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THE GOODS STRUCTURE OF TRADE BETWEEN POLISH REGIONS AND THE EUROPEAN UNION (1)

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ABSTRACT. The goal of this article is to present the structure of trade between Polish regions (voivodships) and the European Union. The research is a dynamic analysis making it possible to compare the time before and after the expansion of the European Union. The timeframe of the discussed issues relates to 1999–2007. Attention is paid to the scale and diversified nature of the changes to the goods structure of export and import activities undertaken by Polish voivodships to (from) the European Union. The analysis is preceded by the characteristics of the European Union's role in trade of specific regions. Finally, the degree of intra-industry specialization is evaluated as is the trend in changes to the trade between Polish regions and European Union countries.

KEY WORDS: European Union, Poland, goods structure, exports, imports.

INTRODUCTION

The continuing European integration has highlighted the importance of the issues of Poland's foreign trade in terms of regions. A region's position in the European Union is affected by, among other things, the ability to sell in foreign markets. The idiosyncrasies of the internal arrangement of Poland's foreign trade include high irregularity with respect to the intensity of trade, the geographic and goods structures. This irregularity manifests itself in voivodships (administrative regions of the 1st order) and poviats (administrative regions of the 2nd order) alike.

The goal of this article is to present the structure of trade between Polish regions (voivodships) and the European Union. The research is a dynamic analysis making it possible to compare the time before and after the expansion of the European Union. The timeframe of the discussed issues relates to 1999–2007.

Attention is paid to the scale and diversified nature of the changes to the goods structure of export and import activities undertaken by Polish voivodships to (from) the countries of the European Union. International specialization and trade rely primarily upon parallel exports and imports of highly processed goods. Hence the analysis is completed with an evaluation of the degree of intra-industry specialization and the trends in changes to the trade between Polish regions and European Union countries. In order to survey the goods structure of trade, CN classification was employed (Combined Nomenclature of Goods in Foreign Trade).

This type of analysis has been possible owing to materials made available by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw.

THE ROLE OF THE EUROPEAN UNION IN POLISH REGIONS' TRADE

Specific voivodships participate in national exports to the European Union (EU) in a diversified way (Fig. 1). The biggest shares of sales to the EU markets are enjoyed by the Śląskie, Mazowieckie, Dolnośląskie, and Wielkopolskie voivodships; in 2007 they represented in total 63% of the value of exported goods. With respect to voivodships' shares in the total Polish exports to the EU, the ranking list is further occupied by Pomorskie (6.6%) and Małopolskie voivodships (6.5%). Podlaskie voivodship has the smallest share in exports to the EU (0.8%).

It is worth noting that, in comparison to 1999, the share of the above-mentioned voivodships in Poland's exports to the EU markets has grown significantly: Dolnośląskie (by 4.5%), Śląskie (by 3.0%), Małopolskie (by 2.6%), and Mazowieckie (by 1.5%) voivodships. On the other hand, the shares of the remaining voivodships' exports declined (except for the Świętokrzyskie voivodship); the biggest change affected Zachodniopomorskie voivodship (by 2.1%). A comparison of the shares of specific voivodships in Poland's exports in 2007 to the EU consisting of 15 countries (EU-15) and 26 countries (EU-26) shows that, as a result of the expansion, the role of Mazowieckie voivodship grew, albeit slightly (growth by 1.2%) and that of Małopolskie voivodship (by 0.6%) in sales to the EU markets. On the other hand, Wielkopolskie voivodship experienced the biggest decrease (by 0.8%) (Fig. 1).

The fact that a given region's exports to the European Union are the biggest by value does not mean that this region's exports also enjoy a large share of sales to that group. This is why the presented data is worth complementing in order to present the share of the EU market in voivodships' exports (Fig. 2). The

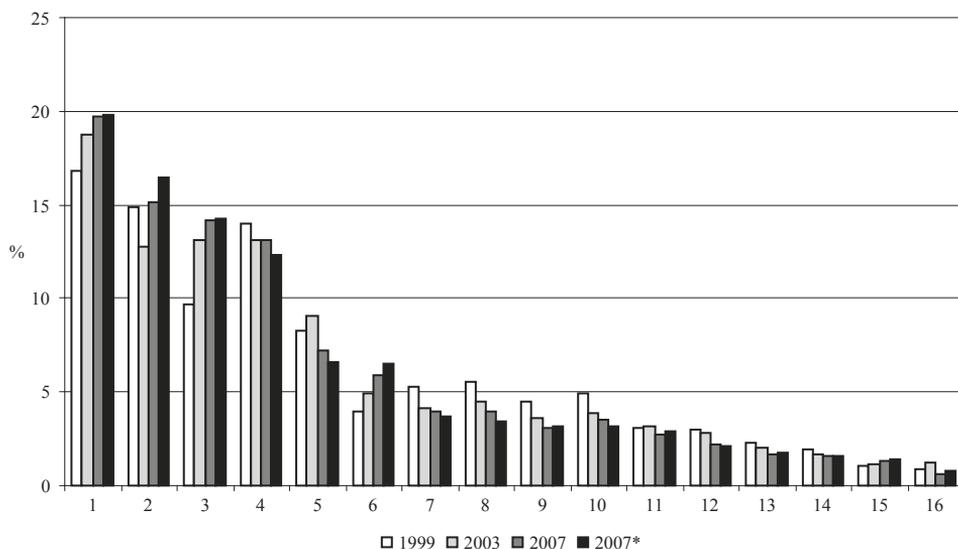


Fig. 1. Voivodships' shares in Poland's exports to the European Union (a) in 1999–2007
 Explanation: (a) – for 1999, 2003 and 2007 the notion 'European Union' is applied to 15 member countries and for 2007* to 26 countries; 1 – Śląskie; 2 – Mazowieckie; 3 – Dolnośląskie; 4 – Wielkopolskie; 5 – Pomorskie; 6 – Małopolskie; 7 – Kujawsko-Pomorskie; 8 – Zachodniopomorskie; 9 – Łódzkie; 10 – Lubuskie; 11 – Podkarpackie; 12 – Warmińsko-Mazurskie; 13 – Opolskie; 14 – Lubelskie; 15 – Świętokrzyskie; 16 – Podlaskie

