.7	22.2	20.2	19.0	19.4	19.4
bread and cereals	35.6	32.0	27.0	24.8	24.2	24.6	24.9
meat	36.8	34.0	31.5	26.2	27.5	27.2	27.6
fish	27.6	25.8	24.0	18.7	18.1	17.2	18.0
milk, cheese and eggs	22.5	20.5	17.4	17.9	16.3	15.6	16.3
oils and fats	18.3	15.0	14.0	15.0	13.2	14.4	12.6
fruit, vegetables and potatoes	32.3	30.0	24.9	25.2	22.0	23.6	22.4
other food	24.9	20.0	17.9	17.6	15.9	16.8	17.3
Non-alcoholic beverages	25.4	23.5	21.5	21.6	21.1	20.4	19.2
Alcoholic beverages	32.9	29.5	25.7	22.1	21.5	25.8	25.4
Tobacco	55.0	53.3	50.3	42.5	38.2	40.7	39.5
Consumer goods and services in total	33.5	30.2	26.6	25.4	26.3	27.2	27.2

Source: calculations based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

Over the analysed period, the "food" group was subject to the price convergence by 10.0 pp, i.e. by nearly 1/3 when compared to the level of 2003. Among the subgroups in this category, a particular decrease was observed for price differences with regard to cereals, cereal products and bread, fruit, vegetables, potatoes and potato preparations, fish and fish preparations as well as meat and meat preparations (Chart 6.2). The weakest price convergence was observed in case of oils and fats as well as milk, cheese and eggs, which, however, as early as in 2003 were characterised by the relatively low price differentiation.

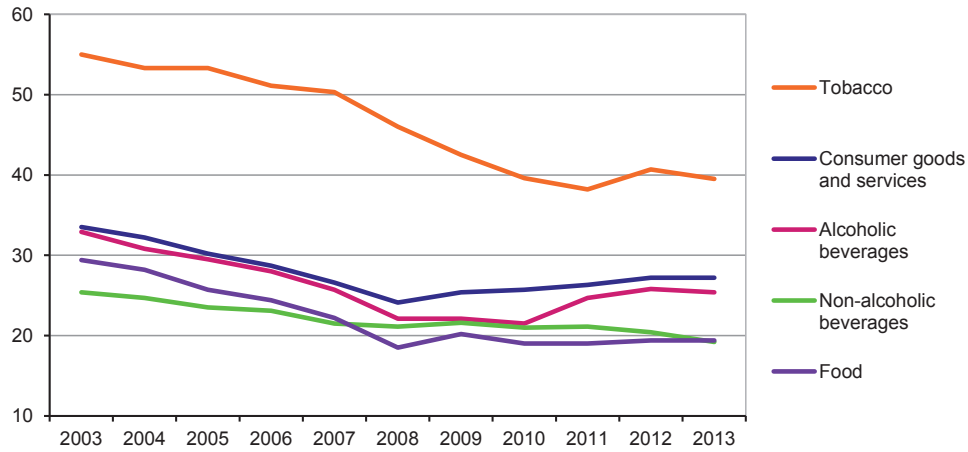
Chart 6.2. Variation coefficient of relative price level indices in the "food" group in the EU-28 in 2003, 2007 and 2013, in percent



Source: calculations based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

The differentiation of general consumer goods and services prices in the EU is greater than in food, non-alcoholic and alcoholic beverages prices, although also in this case the process of price equalisation took place (Chart 6.3). However, it lasted only until 2008, since that time, the dispersion of consumer goods and services prices in the Community market has increased again. Over the past decade, the differentiation in food product prices in the EU market, as measured by the variation coefficient of relative price level indices, has decreased to a greater extent than the differentiation in consumer goods and services prices.

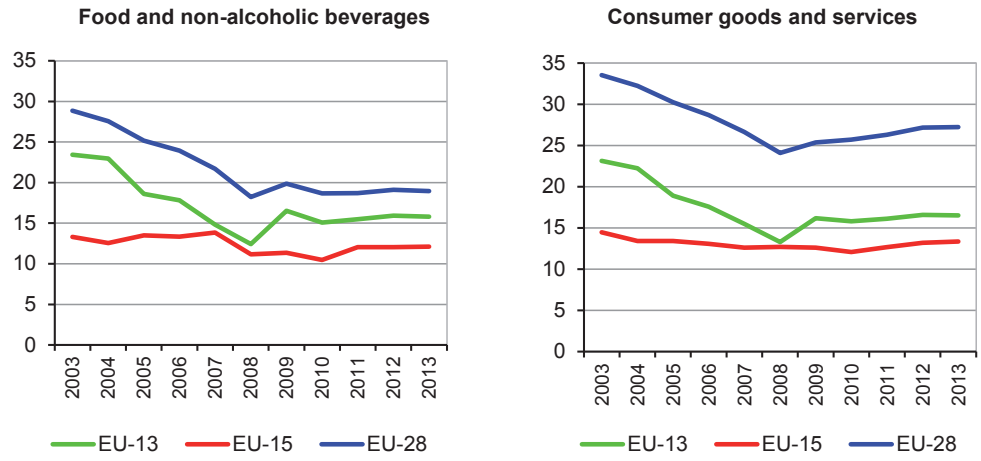
Chart 6.3. Variation coefficient of relative price level indices in the EU-28 in 2003-2013, by product groups, in percent



Source: calculations based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

An analysis of the degree of the differentiation of the relative food product price level indices shows that the differentiation in the level of food products prices, and consumer goods and services prices, is much lower in the EU-15 countries (in 2013, the variation coefficient of the price index of food and non-alcoholic beverages amounted to 12.1%, and of consumer goods to 13.4%) than in the EU-13 countries (respectively: 15.8% and 16.5%) – Chart 6.4. Over the analysed period, the variation coefficients of prices in the EU-15 countries were relatively stable, while in the "new" Member States we dealt with the progressive price convergence which directly affected the gradual equalisation of prices throughout the Community. The price convergence process in the EU-13 countries and in the entire EU was the strongest in the first period after the enlargement of the Union, and currently we observe a slowdown in this process.

Chart 6.4. Variation coefficient of relative price level indices in the EU-28, EU-15 and EU-13 in 2003-2013, in percent



Source: calculations based on the Eurostat data, www.epp.eurostat.ec.europa.eu, 26.06.2014.

The observed differences in the degree of variation of relative food price indices among the EU-15 and EU-13 countries indicate a reduction in the food price differentiation resulting from the high degree of the economic integration of the EU-15 countries (including the adoption of the single currency by most countries). This is all the more important that reducing the food price dispersion in this group of countries was reported after 2008, i.e., when the price convergence process slowed down in the EU-13 countries. The duration of cooperation within the EU structures and the introduction of the single currency were certainly factors conducive to the lower price differentiation. The enhanced economic integration, increased price transparency and reduction in the exchange rate risk of prices are, in fact, conducive to the price convergence in the market.

