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w Olsztynie

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Contents

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- https://www.researchgate.net/project/Foreign-Trade-in-Special-Economic-Zones-in-Poland
- https://nazarczuk.wordpress.com/hzwsse/

An online appendix with the particular set of trade data being an online companion to the book is also available there.

Introduction

Since the mid-1980s (and especially since the beginning of the 21st century), we have seen a rapidly growing number of countries that decided to introduce different types of privileged areas. By introducing preferential business practices for entities that meet certain prerequisites, countries offer a certain package of preferences (e.g. tax exemptions/reductions in customs duties, suitable location, etc.) that make business in specific locations more convenient for investors compared to those located outside the zones.

The main prerequisite for the introduction of special economic zones (SEZs) is usually an attempt to base the future direction of the country's development on industrialization (Chaudhuri & Yabuuchi, 2010) and openness of the economy (Baissac, 2011; Ge, 1999), which with favourable institutional conditions, creates a beneficial climate for generating growth (Litwack & Qian, 1998; Pan & Ngo, 2016; Schrank, 2001; Zeng, 2010) and economic development (Alkon, 2018; Ambroziak & Hartwell, 2017; Moberg, 2015; Pan & Ngo, 2016; Pastusiak, 2011; Pastusiak, Jasiniak, Keller, & Krzeczewski, 2016). At this stage, however, most developing countries, acting in the face of capital shortfalls (with great international competition in its acquisition) (Cheng & Kwan, 2000), are also able to offer relatively cheap quality inputs of fairly good quality. In transition countries, firms willing to operate within the zones have to facilitate the testing of certain market-oriented solutions in a limited area (e.g. China) or solutions to improve the investment climate and enhance the absorption of foreign capital (Wang, 2013), providing opportunities to support the competitiveness of the economy or initiate certain structural transformations (Ahrens & Meyer-Baudeck, 1995; Ge, 1999; Zeng, 2011).

The establishment of SEZs seems to be seen as a remedy for the economic difficulties of those countries where by, setting up privileged areas, the governing authorities would like to address a number of structural problems. As international experience demonstrates, the very establishment of the zones does not guarantee success (Dobronogov & Farole, 2012). There are many cases in countries, where zoning programs have failed. Elastic zone policy tailored to the needs of the private sector seems to be crucial (Farole, 2011). The preparation of areas for investment alone was in many cases insufficient to attract the anticipated number of companies. Several other reasons of SEZs programmes failures could be mentioned: the absence of government support and the general investment climate, an insufficient number of qualified workers, large proximity to ports and road infrastructure, the inappropriate range of tax and customs incentives. In some of the cases, national circumstances, including, i.e. political stability, judiciary system, level of development have also been important in this regard, especially in comparison to other economies from the region.

Relatively weak effects of privileged areas' operation (although with some exceptions) were seen in South Asia and Africa (where most of the zonal projects were highly ineffective), while the most favourable impacts were observed in Latin America, Southeast Asia and the Persian Gulf. However, it should be borne in mind that the activity of zones is often subject to the same rules as the product life cycle, and often the most dynamic changes are visible in the first 20 years of their operation, after which the pace of adjustments is less intensive.

The functioning of the zones also involves some side effects to the hosting economy, especially for their close neighbourhood. Being a type of privileged business practices in the form of tax exemptions or reductions in the amount of taxes/duties paid by firms, they are de facto granted as a public aid. Thus, the zones distort competition on the market (Ambroziak, 2015), supporting only selected economic entities, having valid permit to operate within the zone. Their activities involve, i.a. the necessary expenses (e.g. preparation of investment sites, promotion) and the depletion of tax revenues flowing into the budget. The zones also affect trade by favouring specific industries/products or companies to locate within SEZs, due to restrictions imposed on entities willing to set up a business in the zone.

Despite the relatively large number of zones in the world (more than 4300), which were present in more than 150 countries (Yücer & Siroën, 2017), as well as the anticipated high importance for global trade, analyses referring to one of the main objectives of establishing zones, i.e., increased export activity are rather scarce. Most of the available studies focus on the role of the zones in national sales, the volume of investment (Ambroziak & Hartwell, 2017; Cheng & Kwan, 2000; Ciżkowicz, Ciżkowicz-Pękała, Pękała, & Rzońca, 2016; Ciżkowicz, Rzońca, Ciżkowicz-Pękała, & Pękała, 2014), employment (Ambroziak & Hartwell, 2017; Cicha-Nazarczuk & Nazarczuk, 2016; Ciżkowicz et al., 2016; Curtis, Hill, & Lin, 2006; Jensen, 2017; Madani, 1999; Nazarczuk & Cicha-Nazarczuk, 2016), productivity (Nazarczuk, 2017), economic growth (Pan & Ngo, 2016) or investigate the effectiveness of the public aid granted (Damborský, Wokoun, & Krejcová, 2013; Pastusiak, Bolek, Jasiniak, & Keller, 2018).