Source: Author's own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

European Union's share in regional exports (above 83%) was recorded in 2007 in Dolnośląskie, Śląskie, Opolskie, Lubuskie, and Wielkopolskie voivodships, i.e., mainly in western Poland. The significant importance of the EU in the export structure of Dolnośląskie, Lubuskie and Opolskie voivodships stems to a large extent from their border location and intense trade relations with Germany and other EU countries. The structure of the industry and the related sales to the EU markets affect to a large extent the EU's large share in exports in the case of economically strong regions, i.e., Śląskie (exports of passenger cars, metallurgical goods and coal) and Wielkopolskie (exports chiefly of electro-mechanical industry goods and furniture) voivodships.

The EU countries are least active in purchasing goods from Pomorskie, Podkarpackie, Podlaskie, Mazowieckie, and Lubelskie voivodships. What is conspicuous is the poor position of Mazowieckie and Pomorskie voivodships with respect to their ranking in Poland's total exports to the EU. In the case of

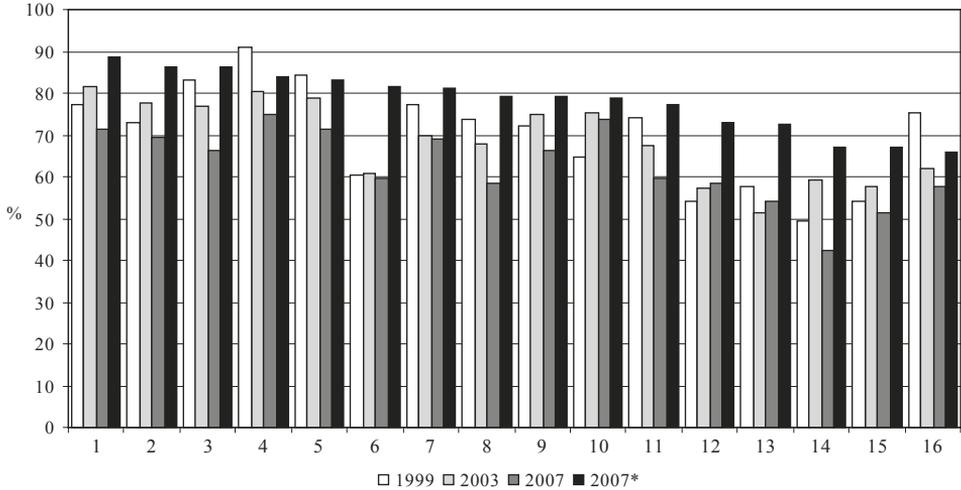


Fig. 2. Share of exports to the European Union (a) in the total exports in voivodships in 1999–2007

Explanation: (a) – for 1999, 2003 and 2007 the notion ‘European Union’ is applied to 15 member countries and for 2007* to 26 countries; 1 – Dolnośląskie; 2 – Śląskie; 3 – Opolskie; 4 – Lubuskie; 5 – Wielkopolskie; 6 – Małopolskie; 7 – Kujawsko-Pomorskie; 8 – Świętokrzyskie; 9 – Warmińsko-Mazurskie; 10 – Zachodniopomorskie; 11 – Łódzkie; 12 – Lubelskie; 13 – Mazowieckie; 14 – Podlaskie; 15 – Podkarpackie; 16 – Pomorskie

Source: Author’s own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

Pomorskie voivodship, it results from the important role of Norway and the significant role of developing countries in the voivodship’s exports structure. The relatively small share of the EU in Mazowieckie voivodship’s exports is affected by a large extent of diversification of exports destinations typical of this region. On the other hand, the smaller involvement of the EU in eastern Poland regions’ exports (Podkarpackie, Podlaskie and Lubelskie voivodships) has been affected by the significant role of countries from Central and Eastern Europe (2), mainly Ukraine and Russia.

Fig. 2 shows that in 1999–2007 the biggest growth in exports to EU countries, accompanied by Poland’s average growth of 8.1% was enjoyed by exports from Małopolskie (by 21.0%), Lubelskie (by 18.8%) and Podlaskie (by 17.8%) voivodships. A drop by several per cent in EU’s share occurred at that time only in exports in Pomorskie, Lubuskie and Wielkopolskie voivodships. The process of expansion contributed to the growth of EU’s share in Poland’s exports

(by 15.8%) and all voivodships; the most spectacular growth by over 20% was recorded in exports from Podlaskie, Małopolskie, Świętokrzyskie, and Opolskie voivodships. Imports from the EU tend to be more spatially concentrated than exports.