The progressive price convergence for food products in the European Union market, although it is a long-term process, means that the cost and price advantages gradually stop being a primary source of building competitive advantages for food producers from the New Member States (NMS), including Poland. In conditions of the globalisation and European integration, the importance of non-price factors of competitiveness is growing on a regular basis. Without the clear increase in the efficiency of the use of the widely understood competitive potential of the food sector, it will be impossible to strengthen the competitive advantages held by the New Member States. This phenomenon makes producers from different countries seek new sources (other than prices) to enable them to improve their competitive position in the Community market. This applies also to Polish food producers, despite the fact that – as shown by the analysis – they continue to have significant price advantages over competitors from other European Union countries.

6.6. Final comments

In the recent years, we could observe the process of gradual equalisation of food product prices within the European Union, which at the same time proves the effective functioning of the Common Market and progressive economic integration of the individual Member States' markets with the EU market. The food price convergence process in the EU countries is an argument opting for abandoning the price as a primary element shaping the competitive position of the economies.

The greater homogeneity of food prices in the EU-15 countries confirms the positive impact of the integration on the functioning of "single price law", while the relatively low price variation indicates the boundaries of the price equalisation process. In this context, it may be concluded that the further level of the price convergence in the EU-28 countries will depend on the level of price equalisation in the new Member States with the average of the EU. However, it should be stressed that we may not expect the total elimination of the food price dispersion in the EU countries. Aside from the level of the economic integration, this is associated with the very large differentiation of sizes and development levels of food markets in the individual countries.

Throughout Poland's membership in the European Union, Polish food producers have been competitive in terms of prices with respect to producers from most of the EU Member States, whereby price advantages increased with the increasing degree of processing of products offered for sale. This is evidenced by quotations of food prices in the markets of the individual EU countries and, thus, advantages at the consumer level. The level of food product prices in Poland in 2013 was by about 30-40% lower than the average price level of those products in the European Union market.

An analysis of the price differentiation within the European Union showed that price advantages of Polish food producers were particularly significant in relation to

producers from the EU-15 countries. The level of food prices in Poland was comparable with their level in most of the EU-13 countries, although in some NMS' markets we were competitive as well. Despite the undisputed increase in the importance of non--price sources of competitive advantages, the price factor still remains an important determinant of the international competitiveness of the Polish food sector.

The phenomenon of Polish food product prices converging with the average EU level should not be considered in terms of the concern of the increased inflation, but as a positive price formation process based on the market mechanism. Of course, it will be fully beneficial for our country when it enforces a noticeable improvement in the labour productivity and economic efficiency.

Conclusion

Competition is one of the basic mechanisms of the market economy. In conditions of the progressive globalisation and regional economic integration processes, which popularise the model of the open economic development, enhancing the competitiveness of national economies and sectors forming them has become an economic necessity and one of the priorities of economic policies in many countries. From the concept presented in the paper it results that the international competitiveness is most frequently referred to and evaluated in the context of foreign trade. As it is a relative category, it is usually measured by means of relative indicators, i.e. various types of indices developed based on trading results.

The European Union is one of the most important exporters and importers of agri-food products in the world (its share in global trade in food amounts to 41%), whereby about 72% of the value of trade of the EU agri-food sector takes place as part of intra-EU trade. The functioning in the well-developed and highly competitive Common European Market, with more than 500 million consumers, enforces the re-allocation of production factors and reorientation of the export specialisation from chapters unable to face the competition to those which are competitive in the EU market, particularly in the light of ever-changing external trade considerations. What is important here, is not only the current competitive position of a given production section, but also the ability to maintain or even strengthen possessed competitive advantages in the long term. From that point of view, of particular importance are determinants of the international competitiveness of individual sectors, including the agri-food sector, and not only the effects of implemented competitive activities.

Such an approach to the issue of the international competitiveness makes it necessary to develop studies which will take into account internal factors and external considerations of competitiveness (dependent on and independent of the given entity), and thus will allow to predict the future changes in competitiveness. This way of thinking is supported by studies conducted under the so-called "competitiveness" system, which is composed of the competitive potential, competition strategy, competition instruments and competitive position. Effective management of individual elements of this system and the identification of various cause-and-effect relationships between them, with the simultaneous proper use of external considerations allows entities to achieve higher competitiveness in the international market, and thus to develop the potential competitiveness of the sectors to which they belong.

The studies presented in this paper proved that during the EU membership, the competitiveness of Polish food producers in the CEM has increased. This is evidenced by the dynamically growing turnover of trade in agri-food products with the EU (export, balance), systematic rise in the importance of Poland in the EU turnover of trade in food as well as the clear improvement in the competitive position of Polish food producers in the EU market, as measured by several international competitive position

indices, both proving the inter-industry specialisation in trade in the given product group (which is usually understood as having comparative advantages in trade in these products by a given country) and informing about the intra-industry specialisation (a given country competing in the international market with products or their varieties under the same production industry).

An increase in the competitiveness of Polish food producers in the EU market would not be possible if they did not achieve competitive advantages over producers from other countries, i.e., if they did not provide the EU consumers with products which met their requirements to a greater extent than the competitive offer. So far, the basis of building competitive advantages in the food sector have been lower product prices. With each year of Poland's membership in the EU, with the progressive convergence of prices among the individual Community members, non-price advantages become increasingly important. This is confirmed by an analysis of the competition strategy, carried out based on the quality and price method, which showed that after accession, there was a significant increase in the importance of the differentiation strategy based on the efficient competition with the quality of products in the Polish agri-food export to the EU. Whereas, much less important was the cost leadership strategy consisting in the efficient competition with lower prices.

Despite a decrease in price advantages and an undisputed increase in the importance of non-price sources of competitiveness, the price factor still remains a prominent determinant of the international competitiveness of the Polish food sector, which is confirmed by an analysis of the differentiation of food prices in the EU. Without a clear improvement in the efficiency of using the competitive potential of the agri-food sector, enhancing innovation or increasing the concentration of production and agri-food processing, further strengthening of non-price competitive advantages in the EU market will not be possible any longer.

Strong economic connections between Poland and the European Union are by all means understandable in the age of the progressive regional economic integration. However, limiting the interest of producers to the European market and lower activity and trade expansion in other foreign markets may become a threat to the Polish food sector in the future. A strong connection with one outlet market may be, in fact, a risky export strategy. The EU market is undoubtedly enormous and relatively stable but possibilities of placing Polish agri-food products on it are limited. Right now, a permanent increase in the production of food in Poland requires vigorous measures aimed at searching for new outlet markets. The strategy of diversification of foreign markets seems an appropriate solution also due to significant fluctuations of the economic situation in external markets. However, it entails many problems, related to, *inter alia*, distribution, transport, logistics as well as adaptation to different tastes and expectations of consumers.