A link between trade and the effects of SEZs was established by Johansson and Nilsson (1997) at the national level. However, the outcomes were highly contextual, and varied within the group of 11 countries, being influenced by the country's trade strategy adopted and the level of trade openness. Yücer and Siroën (2017) have found that SEZs play a major role in global value chains (GVCs) and global trade development, but their effect mostly restricts to easing the effects of tariffs on trade. Pradhan and Zohair (2016) have identified regional factors influencing the probability of being an exporter. The probability however increases if a company is a foreign owned entity (FOE), large or conduct R&D activity. Lonarkar (2014) and Tantri (2011) examined the inter-SEZs differences regarding trade performance in India. According to the former, some of the SEZs

have not reached the target level of exports, whereas in case of the latter, they were susceptible to the external shocks of the global economy.

The main motives of undertaking the research on the role of SEZs in Poland's trade turnover and exporting activity of firms were as follows: deliberations on subsequent operations of special economic zones (SEZs) carried out both in the domestic (Ambroziak, 2009; EY, 2011; NIK, 2012) and foreign literature (Aggarwal, 2012; Engman, Onodera, & Pinali, 2007; Farole, 2011; Farole & Akinci, 2011; FIAS, 2008), on-going debates on prolonging the existence of the zones, subsequent decisions of the Polish government on their temporary operational extensions and so far unidentified impact on the scale, structure, level of technological intensity of the Poland's foreign trade turnover.

Furthermore, the long-term existence of this mechanism of attracting investments, supporting businesses and developing exports – provokes a review of the instrument's effectiveness. The above was suggested by the Supreme Audit Office (in Polish NIK) and the European Commission with regard to the need to expand the monitoring of economic results – stemming from the operations of the SEZs and confirming the rationale for continuing that form of economic stimulus (EC, 2014; NIK, 2010), as well as the profitability of SEZs and their growth prospects (NIK, 2012).

Given the lack of analyses covering that aspect of operations run by the SEZs in Poland, a decision has been made to launch research aimed, primarily, at identifying the actual impact of the special economic zones on foreign trade turnover of Poland's economy. The research covers, amongst others, the directions of impact, scale, share in the domestic trade turnover, commodity structure, technological intensity, commodity and geographic concentration of foreign trade turnover generated by companies holding valid permits to carry out business operations in the SEZs relative to the overall Poland's foreign trade.

The conducted research primarily aimed at responding to the following scientific questions:

1) What is the share of Poland's exports/imports generated within the SEZs? Do the SEZs have a significant impact on the Poland's trade turnover? What is the balance of foreign trade turnover in the SEZs?
2) How do the SEZs contribute to creating competitive edges in Poland's foreign trade? Which commodity groups are characterised by the highest competitive advantage in terms of exports generated by entities operating in the SEZs? What types of commodities (i.e. of low, average or high competitiveness) prevail in the foreign trade turnover generated within the SEZs? Do the SEZs contribute to stimulating changes in the Poland's foreign trade turnover?
3) What is the technological intensity of exports and imports in the SEZs, as compared to the non-SEZ part of the economy? Do we witness higher technological advancement of exported goods within the zones, as compared with non-SEZ ones?

4) What is the difference in the structure of Poland's foreign trade turnover, as compared with the trade turnover structure typical of entities operating in the SEZs? What is the product concentration of exports and imports in the SEZs?
5) What are the main sale markets of companies operating in the SEZs? Are entities operating in the SEZs characterised by higher intensity of trade connections than the aggregate national economy? Are entities operating within the SEZs more prone to the transmission of negative shocks related to economic cycles via the trade channel?
6) Are entities operating in the SEZs characterised by a higher export/import activity than entities staying outside the zones? Is the financial standing of entities operating in the SEZs more dependent on the economic climate witnessed on external markets than the standing of entities located outside the zones?

The monograph summarizes a significant part of the results of the research project entitled "Foreign Trade in Special Economic Zones in Poland", financed by the National Science Centre in Poland (project no. DEC-2013/11/D/HS4/04007). The project aimed at identifying the real impact of SEZs on Poland's trade turnover. Its implementation focused on expanding the available scope of knowledge on the impact of the SEZs on the Poland's trade and has enabled to join in the ongoing national and international academic debate on further functioning of various types of areas of special preference. Moreover, the research permitted for identification of microeconomic determinants of the impact of the SEZs on business entities in terms of their export activities contributing to a widening of scientific achievements in the field of economics.