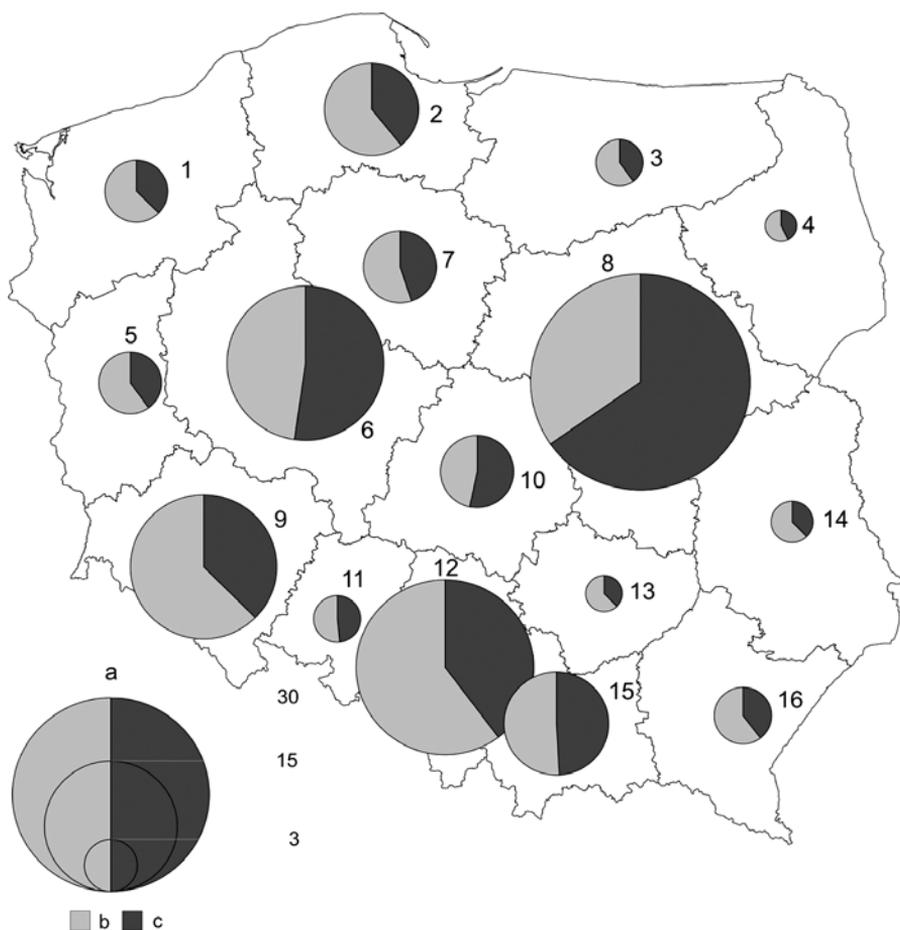


Fig. 3. Trade sales of Polish voivodships with 26 countries of the European Union in 2007

Explanation: a – sales in billions of Euro; b – exports; c – imports; 1 – Zachodnio-pomorskie; 2 – Pomorskie; 3 – Warmińsko-Mazurskie; 4 – Podlaskie; 5 – Lubuskie; 6 – Wielkopolskie; 7 – Kujawsko-Pomorskie; 8 – Mazowieckie; 9 – Dolnośląskie; 10 – Łódzkie; 11 – Opolskie; 12 – Śląskie; 13 – Świętokrzyskie; 14 – Lubelskie; 15 – Małopolskie; 16 – Podkarpackie

Source: Author's own on the basis of data supplied by the Analytical Centre of Customs Administration in Warsaw

In Poland's imports from the EU, Mazowieckie voivodship has been more active (32.6% of total imports value in 2007). It is followed by Wielkopolskie (14.3%) and Śląskie (13.8%) voivodships; the latter's role is significantly smaller than in the case of exports. Podlaskie voivodship tends to be least involved in imports from EU (0.6%) as it is the case with exports.

Since 2005, exports tended to dominate imports in Poland's trade with the EU. In 2007 trade with EU countries amounted to a total surplus of €3.2 billion. With respect to specific regions, only 3 voivodships showed deficits in trade with the European Union (Fig. 3). The biggest negative balance occurs in Mazowieckie voivodship, amounting in 2007 to €10.9 billion. By comparison, in another voivodship showing the next biggest deficit – Wielkopolskie voivodship – the deficit reached €0.9 billion. The biggest positive balance amounting to €5.1 billion is enjoyed by Śląskie voivodship. Such huge disproportions between Mazowieckie voivodship and the remaining voivodships stem from the fact that this voivodship and, most importantly, Warsaw, host the headquarters of the country's biggest companies and trade intermediaries operating all over Poland as well as seats of companies with foreign capital. As suggested by research conducted by the Foreign Trade Research Institute, the latter tend to be more imports-inclined than the domestic companies.

THE GOODS STRUCTURE OF POLISH REGIONS' EXPORTS TO THE EUROPEAN UNION

An analysis of the goods structure of Polish regions' trade with the European Union in 1999–2007 was conducted with reference to CN (3). In order to present the scale of changes to the structure, the ratio of structure transformation degree (Wp) was employed. It is calculated in the following mode:

$$Wp = \frac{1}{2} \sum_{k=1}^n |C_k^I - C_k^O|$$

Wp – the ratio of the degree of transformations of the goods structure in foreign trade (exports, imports),

C_k^I – the share of the goods group (section) k in the total value of exports (imports) in the final year,

C_k^O – the share of the goods group (section) k in the total value of exports (imports) in the initial year,

k – the number of goods groups (sections), 1, 2, ...n.

If the goods structure of trade has not changed, the ratio equals 0 while a total change in the structure equals 100.

Table 1. The index of transformation of the goods structure (Wp) in the trade between Polish voivodships and the European Union in 1999–2007 by goods group

Voivodship	A	B
Dolnośląskie	29.7	11.6
Kujawsko-Pomorskie	31.1	15.6
Lubelskie	19.1	21.2
Lubuskie	18.0	18.8
Łódzkie	33.0	17.4
Małopolskie	33.7	18.8
Mazowieckie	12.1	8.4
Opolskie	24.3	15.0
Podkarpackie	9.3	18.3
Podlaskie	32.7	22.5
Pomorskie	15.2	17.6
Śląskie	17.6	12.4
Świętokrzyskie	26.3	12.0
Warmińsko-Mazurskie	30.0	25.6
Wielkopolskie	15.1	9.9
Zachodniopomorskie	20.5	16.8

Explanation: A – Wp : voivodship's exports; B – Wp : voivodship's imports

Source: Own calculations on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

Table 1 presents the value of Wp ratios for Polish voivodships' trade with the European Union. The results lead to the conclusion that in 1999–2007 a significant evolution took place in the goods structure of trade between Polish regions and the EU. This resulted from, among other things, Poland's and 11 other countries' accession to the EU, a regionally diversified inflow of foreign direct investment, changes to the industry structure in specific voivodships and changes in demand in EU countries and the determining international prices.