Annex

Annex 2.1. Objective scope of the "food industry"

The term "food industry" means three processing branches according to the Polish Classification of Activities[102]:

10. Production of food articles,
11. Production of beverages,
12. Production of tobacco products.

For the purposes of the paper, some modifications have been made to the division presented in the Polish Classification of Activities 2007 (PKD 2007), to single out 17 food industries:

01. Meat industry – 10.11. Processing and preservation of meat, exclusive of poultry meat; 10.12. Processing and preservation of poultry meat; 10.13. Production of meat products, including poultry meat products.
02. Fish industry – 10.20. Processing and preservation of fish, crustaceans and molluscs.
03. Fruit and vegetables industry – 10.31. Processing and preservation of potatoes; 10.39. Other processing and preservation of fruit and vegetables.
04. Fats industry – 10.41. Production of oils and other liquid fats; 10.42. Production of margarine and similar edible fats.
05. Dairy industry – 10.51. Processing of milk and cheese products; 10.52. Production of ice cream.
06. Milling and starch industry – 10.61. Production of cereal milling products; 10.62. Production of starch and starch products.
07. Bakery and pasta industry – 10.71. Production of bread and production of fresh pastry products and cakes; 10.72. Production of crackers and biscuits and production of preserved pastry products and cakes; 10.73. Production of pasta, dumplings, couscous and similar flour products.
08. Sugar industry – 10.81. Production of sugar.
09. Confectionery industry – 10.82. Production of cocoa, chocolate and confectionery products.
10. Coffee and tea industry– 10.83. Processing of coffee and tea.

[102] Rozporządzenie Rady Ministrów z dnia 24 grudnia 2007 r. w sprawie Polskiej Klasyfikacji Działalności (PKD) (Regulation of the Council of Ministers of 24 December 2007 on the Polish Classification of Activities (PKD)), Dz.U. No. 251, item 1885.

11. Concentrates industry – 10.84. Production of condiments; 10.85. Production of ready-to-eat meals and dishes; 10.86. Production of homogenised food articles and dietetic food; 10.89. Production of other food articles, not classified anywhere else.
12. Feedstuffs industry – 10.91. Production of prepared feed for farm animals; 10.92. Production of prepared pet food.
13. Spirit industry – 11.01. Distillation, rectification and blending of alcohols.
14. Wine industry – 11.02. Production of grape wines; 11.03. Production of cider and other fruit wines; 11.04. Production of other non-distilled fermented beverages.
15. Brewing industry – 11.05. Production of beer; 11.06. Production of malt.
16. Non-alcoholic beverages industry – 10.32. Production of fruit and vegetable juices; 11.07. Production of non-alcoholic beverages and production of mineral waters and other bottled waters.
17. Tobacco industry – 12.00. Production of tobacco products.

The Polish Classification of Activities is the subjective classification developed on the basis of the Statistical Classification of Economic Activities NACE Rev. 2[103]. In other words, the PKD 2007 classification is a hierarchically structured division of the set of socio-economic activity types implemented by units (economic entities). In order to assign the respective Harmonised System (HS) codes to the individual food industries, the Polish Classification of Products and Services (PKWiU) 2008[104] was applied. The structure of the PKWiU 2008 classification is based on the statistical classification of economic activities in the European Community – NACE Rev. 2, however, as opposed to this classification, PKWiU is the classification of products, i.e. includes both services and products (objective classification).

[103] Regulation (EC) No 1893/2006 of the European Parliament and of the Council of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains (OJ EU L 393/1 of 30.12.2006).
[104] Rozporządzenie Rady Ministrów z dnia 29 października 2008 r. (Regulation of the Council of Ministers of 29 October 2008), Dz.U. No. 207, item 1293, as amended.

The objective scope of the individual food industries

Industries	HS codes
Meat	0201, 0202, 0203, 0204, 0205, 0206, 0208, 0209, 0502, 0504, 0506, 0507, 0207, 0505, 0210, 1501, 1502, 1601, 051199, 230110, 160220, 160231, 160232, 160239, 160241, 160242, 160249, 160250, 160290
Fish	0303, 0304, 0305, 0306, 0307, 1604, 1605, 051191, 230120
Fruit and vegetable	0711, 0712, 0811, 0812, 0814, 0813, 1105, 2002, 2003, 2001, 2008, 2308, 071010, 071021, 071022, 071029, 071030, 071040, 071080, 071090, 080620, 200410, 200520, 200551, 200559, 200540, 200560, 200570, 200580, 200590, 200490, 200791, 200799
Fats	1503, 1504, 1506, 1507, 1508, 1509, 1510, 1514, 1516, 1512, 1513, 1511, 1522, 2304, 2305, 2306, 1208, 1517, 140420, 152110, 151511, 151519, 151530, 151550, 151590
Dairy	0401, 0402, 0403, 0404, 0405, 0406, 2105, 170211, 170219
Milling and starch	1101, 1102, 1106, 1103, 1104, 1904, 2302, 1108, 1109, 1903, 100620, 100630, 100640, 190120, 170230, 170240, 170250, 170260, 151521, 151529, 230310
Bakery and pasta	190510, 190540, 190520, 190531, 190532, 190590, 190211, 190219, 190240
Sugar	1701, 1703, 170220, 230320
Confectionery	1803, 1804, 1805, 1806, 1704, 2006, 1802
Coffee and tea	2101, 090112, 090121, 090122, 090190, 090210, 090230
Concentrates	0910, 0408, 2209, 2103, 2106, 2102, 1603, 1302, 090412, 090420, 090620, 190220, 190230, 160210, 190110, 200510, 200710, 210420, 210410, 170290, 190190
Feedstuffs	230990, 121410, 230910
Spirit	2208
Wine	2204, 2307, 2206, 2205
Brewing	2203, 1107, 230330
Non-alcoholic beverages	2009, 2201, 2202
Tobacco	2402, 2403, 240130

Source: own elaboration based on PKD 2007, PKWiU 2008 and HS.

Comments on the adopted assignment of HS codes to the individual food industries:

1. From the several food industries those products were excluded which went beyond agri-food products defined in the HS trade classification (i.e. beyond the HS 01-24 chapters), and they were, namely: in the meat industry – hides and skins (4101, 4102, 410390), wool (510119), feathers and down (6701); in the milling and starch industry – dextrins (350510); in the concentrates industry – egg albumins (350211, 350219).
2. Some of the products classified as agri-food products (HS 01-24 chapters) belong to the industries other than food industry. They are: wool grease (HS 1505), inedible vegetable or animal fats and oils (HS 1518), glycerin (HS 1520), ethanol (HS 2207). Due to the insignificance of these products in Polish trade and for the sake of maintaining the balance sheet total (HS 1-24), it was decided to leave them in the group of agri-food products.

Annex 2.2. RCA indices in the export of food industry products of the individual EU-15 countries in 2013, by food industries (green colour marks the RCA index values higher than in Poland)

Food industries	Austria	Belgium	Denmark	Finland	France	Greece	Spain	Netherlands	Ireland	Luxembourg	Germany	Portugal	Sweden	Great Britain	Italy
Meat	1.33	1.23	5.60	0.27	1.13	0.27	2.14	2.25	3.84	0.33	1.02	0.83	0.21	0.58	0.74
Fish	0.04	0.34	4.37	0.07	0.39	0.70	1.72	0.86	0.78	0.13	0.29	2.40	0.94	0.43	0.17
Fruit and vegetable	0.70	2.60	1.05	0.19	1.14	9.82	2.62	2.23	0.18	3.02	0.50	2.43	0.49	0.33	1.81
Fats	0.30	0.67	0.91	0.09	0.37	3.02	1.77	1.83	0.06	0.07	0.42	1.53	0.41	0.17	0.65
Dairy	1.67	1.67	4.57	1.77	2.86	2.85	0.77	3.12	4.13	6.81	1.56	1.20	0.65	0.70	1.27
Milling and starch	0.67	1.09	0.49	0.37	1.26	1.17	0.99	0.77	0.21	1.00	0.64	0.54	0.29	0.71	0.86
Bakery and pasta	2.27	2.44	1.84	0.49	1.83	1.70	1.41	1.51	1.27	2.13	1.34	1.93	1.63	1.13	4.06
Sugar	0.48	0.54	0.93	0.25	1.53	0.79	0.16	0.41	0.09	0.05	0.30	1.82	0.18	0.22	0.09
Confectionery	1.40	2.74	1.21	0.69	1.69	0.96	1.40	3.25	1.25	0.70	1.60	0.26	1.08	0.86	1.41
Coffee and tea	0.73	0.91	0.44	0.42	1.32	0.88	1.57	1.22	1.52	2.83	1.67	1.08	0.99	1.19	2.18
Concentrates	1.31	1.07	4.01	0.46	1.52	1.37	1.47	2.61	3.89	0.72	0.93	0.95	0.95	0.84	1.19
Feedstuffs	2.01	2.25	3.41	0.28	2.85	0.51	1.48	3.93	1.30	0.40	1.04	0.52	0.68	1.29	0.64
Spirit	0.26	0.26	0.68	1.14	4.81	1.51	1.45	0.81	4.27	0.25	0.62	0.54	2.06	8.62	0.95
Wine	0.60	0.22	0.88	0.16	8.49	1.00	5.21	0.27	0.38	0.97	0.46	6.97	0.57	0.65	6.23
Brewing	0.84	3.41	3.01	0.44	1.58	0.58	0.45	3.01	2.34	1.00	0.94	3.44	0.70	1.65	0.28
Non-alcoholic beverages	6.12	2.11	2.37	0.20	1.56	1.00	1.75	2.56	0.88	1.17	0.86	1.53	0.32	0.61	1.36
Tobacco	0.00	1.15	1.28	0.02	0.69	4.85	0.57	4.92	0.61	7.87	1.99	5.02	0.89	0.48	0.04
Food industry in total	1.10	1.29	2.80	0.42	1.66	1.99	1.68	2.04	1.83	1.49	0.87	1.67	0.66	0.86	1.19

Source: own calculations based on WITS-Comtrade data.

Annex 2.3. RCA indices in the export of food industry products of the individual EU-13 countries in 2013, by food industries (green colour marks the RCA index values higher than in Poland)

Food industries	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	Lithuania	Latvia	Malta	Poland	Romania	Slovakia	Slovenia	Hungary
Meat	0.82	1.11	0.66	0.40	0.70	1.29	1.01	0.01	2.89	0.75	0.40	0.65	1.62
Fish	0.17	0.87	0.11	0.08	2.33	2.26	2.77	3.82	1.39	0.07	0.01	0.14	0.02
Fruit and vegetable	1.92	0.86	0.21	0.27	0.82	0.96	1.49	0.01	2.26	0.36	0.27	0.17	1.76
Fats	1.51	0.29	0.17	0.42	0.60	0.50	0.76	0.00	0.55	0.94	0.52	0.44	1.01
Dairy	1.02	1.05	9.44	1.10	2.86	4.76	4.40	0.02	2.07	0.29	0.85	1.38	0.82
Milling and starch	2.95	0.47	1.33	0.36	0.52	1.76	1.10	0.28	0.85	0.33	0.92	0.16	1.22
Bakery and pasta	3.27	2.09	0.44	1.21	1.57	1.32	1.96	0.55	2.45	0.82	0.64	0.46	0.55
Sugar	0.41	4.21	0.00	0.86	0.47	1.42	1.45	0.00	1.15	0.55	1.81	0.63	0.87
Confectionery	1.51	2.18	0.08	1.11	2.64	1.78	1.11	0.62	3.21	0.41	1.44	0.46	0.96
Coffee and tea	1.61	0.90	0.54	1.06	0.45	2.18	1.75	0.02	2.77	0.37	1.70	0.74	1.30
Concentrates	0.47	3.97	1.11	0.78	1.54	1.23	1.26	4.07	1.76	0.42	0.61	1.00	0.80
Feedstuffs	2.57	2.17	1.45	1.28	0.17	4.41	1.89	0.22	1.34	0.10	0.17	0.40	4.22
Spirit	0.49	0.70	7.59	0.31	6.42	0.97	21.55	0.18	0.55	0.03	0.13	0.30	0.05
Wine	1.13	0.68	0.53	0.18	0.85	3.97	2.76	0.10	0.07	0.18	0.14	0.29	0.47
Brewing	0.52	3.50	0.43	2.00	1.74	1.47	1.40	0.28	0.69	0.43	1.35	1.02	0.68
Non-alcoholic beverages	0.54	2.41	6.33	0.57	0.26	1.09	1.26	0.68	2.45	0.58	0.44	0.91	1.27
Tobacco	6.21	3.51	19.17	2.12	0.31	8.32	1.32	1.78	6.28	6.58	0.02	0.00	1.18
Food industry in total	1.31	1.51	2.24	0.64	1.39	2.00	2.33	0.90	1.85	0.64	0.57	0.56	1.05

Source: own calculations based on WITS-Comtrade data.