In the period in question, changes to the exports structure tended to be more dramatic than to imports. A different situation occurred only in 4 voivodships: Lubelskie, Lubuskie, Podkarpackie, and Pomorskie (Table 1).

Fig. 4 presents the goods structure of voivodships' exports to the European Union in 1999–2007. In the case of 6 voivodships: Dolnośląskie, Kujawsko-Pomorskie, Lubuskie, Łódzkie, Małopolskie, and Opolskie, Wp indicator in relation to exports to the EU was affected by changes in shares of the same two goods groups, homogenous in direction. Transformations in the exports structure of the above-mentioned regions were primarily affected by a greater share in exports of electro-mechanical goods (especially in Małopolskie and Dolnośląskie voivodships) and a drop in the share of textile materials and goods

(biggest in Łódzkie voivodship). It is worth highlighting other changes in the exports structure in specific voivodships in this group, namely smaller shares of ‘the remaining sections’ (mainly wood and wooden products; stone products, ceramics, glass; pearls, precious stones, precious metals and products) – in exports

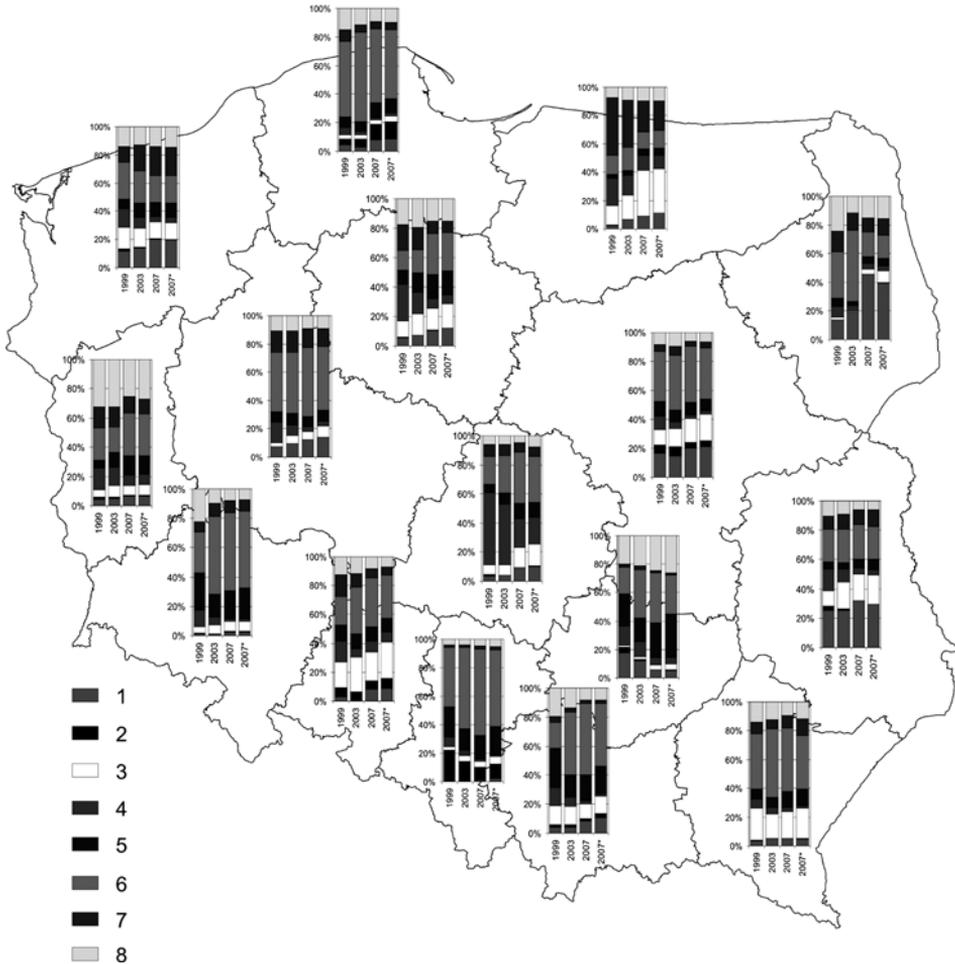


Fig. 4. Goods structure of voivodships' exports to the European Union (a) in 1999–2007
 Explanation: (a) – for 1999, 2003 and 2007 the notion ‘European Union’ is applied to 15 member countries and for 2007* to 26 countries; 1 – agri-food products; 2 – mineral products; 3 – chemical products; 4 – textile materials and products; 5 – base metals and related products; 6 – electro-mechanical products; 7 – various finished products: furniture, prefabricated houses, toys; 8 – other

Source: Author's own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

of Dolnośląskie and Małopolskie voivodships, smaller shares of various finished products: furniture, prefabricated buildings, toys – in exports of Kujawsko-Pomorskie and Opolskie voivodships, smaller shares of base metals and related products – in exports of Małopolskie voivodship, bigger shares of chemical products – in exports of Opolskie and Łódzkie voivodships.

The most significant changes in the exports structure of Mazowieckie, Wielkopolskie and Lubelskie voivodships were related to smaller shares of textile materials and products accompanied by a bigger share of chemical products. Moreover, exports of Wielkopolskie voivodship were marked with a more conspicuous increase in the share of agri-food products.

Other types of changes, each time related to the same goods groups, yet different with respect to the direction, occurred in the exports structure of Śląskie and Pomorskie voivodships. In the case of Śląskie voivodship's exports, the size of Wp ratio was most prominently affected by a bigger share of electro-mechanical goods and a smaller share of mineral products. On the other hand, the degree of transformations in the goods structure of Pomorskie voivodship's exports stemmed to a large extent from increase in the share of exports of mineral products accompanied by decrease in the share of exports of electro-mechanical goods.