Annex 2.4. GL indices in the export of food industry products of the individual EU-15 countries in 2013, by food industries (green colour marks the GL index values higher than in Poland)

Food industries	Austria	Belgium	Denmark	Finland	France	Greece	Spain	Netherlands	Ireland	Luxembourg	Germany	Portugal	Sweden	Great Britain	Italy
Meat	41.8	40.7	19.0	10.5	32.1	4.9	21.3	35.7	21.0	25.1	36.7	19.3	14.6	24.0	21.6
Fish	8.3	38.2	19.2	7.6	16.9	19.3	18.4	28.4	20.1	17.7	25.7	32.7	14.1	15.0	10.0
Fruit and vegetable	42.2	32.7	23.0	6.8	32.3	14.4	30.7	30.2	16.7	11.0	30.1	35.2	18.2	12.2	20.8
Fats	30.6	31.2	10.1	7.4	16.4	4.9	11.3	17.0	7.8	12.3	19.1	29.8	19.1	15.5	6.9
Dairy	41.8	53.6	27.8	12.4	38.3	34.3	38.9	41.8	34.9	15.5	44.5	34.0	25.4	37.7	38.9
Milling and starch	29.1	35.0	18.8	7.7	33.2	13.0	35.2	42.4	15.1	21.5	36.3	22.9	20.0	29.4	22.4
Bakery and pasta	66.9	63.9	43.2	24.1	59.2	32.3	54.5	64.1	66.3	53.3	60.2	54.8	52.7	39.2	30.5
Sugar	30.9	46.5	24.6	6.5	24.1	9.4	11.6	52.8	15.7	22.0	38.8	5.8	41.5	18.9	3.0
Confectionery	51.0	41.1	57.5	43.3	44.1	22.6	36.6	35.2	61.3	24.9	44.0	11.5	47.6	37.1	38.0
Coffee and tea	24.6	31.8	18.1	1.2	25.4	8.7	33.6	36.7	17.3	25.3	31.5	33.2	16.7	46.6	28.8
Concentrates	50.9	57.5	22.2	11.9	43.8	30.4	31.7	39.6	17.7	27.3	50.1	34.8	36.4	39.6	36.5
Feedstuffs	57.2	53.4	49.8	5.5	53.1	8.8	43.7	49.7	68.6	20.1	55.6	18.6	31.9	62.9	21.9
Spirit	43.6	42.2	43.6	21.8	24.5	21.9	33.2	47.6	22.2	13.5	40.0	33.8	21.4	21.1	40.2
Wine	18.4	15.2	16.0	4.2	7.7	16.9	9.2	14.0	6.5	28.8	12.7	10.0	6.6	8.1	9.4
Brewing	20.3	19.6	13.3	23.8	19.5	6.5	16.4	19.2	24.2	46.4	15.7	15.8	20.2	41.6	13.7
Non-alcoholic beverages	24.4	36.7	24.0	7.0	32.2	23.1	32.8	37.3	54.3	22.8	35.1	27.5	17.2	22.1	29.8
Tobacco	0.0	47.3	20.2	0.0	19.2	9.1	10.5	19.4	14.9	38.4	22.8	10.2	3.6	24.6	0.5
Food industry in total	39.5	41.8	22.9	12.7	30.3	16.5	24.3	33.6	28.1	23.8	36.8	26.4	23.4	26.8	21.7

Source: own calculations based on WITS-Comtrade data.

Annex 2.5. GL indices in the export of food industry products of the individual EU-13 countries in 2013, by food industries (green colour marks the GL index values higher than in Poland)

Food industries	Bulgaria	Croatia	Cyprus	Czech Republic	Estonia	Lithuania	Latvia	Malta	Poland	Romania	Slovakia	Slovenia	Hungary
Meat	15.9	7.7	3.3	16.6	22.4	17.5	33.8	0.4	13.6	30.4	26.9	23.7	24.3
Fish	12.8	17.2	1.3	10.8	23.8	19.8	26.7	0.9	23.1	10.9	8.3	12.4	12.4
Fruit and vegetable	32.1	17.8	4.2	26.8	9.4	20.9	21.8	0.1	19.6	14.2	26.4	16.3	25.8
Fats	17.2	6.1	3.2	25.6	7.2	13.9	21.7	0.1	14.2	15.0	36.8	4.5	9.3
Dairy	27.2	16.4	27.6	26.9	26.4	20.5	35.9	0.2	33.1	14.2	31.6	9.9	26.1
Milling and starch	12.7	5.8	3.6	28.0	39.3	16.9	21.0	1.3	24.7	18.1	16.6	10.1	18.0
Bakery and pasta	56.1	30.9	4.8	55.9	40.9	42.8	56.8	9.2	51.2	40.8	61.1	27.2	48.3
Sugar	19.2	8.4	0.0	26.5	15.7	28.8	50.8	0.0	11.4	4.5	35.4	17.6	35.6
Confectionery	28.5	17.5	1.5	50.2	11.5	44.2	34.5	0.1	40.1	31.4	51.8	26.6	46.9
Coffee and tea	20.3	5.5	9.1	38.2	6.1	21.7	41.5	0.0	40.9	10.0	21.0	11.2	40.1
Concentrates	25.9	35.4	5.2	44.6	24.6	21.7	26.7	3.1	42.5	31.2	37.1	19.0	37.8
Feedstuffs	30.9	11.4	4.5	42.1	9.7	41.5	14.4	3.5	52.0	6.7	26.1	11.9	32.7
Spirit	15.5	24.3	3.1	24.9	9.5	21.4	10.6	15.4	26.8	6.2	40.0	12.0	13.6
Wine	11.2	27.9	6.6	18.6	16.3	2.1	9.6	7.2	2.2	20.0	13.8	19.5	17.0
Brewing	12.8	9.1	10.6	16.0	47.6	46.4	57.4	12.0	25.5	10.8	14.5	12.3	23.4
Non-alcoholic beverages	27.0	45.6	14.0	59.4	30.4	35.6	42.3	5.2	21.9	30.7	54.4	32.2	43.6
Tobacco	1.5	18.8	7.1	18.3	2.2	15.0	43.7	1.5	8.2	15.5	1.5	0.0	30.4
Food industry in total	21.8	18.1	8.7	31.4	19.4	21.2	27.7	2.5	25.1	20.5	32.7	16.4	27.5

Source: own calculations based on WITS-Comtrade data.

Annex 2.6. Indices of commodity and geographical concentration in the agri-food export and import of the individual EU countries in 2003 and 2013

Country	HHI index of commodity concentration				HHI index of geographical concentration			
	export		import		export		import	
	2003	2013	2003	2013	2003	2013	2003	2013
Austria	0.0296	0.0243	0.0083	0.0087	0.1536	0.1337	0.1742	0.1625
Belgium	0.0085	0.0099	0.0079	0.0077	0.1413	0.1247	0.1384	0.1352
Bulgaria	0.0307	0.0653	0.0165	0.0107	0.0391	0.0477	0.0374	0.0602
Croatia	0.0579	0.0221	0.0104	0.0105	0.1511	0.1006	0.0518	0.0616
Cyprus	0.0879	0.0975	0.0202	0.0147	0.0567	0.0535	0.0512	0.0831
Czech Republic	0.0210	0.0160	0.0110	0.0094	0.1114	0.1262	0.0703	0.0987
Denmark	0.0225	0.0197	0.0110	0.0104	0.0762	0.0774	0.0739	0.0907
Estonia	0.0545	0.0216	0.0291	0.0135	0.1386	0.1259	0.0513	0.0447
Finland	0.0305	0.0224	0.0109	0.0121	0.0956	0.1152	0.0616	0.0642
France	0.0213	0.0222	0.0075	0.0059	0.0750	0.0555	0.0759	0.0670
Greece	0.0370	0.0323	0.0117	0.0123	0.0758	0.0632	0.0717	0.0642
Spain	0.0143	0.0112	0.0130	0.0107	0.0986	0.0784	0.0588	0.0501
Netherlands	0.0174	0.0112	0.0087	0.0079	0.1054	0.1032	0.0786	0.0693
Ireland	0.0371	0.0355	0.0118	0.0095	0.2277	0.2064	0.2850	0.2314
Lithuania	0.0455	0.0212	0.0104	0.0110	0.0764	0.1126	0.0369	0.0768
Luxembourg	0.0500	0.0596	0.0197	0.0196	0.3160	0.2936	0.2478	0.1915
Latvia	0.0524	0.0356	0.0111	0.0084	0.0976	0.1234	0.0725	0.1096
Malta	0.1926	0.1847	0.0152	0.0137	0.1165	0.1619	0.0840	0.1250
Germany	0.0118	0.0110	0.0078	0.0070	0.0697	0.0526	0.0676	0.0634
Poland	0.0120	0.0136	0.0160	0.0119	0.0825	0.0749	0.0446	0.0696
Portugal	0.0571	0.0257	0.0102	0.0094	0.1203	0.1658	0.1780	0.2210
Romania	0.0612	0.0756	0.0393	0.0102	0.0643	0.0371	0.0461	0.0675
Slovakia	0.0192	0.0190	0.0125	0.0102	0.1947	0.1515	0.1382	0.1170
Slovenia	0.0382	0.0338	0.0098	0.0111	0.1352	0.1040	0.0666	0.0822
Sweden	0.0398	0.0731	0.0111	0.0289	0.0785	0.0673	0.0914	0.1017
Hungary	0.0171	0.0185	0.0192	0.0113	0.0587	0.0626	0.0535	0.0828
Great Britain	0.0546	0.0537	0.0141	0.0081	0.0611	0.0656	0.0581	0.0601
Italy	0.0250	0.0248	0.0129	0.0116	0.0905	0.0688	0.0823	0.0639

Source: own calculations based on WITS-Comtrade data.

Annex 2.7. Index of similarity of the commodity and geographical structure of the agri-food export and import of Poland and the individual EU countries in 2003 and 2013, in percent

Country	FK index of similarity of the commodity structure				FK index of similarity of the geographical structure			
	export		import		export		import	
	2003	2013	2003	2013	2003	2013	2003	2013
Austria	37.5	50.9	49.6	56.7	64.2	61.2	60.3	63.0
Belgium	42.4	49.1	44.4	53.3	49.2	58.0	52.3	50.9
Bulgaria	26.3	31.6	48.7	56.0	49.8	44.0	58.9	52.9
Croatia	26.0	39.6	49.3	57.1	24.2	30.5	56.3	53.4
Cyprus	13.2	18.3	36.5	45.1	42.0	39.9	53.5	51.3
Czech Republic	43.0	54.4	60.5	63.9	54.7	58.2	66.9	68.2
Denmark	34.4	41.8	47.2	58.1	51.9	61.8	61.1	70.5
Estonia	27.4	34.7	43.8	52.7	41.9	32.0	51.0	47.4
Finland	34.7	40.7	49.9	51.3	42.2	35.0	64.9	66.5
France	37.4	44.5	46.8	58.5	48.7	51.0	61.4	58.8
Greece	18.1	25.6	36.8	52.1	54.1	58.3	64.1	62.9
Spain	24.3	33.8	36.2	44.8	50.0	56.6	55.8	57.8
Netherlands	34.6	46.5	46.0	55.8	58.4	67.3	53.9	61.6
Ireland	29.1	33.9	38.0	46.3	39.0	46.6	38.8	44.8
Lithuania	33.1	51.4	56.5	56.1	54.8	42.0	63.8	52.9
Luxembourg	18.5	31.1	28.8	40.0	41.5	46.0	37.6	42.4
Latvia	31.5	37.9	48.0	58.4	49.9	37.0	54.6	42.7
Malta	8.9	18.4	34.2	40.0	16.3	13.8	51.0	46.0
Germany	46.3	60.7	50.5	61.6	43.8	55.2	58.9	57.6
Portugal	21.3	36.1	34.8	47.7	35.1	33.9	50.1	43.8
Romania	24.7	32.9	41.8	62.2	40.2	43.1	50.3	56.5
Slovakia	34.7	41.5	53.7	56.0	39.7	36.8	54.9	41.8
Slovenia	29.0	38.3	52.7	58.2	26.2	34.5	54.6	49.6
Sweden	35.6	36.7	47.0	54.3	42.4	44.3	58.1	59.8
Hungary	32.4	41.8	61.2	60.3	63.3	61.0	69.9	57.9
Great Britain	32.9	42.3	41.5	53.2	38.2	42.1	56.0	58.0
Italy	27.9	35.4	36.7	47.8	55.4	63.3	66.5	65.2

Source: own calculations based on WITS-Comtrade data.