The level of Wp ratio with respect to exports of Świętokrzyskie, Podlaskie and Zachodniopomorskie voivodships has been mainly affected by changed shares of agri-food products, electro-mechanical goods as well as textile materials and products. The structure of exports of Podlaskie and Zachodniopomorskie voivodships was marked by a bigger share of agri-food products accompanied by smaller shares in the electro-machinery industry. As for exports from Świętokrzyskie voivodship, a drop was noticed in the share of agri-food products and bigger shares of electro-mechanical products. Exports from all three regions suffered smaller shares of textile materials and goods. Other noticeable changes to the structure of exports from specific voivodships in this group include: in Zachodniopomorskie voivodship's exports – bigger share of various finished products – furniture, prefabricated buildings, toys; in Świętokrzyskie voivodship's exports – bigger shares of base metals and related products, in Podlaskie voivodship's exports – bigger shares of chemical products and smaller shares of the 'remaining sections' (mainly wood and wooden products).

The degree of transformations in the exports structure of Warmińsko-Mazurskie voivodship in the time in question was primarily affected by a bigger share of exports of chemical products and agri-food products accompanied by a smaller share of various finished products (furniture, prefabricated buildings, toys) as well as textile materials and products. The Podkarpackie voivodship's exports structure was devoid of conspicuous change trends.

Among the 16 analyzed voivodships, in 1999–2007 the structure underwent the most significant change in exports from Małopolskie voivodship and the smallest in exports of Podkarpackie voivodship (Table 1). In 2007, for 11 voivodships, the most important group of goods in exports to the European Union was electro-mechanical products; they tended to play a special role in Śląskie (share of 53.7%), Dolnośląskie (52.4%) and Pomorskie (48.4%) voivodships. In two eastern voivodships, i.e., Lubelskie and Podlaskie, the exports structure was headed by agri-food products. Chemical products prevailed in exports from Warmińsko-Mazurskie voivodship while base metals and base metal products dominated exports from Świętokrzyskie voivodship. On the other hand, there was no dominance of any goods group in the structure of exports from Zachodniopomorskie voivodship, while three groups accounted for about 20% of the total export each: electro-machinery products, various finished goods (furniture, prefabricated buildings, toys) and agri-food products.

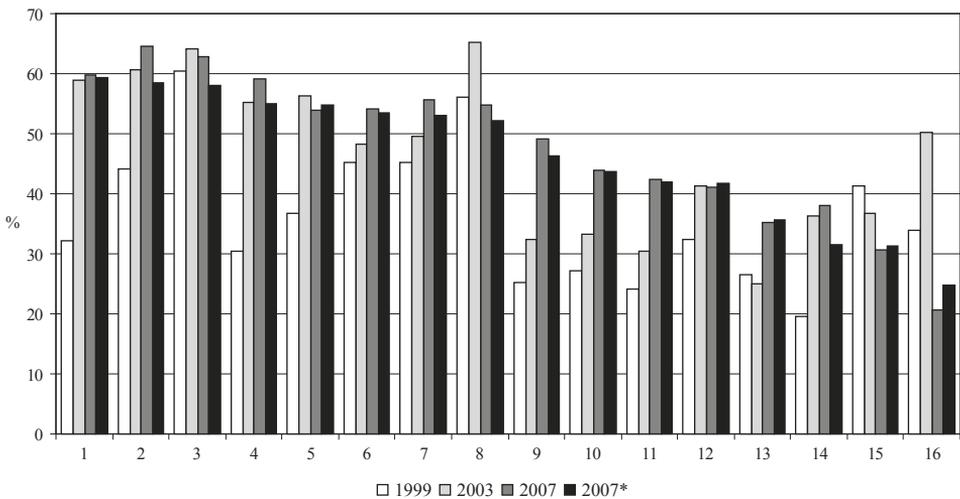


Fig. 5. Share of highly processed goods in voivodships' exports to the European Union (a) in 1999–2007

Explanation: (a) – for 1999, 2003 and 2007 the notion ‘European Union’ is applied to 15 member countries and for 2007* to 26 countries; 1 – Dolnośląskie; 2 – Śląskie; 3 – Podkarpackie; 4 – Małopolskie; 5 – Opolskie; 6 – Wielkopolskie; 7 – Mazowieckie; 8 – Pomorskie; 9 – Łódzkie; 10 – Warmińsko-Mazurskie; 11 – Kujawsko-Pomorskie; 12 – Lubelskie; 13 – Lubuskie; 14 – Świętokrzyskie; 15 – Zachodniopomorskie; 16 – Podlaskie

Source: Author's own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

The structure of the goods is of great importance from the point of view of the regions' exports competitiveness. An economy capable of producing and selling highly processed, technologically advanced goods is in a most advantageous position. Bigger shares of modern goods in the exports offer allow to face international competition, especially from economically developed countries and to tap into inter-industry trade (Maćkowiak, 2007).

As indicated in Fig. 5, the biggest shares in exports of highly processed goods (4) to the EU in 2007 were enjoyed by Dolnośląskie (59.4%), Śląskie, Podkarpackie, Małopolskie, and Opolskie voivodships. On the other hand, voivodships with the smallest shares of such exports to the EU included Podlaskie (24.7%), Zachodniopomorskie and Świętokrzyskie voivodships. Dolnośląskie voivodship also enjoyed the biggest growth in share of exporting these products to the EU in the time under scrutiny (over 27%), followed by Małopolskie and Łódzkie voivodships. It was a positive phenomenon that the growth in share of processed and technologically advanced goods in exports to EU markets was recorded in as many as 12 voivodships. Highly processed goods lost their importance in the structure of exports to the EU in 4 voivodships, most acutely in Zachodniopomorskie voivodship (drop by 10%).