Annex 4.1. Indices of intra-industry trade in agri-food trade with the European Union, in percent

Country	2003	2004	2008	2009	2010	2011	2012	2013	Change in 2003-2013 in pp	Share in total agri--food trade in 2013, in %
Germany	21.5	29.2	38.5	42.7	42.3	43.8	41.8	41.8	20.2	22.7
Czech Republic	26.8	29.3	31.9	27.8	31.0	32.1	37.1	34.0	7.2	4.7
Netherlands	23.7	22.5	22.6	24.4	27.6	29.2	27.7	29.8	6.1	6.4
Lithuania	5.8	13.1	20.9	22.0	29.2	26.3	24.1	29.4	23.6	1.9
Austria	8.6	16.6	29.6	28.5	27.3	24.3	25.1	28.4	19.8	1.5
Hungary	25.5	26.7	25.1	22.7	26.0	30.9	29.8	28.2	2.7	2.4
France	20.4	26.5	32.3	31.4	32.1	29.6	25.8	25.7	5.2	5.0
Denmark	19.9	25.9	23.8	23.5	23.6	25.3	23.0	24.6	4.7	3.1
Sweden	17.1	20.9	20.0	28.8	28.4	27.7	25.3	23.9	6.8	1.4
Italy	9.8	13.1	16.9	15.7	17.7	20.2	16.2	22.6	12.8	4.7
Belgium	8.7	13.0	19.6	19.8	20.2	19.7	22.0	21.6	12.8	2.4
Great Britain	19.1	22.5	21.7	18.5	15.4	18.4	19.0	19.6	0.5	5.5
Ireland	3.2	6.2	25.9	22.9	22.7	24.0	16.8	18.7	15.5	0.8
Slovakia	13.6	27.7	18.5	19.4	20.1	18.1	22.5	18.3	4.7	2.8
Bulgaria	13.6	13.9	13.7	15.1	18.4	18.7	17.7	17.3	3.7	0.9
Croatia	1.8	5.1	10.7	16.5	16.6	14.7	17.0	15.2	13.4	0.3
Romania	3.0	3.8	15.2	18.4	18.0	13.3	15.5	15.0	12.0	1.2
Portugal	12.6	6.2	8.7	11.1	16.1	14.2	11.5	14.0	1.3	0.3
Cyprus	0.0	16.5	18.5	30.0	4.2	11.5	15.6	13.9	13.9	0.1
Luxembourg	0.0	0.0	3.3	1.3	3.0	14.6	6.7	13.9	13.9	0.0
Latvia	1.4	5.1	10.9	9.5	17.0	11.3	14.2	10.6	9.2	0.7
Greece	2.2	4.5	8.7	7.8	17.2	20.3	13.7	10.3	8.0	0.7
Spain	4.1	7.4	8.0	8.3	8.2	10.5	11.1	9.0	4.9	3.3
Slovenia	9.5	15.5	7.1	5.0	7.6	7.4	6.8	8.5	-0.9	0.2
Estonia	0.0	2.6	10.9	5.8	6.4	8.8	5.4	7.1	7.1	0.4
Finland	16.2	17.2	7.0	6.7	7.2	7.9	7.3	6.4	-9.8	0.5
Malta	0.0	0.0	0.5	0.0	0.5	0.0	0.3	1.0	1.0	0.0

Source: own calculations based on WITS-Comtrade data.

Annex 5.1. Relationships of average export prices to average import prices in foreign trade in agri-food products of Poland with the European Union (by HS chapters)

HS chapter	EU-28						EU-15						EU-13					
	2003	2007	2009	2011	2012	2013	2003	2007	2009	2011	2012	2013	2003	2007	2009	2011	2012	2013
01	0.11	0.53	0.90	0.29	0.68	1.38	0.09	0.47	0.91	0.22	0.52	1.28	0.81	0.64	1.11	1.76	2.26	2.25
02	1.91	1.47	1.30	1.41	1.31	1.19	2.15	1.62	1.38	1.55	1.43	1.28	0.42	0.83	0.92	0.86	0.90	0.91
03	2.28	2.76	2.90	2.90	2.47	2.33	2.46	2.79	2.95	2.88	2.51	2.37	0.95	1.50	1.88	1.97	1.34	1.23
04	0.62	0.88	0.69	0.81	0.74	0.84	0.50	0.79	0.61	0.72	0.63	0.72	1.18	1.29	1.13	1.26	1.36	1.52
05	0.02	0.04	0.12	0.09	0.81	0.67	0.02	0.04	0.12	0.09	0.83	0.65	2.41	0.40	0.22	0.13	1.07	1.09
06	1.22	1.41	1.36	1.69	1.19	1.24	1.26	0.95	1.31	1.81	1.30	1.31	0.72	11.63	3.71	1.38	0.37	0.58
07	0.88	1.23	1.03	1.30	1.01	1.05	1.05	1.34	1.14	1.41	1.08	1.14	0.37	0.91	0.56	0.71	0.71	0.65
08	1.60	1.57	1.40	1.55	1.46	1.19	1.60	1.77	1.53	1.63	1.56	1.31	2.87	0.89	0.49	0.72	0.60	0.42
09	2.65	1.48	1.46	1.53	1.49	2.14	7.62	1.83	1.52	1.62	1.57	2.82	1.58	1.24	0.94	0.87	1.02	0.89
10	0.30	0.69	0.45	0.62	0.51	0.30	0.34	0.48	0.24	0.45	0.32	0.19	0.16	2.56	2.71	1.62	1.11	0.98
11	1.80	1.42	0.86	1.10	1.02	1.10	1.32	0.99	0.63	0.76	0.72	0.80	1.99	2.38	1.16	1.92	1.63	1.79
12	0.12	0.10	0.09	0.23	0.11	0.05	0.08	0.06	0.05	0.15	0.06	0.03	2.82	1.50	4.18	2.27	3.52	2.23
13	1.05	2.73	1.64	0.49	0.49	0.32	1.07	4.44	0.73	0.52	0.46	0.15	0.72	1.19	0.93	0.39	0.69	0.79
14	0.24	0.31	3.55	2.14	2.53	0.42	0.16	0.23	3.45	2.24	1.33	0.34	2.82	2.37	9.00	2.13	10.55	1.02
15	0.72	0.57	0.62	0.70	0.79	0.72	1.19	0.54	0.60	0.65	0.72	0.62	1.26	1.10	0.95	1.15	1.13	1.22
16	1.30	1.18	1.02	1.01	0.99	0.98	1.36	1.29	1.11	1.09	1.07	1.05	0.84	0.74	0.67	0.72	0.70	0.72
17	0.88	1.18	1.44	1.18	1.05	0.94	0.95	1.13	1.36	1.12	0.95	0.97	0.99	1.74	2.25	1.80	1.64	1.02
18	1.10	1.20	1.46	1.29	1.24	1.25	1.19	1.28	1.58	1.39	1.31	1.30	1.00	1.23	1.29	1.06	1.01	1.13
19	1.22	1.47	1.06	1.03	1.05	1.02	1.49	1.67	1.13	1.06	1.09	1.05	1.01	1.23	0.99	1.06	1.06	1.07
20	1.14	1.42	0.96	1.28	1.08	0.96	1.03	1.51	0.95	1.32	1.06	0.92	1.20	1.01	1.10	1.23	1.22	1.24
21	0.71	0.73	0.70	0.64	0.66	0.63	0.69	0.70	0.74	0.63	0.63	0.61	1.43	1.32	0.81	0.73	0.88	0.66
22	0.49	0.35	0.68	0.58	0.60	0.55	0.47	0.41	0.41	0.74	0.77	0.74	0.51	0.53	1.94	0.59	0.61	0.57
23	1.27	1.00	1.10	1.02	1.01	1.85	1.60	0.94	1.12	1.04	0.95	0.85	0.58	1.27	1.02	1.05	1.19	5.19
24	1.14	1.53	2.12	2.05	2.15	2.16	1.26	1.88	2.72	2.32	2.35	2.35	1.78	1.40	0.98	1.03	1.27	1.28
01-24	0.40	0.64	1.02	1.10	1.35	1.24	0.36	0.62	1.02	1.14	1.38	1.29	1.29	1.66	1.68	1.59	1.73	1.46