THE GOODS STRUCTURE OF POLISH REGIONS' IMPORTS FROM THE EUROPEAN UNION

Fig. 6 presents the goods structure of voivodships' imports from the European Union in 1999–2007. In 8 voivodships (Kujawsko-Pomorskie, Lubelskie, Lubuskie, Małopolskie, Podkarpackie, Śląskie, Świętokrzyskie, and Zachodniopomorskie voivodships) the transformations of imports from the EU were affected by changes in the shares of the same three goods groups, homogenous in direction. *Wp* ratio with respect to imports to the mentioned regions was mainly affected by a bigger share of base metals and related products (especially in Kujawsko-Pomorskie voivodship) accompanied by a drop of share in electro-machinery products (most acute in Podkarpackie voivodship) as well as textile materials and goods. The other changes to the structure of imports to specific voivodships in this group include: bigger shares of chemical products – in imports to Lubelskie and Podkarpackie voivodships, bigger shares of agri-food products – in imports to Lubelskie voivodship, bigger shares in mineral products – in imports to Małopolskie and Lubuskie voivodships, smaller share of mineral products – in imports to Zachodniopomorskie voivodship.

The extent of the changes to the structure of imports to Dolnośląskie voivodship was affected primarily by bigger shares of base metals and related products, while

there was no change in all the remaining groups of goods. The most important changes to the goods structure of imports to Warmińsko-Mazurskie, Łódzkie and Opolskie voivodships were related to a growth in the share of chemical products (the biggest in Warmińsko-Mazurskie voivodship) and a drop in shares of textile

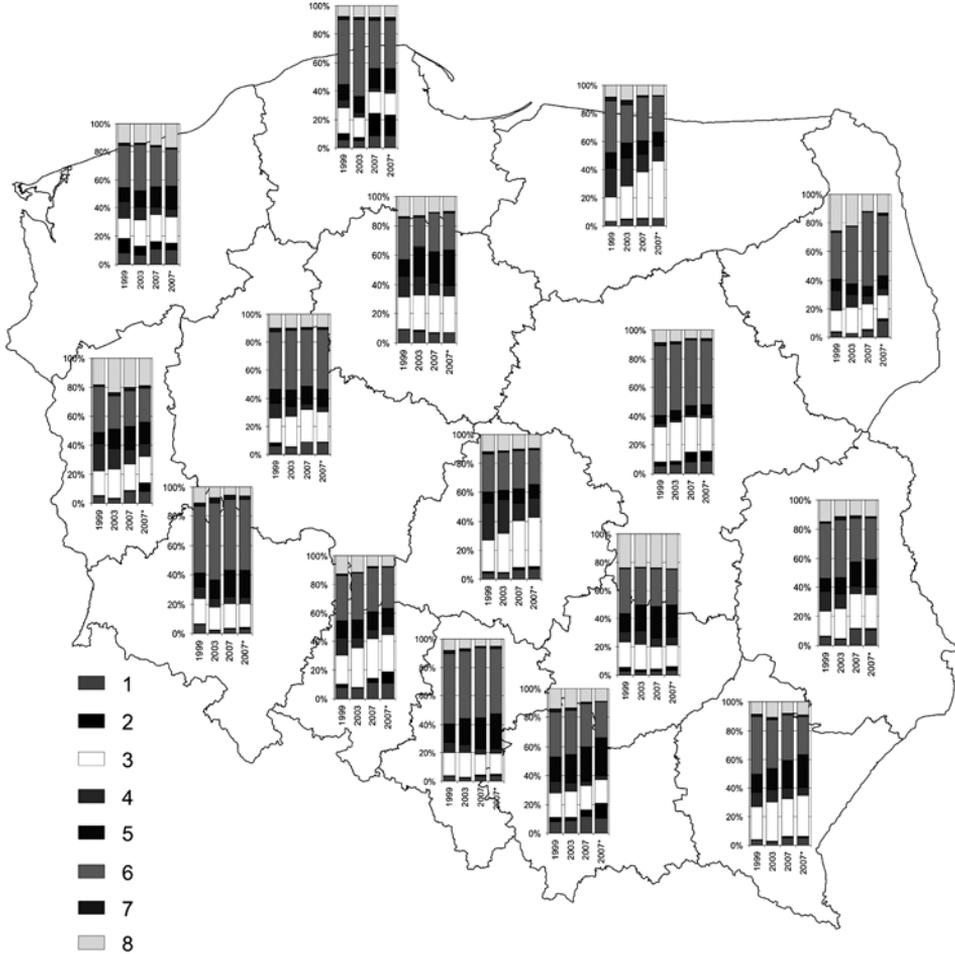


Fig. 6. The goods structure of imports to voivodships from the European Union (a) in 1999–2007

Explanation: (a) – for 1999, 2003 and 2007 the notion ‘European Union’ is applied to 15 member countries and for 2007* to 26 countries; 1 – agri-food products; 2 – mineral products; 3 – chemical products; 4 – textile materials and products; 5 – base metals and related products; 6 – electro-mechanical products; 7 – various finished products: furniture, prefabricated houses, toys; 8 – other

Source: Author’s own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

materials and products (especially in Łódzkie voivodship). The other changes to the structure of imports to specific voivodships in this group include a sharp drop in shares of electro-mechanical goods in imports to Warmińsko-Mazurskie voivodship and a growth in the share of mineral products in imports to Opolskie voivodship.

On the other hand, a drop in shares of electro-machinery goods accompanied by a growth in share of mineral products were the biggest factors contributing to the size of Wp ratio in the case of imports to Pomorskie voivodship.

Other changes occurred in imports to Podlaskie voivodship: the extent of changes to the structure of imports to this voivodship was affected by a growth in share of electro-mechanical goods and agri-food products accompanied by a smaller share of textile materials and products and ‘other sections’ (mainly: groundwood, paper, carton, and related products).