Source: own calculations based on WITS-Comtrade data.

Annex 5.2. Balance of foreign trade in agri-food products of Poland with the European Union
(by HS chapters, in thousand tonnes)

HS chapter	EU-28						EU-15						EU-13					
	2003	2007	2009	2011	2012	2013	2003	2007	2009	2011	2012	2013	2003	2007	2009	2011	2012	2013
01	58.3	41.4	-33.9	-93.7	-168.6	-261.7	58.5	26.8	-32.7	-69.6	-128.1	-186.1	-0.2	14.6	-1.2	-24.1	-40.5	-75.6
02	98.1	282.0	38.8	137.0	237.0	385.7	45.1	101.0	-131.6	-108.8	-33.7	57.3	53.1	181.1	170.3	245.9	270.7	328.4
03	-1.1	25.3	37.5	3.7	-7.4	18.9	-6.0	21.2	28.4	6.8	-14.0	8.8	5.0	4.1	9.0	-3.2	6.7	10.1
04	83.7	438.5	628.4	561.3	602.9	531.3	55.8	385.0	427.3	390.1	498.8	473.2	27.9	53.6	201.1	171.3	104.1	58.1
05	-14.5	47.5	6.0	23.1	34.6	44.0	-10.8	44.3	-1.4	17.9	18.1	10.2	-3.7	3.2	7.3	5.1	16.5	33.8
06	-35.4	-79.8	-59.8	-77.5	-75.4	-56.8	-41.4	-83.0	-67.8	-84.0	-82.9	-66.7	5.9	3.1	8.0	6.5	7.5	9.9
07	399.3	225.9	172.4	-98.6	214.2	222.1	182.9	31.1	15.3	-216.0	48.7	43.4	216.4	194.8	157.1	117.4	165.4	178.7
08	-96.7	-294.3	-233.5	-505.6	-355.9	-232.5	-157.1	-412.0	-343.0	-518.6	-386.5	-292.1	60.4	117.7	109.5	13.0	30.6	59.6
09	-9.9	-11.6	-22.4	-25.7	-29.1	16.0	-15.3	-19.6	-40.4	-46.4	-50.7	-9.0	5.4	8.0	18.0	20.7	21.6	25.0
10	-312.4	-1739.7	1027.4	-51.5	1254.7	2086.3	-117.7	-730.5	1936.0	807.3	1973.5	2592.5	-194.7	-1009.2	-908.6	-858.8	-718.8	-506.2
11	-223.0	-380.1	-238.5	-271.5	-215.0	-129.3	-48.2	-114.5	-40.2	-47.7	1.2	47.6	-174.8	-265.6	-198.3	-223.8	-216.1	-176.9
12	-31.4	432.0	92.2	-116.8	57.5	577.5	16.1	492.1	307.1	31.7	195.9	667.3	-47.5	-60.1	-214.9	-148.5	-138.5	-89.7
13	-3.4	-5.0	-4.8	-4.8	-5.2	-5.0	-3.3	-5.0	-4.9	-4.8	-5.4	-5.1	-0.1	0.0	0.0	0.0	0.1	0.1
14	12.2	9.0	-11.0	-75.8	-49.5	-38.4	12.3	5.2	-11.3	-76.3	-27.7	-12.1	0.0	3.8	0.3	0.5	-21.8	-26.3
15	-261.6	5.6	-18.5	-151.7	-149.7	-6.7	-242.6	-46.8	-142.0	-260.8	-268.0	-236.9	-19.0	52.4	123.5	109.1	118.3	230.1
16	37.9	111.4	139.8	193.0	202.5	204.4	30.6	73.7	93.5	132.7	134.9	140.9	7.3	37.6	46.2	60.3	67.5	63.5
17	252.2	167.8	-65.5	28.6	143.9	274.3	143.8	76.9	-103.2	10.0	71.2	153.1	108.4	90.9	37.6	18.6	72.7	121.2
18	-10.8	-41.5	-17.2	-4.8	19.8	33.8	-19.9	-56.4	-32.8	-35.8	-15.8	-0.8	9.2	14.9	15.5	31.0	35.6	34.5
19	18.2	56.3	65.9	89.0	74.7	84.1	-25.2	-16.6	-20.8	-7.6	-12.2	9.1	43.4	72.9	86.7	96.6	86.9	75.1
20	316.3	216.6	332.1	192.9	331.0	394.7	252.3	124.7	206.4	92.3	230.8	279.1	63.9	91.9	125.7	100.6	100.2	115.5
21	-3.2	50.7	103.2	183.3	189.4	233.3	-26.6	-13.1	27.5	84.1	92.3	128.0	23.4	63.8	75.8	99.2	97.1	105.3
22	-3475.0	-4439.2	-3896.9	-4236.2	-4741.8	-4763.4	-11.1	-11.3	5.4	-4.4	-29.0	67.3	-3463.9	-4427.8	-3902.3	-4231.9	-4712.8	-4830.7
23	-859.4	-81.2	1.5	-183.8	-49.5	427.6	-663.3	6.5	179.4	-151.8	8.4	361.4	-196.1	-87.7	-177.9	-32.0	-57.8	66.2
24	1.0	36.2	60.9	68.7	78.3	85.5	-2.6	6.6	38.0	44.3	52.3	60.0	3.7	29.6	23.0	24.4	26.0	25.5
01-24	-4060.4	-4926.0	-1896.1	-4417.4	-2406.5	125.5	-593.7	-113.8	2292.4	-15.2	2272.1	4290.5	-3466.7	-4812.3	-4188.4	-4402.2	-4678.6	-4165.0

Source: own calculations based on WITS-Comtrade data.

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