Imports to Wielkopolskie voivodship were only marked by a smaller share of textile materials and products. The imports structure in Mazowieckie voivodship did not undergo any significant changes in the time under discussion.

Table 1 shows data indicating that in 1999–2007, the most profound changes to the structure among 16 surveyed voivodships affected imports to Warmińsko-Mazurskie voivodship while the least dramatic change occurred in imports to Mazowieckie and Wielkopolskie voivodships, i.e., regions leading in the country’s total imports from the EU. As was the case with exports, in 11 voivodships electro-machinery goods were the most significant group of goods in imports from the European Union in 2007. The share of these products exceeded 40% in the structure of imports of the biggest importing voivodships (Dolnośląskie, Śląskie, Mazowieckie, and Wielkopolskie) and Podlaskie voivodship ranked last with respect to the value of imports from the EU. Chemical products had the greatest share in imports to three voivodships: Warmińsko-Mazurskie, Łódzkie and Podkarpackie. Imports to Małopolskie voivodship were dominated by basic metals and related products. On the other hand, the structure of imports to Kujawsko-Pomorskie voivodship was not marked with advantage of any group of goods, while three groups accounted for about 25% of the total import each: chemical products, electro-mechanical as well as base metals and related products.

Fig. 7 presents the share of highly processed goods in voivodships’ imports from the EU in 1999–2007. In 2007 in 12 voivodships the share of these products in the imports structure proved bigger than that of the exports structure. Only 4 voivodships (Małopolskie, Pomorskie, Podkarpackie, and Opolskie) were in the opposite situation. Voivodships with the biggest share of highly processed goods in imports include Mazowieckie (68.6%), Warmińsko-Mazurskie, Dolnośląskie, Wielkopolskie, and Śląskie. The smallest share of imports of these goods was

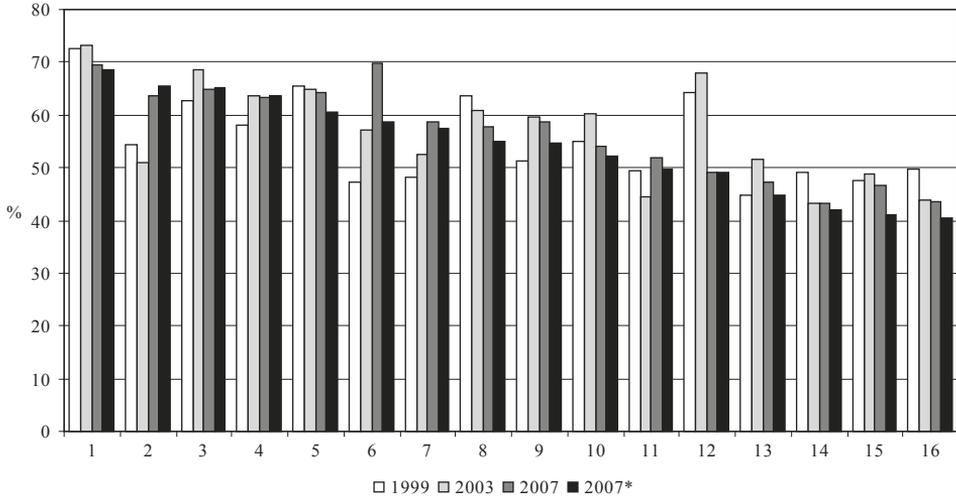


Fig. 7. The share of highly processed goods in voivodships' imports from the European Union (a) in 1999–2007

Explanation: (a) – for 1999, 2003 and 2007 the notion ‘European Union’ is applied to 15 member countries and for 2007* to 26 countries; 1 – Mazowieckie; 2 – Warmińsko-Mazurskie; 3 – Dolnośląskie; 4 – Wielkopolskie; 5 – Śląskie; 6 – Podlaskie; 7 – Łódzkie; 8 – Podkarpackie; 9 – Opolskie; 10 – Lubelskie; 11 – Kujawsko-Pomorskie; 12 – Pomorskie; 13 – Zachodniopomorskie; 14 – Lubuskie; 15 – Małopolskie; 16 – Świętokrzyskie

Source: Author's own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

recorded in Świętokrzyskie, Małopolskie and Lubuskie voivodships. In the period in question, processed and technologically advanced goods became most prominent in the structure of imports to Warmińsko-Mazurskie and Podlaskie voivodships (growth in share by over 11%) while the biggest drop (over 15%) was recorded in imports to Pomorskie voivodship.

THE EXTENT OF INTRA-INDUSTRY SPECIALIZATION IN POLISH REGIONS' TRADE WITH THE EUROPEAN UNION

International specialization and trade rely primarily upon simultaneous exports and imports of highly processed goods. Hence, as a summary, I have evaluated the extent of intra-industry specialization in Polish regions' trade with the European Union.

According to J.L. Mucchielli and F. Celimene, the intensity of growth in international trade of intra-industry nature is affected by (Kundera, 1998: 69): (a) the partners' economic progress (the higher the level of development, the more diversified the demand, including more intense exchange of substitutes); (b) differences in levels of development (smaller differences in development between partners are conducive for intensifying the intra-industry division of labour); (c) the partners' higher economic potential makes it possible to benefit from economies of production scale in exchanging diversified goods; (d) the partners' growth rate, their production and demand structures (the more similar they tend to be, the more they contribute to the development of intra-industry rather than inter-industry specialization); (e) tariff barriers, extra-tariff, geographic barriers as well as costs of transport (the stronger the barriers, the weaker the stimuli to develop intra-industry specialization).

In order to evaluate the extent of intra-industry and inter-industry specialization and trends in Polish regions' trade with the EU, Grubel-Lloyd index was employed. It can be expressed as follows (Kundera, 1984; Zielińska-Głębocka, 1996; Maćkowiak, 2003):

$$B_i = \frac{\sum_{i=1}^n [(X_i + M_i) - |X_i - M_i|]}{\sum_{i=1}^n (X_i + M_i)}, \quad (5)$$

X_i – a voivodship's exports in section i to EU countries,
 M_i – a voivodship's imports in section i to EU countries,
 n – the number of sections considered.

The calculations were made for section CN with respect to 1999, 2003 and 2007. As Table 2 suggests, in 1999–2007, 13 out of 16 voivodships enjoyed growth in intra-industry specialization when trading with the EU. The strongest development of intra-industry specialization in trade with EU countries occurred in Mazowieckie voivodship, followed by Śląskie, Kujawsko-Pomorskie, Łódzkie, and Opolskie voivodships. Inter-industry specialization in trade with the EU slightly evolved only in Podkarpackie voivodship. The intra-industry specialization ratio for Lubuskie and Pomorskie voivodships did not change in the time of the analysis.

In 2007 the highest Grubel-Lloyd index – proof of intra-industry exchange with the EU – was enjoyed by Opolskie, Kujawsko-Pomorskie, Wielkopolskie, Łódzkie, and Małopolskie voivodships. Bearing in mind all voivodships, one can state that 1999–2007 witnessed a noticeable growth in intra-industry specialization

Table 2. Intra-industry and inter-industry specialization index in trade between Polish voivodships and the European Union in 1999–2007

Voivodship	A	B	C	D	E
Dolnośląskie	0.61	0.78	0.71	0.69	+0.08
Kujawsko-Pomorskie	0.67	0.76	0.80	0.79	+0.12
Lubelskie	0.50	0.52	0.56	0.55	+0.05
Lubuskie	0.68	0.71	0.70	0.68	+0.00
Łódzkie	0.64	0.69	0.76	0.76	+0.12
Małopolskie	0.66	0.79	0.75	0.73	+0.07
Mazowieckie	0.38	0.46	0.58	0.64	+0.26
Opolskie	0.70	0.76	0.81	0.82	+0.12
Podkarpackie	0.70	0.61	0.62	0.64	-0.06
Podlaskie	0.50	0.44	0.42	0.59	+0.09
Pomorskie	0.69	0.70	0.68	0.69	-0.00
Śląskie	0.54	0.67	0.68	0.68	+0.14
Świętokrzyskie	0.58	0.65	0.63	0.62	+0.04
Warmińsko-Mazurskie	0.54	0.54	0.59	0.64	+0.10
Wielkopolskie	0.68	0.72	0.71	0.77	+0.09
Zachodniopomorskie	0.61	0.59	0.62	0.64	+0.03

Explanation: A – 1999 (UE-15); B – 2003 (UE-15); C – 2007 (UE-15); D – 2007* (UE-26); E – change in years 1999–2007*

Source: Author's own on the basis of data supplied by the Analytical Centre of Customs Administration and the Centre of Information Technology of Foreign Trade in Warsaw

in trade between Polish regions and the EU. The growth in the intra-industry ratio indicates Poland's genuine integration with this group by aligning the structure of Polish exports to the EU with the EU's internal trade structure. However, the relatively low level of this ratio (in comparison with many EU member states) confirms the existing asymmetry in demand (disproportions in per capita GDP) and supply (a technology gap in the chemical industry) of factors boosting the intra-industry division of labour. Another unfavourable feature of the structure of the Polish exports to the EU is too small share of chemical industry products, plastics and plastic products, regarded as carriers of technological progress. Total imports from the EU in these sections are double the size of exports to the EU.

NOTES

- (1) Paper financed from science-supporting funds in the years 2007–2011 under a research project No. N N306 2508 33.
- (2) In compliance with the EUROSTAT geo-nomenclature, in 2007 the group of Central and Eastern Europe countries consisted of Albania, Belarus, Croatia, Moldova, Russia, and Ukraine.
- (3) The analysis of the goods structure was conducted with respect to CN classification (consisting of 21 sections) in line with the following 8 goods groups: agri-food products (sections 1–4, i.e., live animals and animal origin products; plant products; fats and oils; processed food), mineral products (section 5), chemical products (sections 6–7, i.e., chemical industry products; plastics and objects made of plastic), textile materials and goods (section 11), base metals and base metal products (section 15), electro-mechanical products (sections 16–18, i.e., machines and devices, electric and electronic equipment; transport equipment; optical, photographic and measurement and control instruments), various finished goods – furniture, prefabricated buildings, toys (section 20) and ‘other sections’ (sections 8–10, 12–14, 19, 21 and 0, i.e., skins and leather products; wood and wooden products; groundwood, paper and carton plus paper and carton products; shoes and hats; stone goods, ceramics, glass; pearls, precious stones, precious metals and goods; weapon and ammunition; works of art, collectors’ artefacts, antiques; other unspecified goods).
- (4) With respect to CN classification, highly processed goods have been classified within 6 following sections: 6 (chemical industry products), 7 (plastics and plastic products), 16 (machines and devices, electric and electro-technical equipment), 17 (transport equipment), 18 (optical, photographic and measure and control instruments and apparatuses) and 19 (weapon and ammunition).
- (5) B_i ratio changes in the 0–1 brackets. B_i amounts to 1 when imports equal exports in every goods section considered which relates to the region’s full intra-industry specialization. B_i ratio amounts to 0 when exports (imports) are not accompanied by imports (exports) in trade within specific goods sections. This, in turn, relates to regions with full inter-industry specialization. The ratio may also indicate the evolution of specialization in international trade. The ratio’s growth (up to or within the 0.5–1 bracket) in a given time is to indicate development of intra-industry specialization while its decline (in the 0–0.5 brackets or up their level) indicates development of specialization of inter-industry nature.

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