Readers interested in further exports analyses of SEZs in Poland, are kindly asked to refer to https://nazarczuk.wordpress.com/hzwsse/ or https://www.researchgate.net/project/Foreign-Trade-in-Special-Economic-Zones-in-Poland, where the authors have published electronic versions of publications created within the project. On the above-mentioned websites, we also deposit electronic attachments to this book, which due to their volume and therefore lower readability, have been removed from the paper version of the book.

The book covers unique approach to the analysis of foreign trade. It presents a macroeconomic, mesoeconomic and microeconomic perspective on the effects of special economic zones operation with regard to foreign trade to provide a better understanding of consequences of SEZs' establishment (for country, region or a firm). To the knowledge of the authors, this is the first (so comprehensive) evaluation of SEZs functioning thereof. With different sources of information, three data aggregation levels, various indices computed, statistical tests, an econometric approach, the authors verify the following hypotheses:
– H1: SEZs in Poland are characterized by a positive balance of foreign trade.
– H2: Geographical and commodity concentration of exports in the SEZ is higher than in the case of the Polish economy.

– H3: The export activity of SEZ businesses is more technologically intensive when compared to non-SEZ businesses.
– H4: Intra-industry trade in SEZs plays dominant role – confronted with inter-industry trade.
– H5: The intensity of intra-industry trade in SEZs is higher than for Poland, on average.
– H6: Firms operating in SEZs have been more affected, than non-SEZ entities, by the negative consequences of the financial and economic crisis through the foreign trade channel.

Due to the similar conditions of SEZs' functioning in other countries of Central and Eastern Europe and the relative similarity of these economies, one should assume that the obtained effects and implications may be to some extent similar to other CEEC countries, however some degree of heterogeneity may occur. Therefore, each of the cases should be analyzed individually.

The monograph is organized as follows. In the introductory part, theoretical justification for the public intervention in the form of SEZs in the area of foreign trade is presented. The authors discuss arguments for and against their functioning.

In the first chapter, we refer directly to the effects of the SEZ functioning in Poland, with particular regard to foreign trade, which is compared to other economic indicators. We point implications of the differences in the generated trade flows in the SEZs, beyond the SEZs and the economy of Poland, in the context of, among others, the structure of goods, geographical concentration and product specialization.

In the next (second) part, we point to the causes and effects of the differential effects of SEZ on trade in the regional system of the country, considering the role of foreign capital and straddling differences in the scale, structure or technological sophistication of exports/imports.

In the chapter three, the authors refer to theoretical determinants and the effects of the entrance of investors to the SEZs in Poland, which are analyzed in the context of structural changes in the economy, technological intensity of companies and its exports/imports, as well as the revealed competitive advantage and price competitiveness of goods.

In the fourth part of the book, a firm-level analysis, basing on the survey analysis, indicates to what extent the activity of economic entities in SEZs supports their export behavior, export volume and the scope to which it affects the sensitivity to external shocks.

In the last part, we point to the implications of the results of the research, recommendations for development policy, export support and improvements to the SEZ program, and how the experience of implementation of the SEZ program in Poland can be used in other countries with similar levels of development.

Justification to support export activity in special economic zones

Establishment of a SEZ is – in fact – a departure from a "purely market" approach to the functioning of the economy, according to which the market mechanism determines: the quantity, place of production, and the distribution of comparative advantages, technological advantage, economies of scale, etc. (depending on the theory) in the light of which we interpret trade between countries. These factors influence how international trade is shaped. On theoretical grounds, the issue of departing from free trade – requires justification.

In the literature of international economics arguments are considered for free trade and for possible protectionism. Under the classical doctrine of economics, the principle of free trade has been formulated. Its creators, A. Smith and D. Ricardo, criticized the idea of mercantilism. The basic message of free trade doctrine refers to the efficient allocation of resources, the fall in prices, the increase in prosperity, as well as the dynamic effects of intensification of technological progress and innovation (Zielińska-Głębocka, 1997).

As the time passed, in subsequent "views" of various trade theories and concepts of trade policy, the arguments justifying intervention in international trade were sought. One of the older arguments justifying protectionism is the unfavourable influence of foreign trade on the redistribution of income, known as Stolper-Samuelson's theorem (Salvatore, 2011, p. 256). According to the theory of H-O-S, which is useful for interpreting the trade between different countries in terms of production factors[1], free trade leads to an increase in the income of the factor of production that is relatively abundant in the country and the decrease in the income of the factor of production, which is relatively less abundant. For example, if a country is relatively abundant in capital, it will specialize in the export of capital-intensive products. The relative low price(K)/price(L) ratio in this country – as a result of the engagement in trade – will be on the rise. The income of capital owners will thus increase, but the income of employees will relatively decrease. The trade restriction in this case is argued by its negative impact on the redistribution of income.

The theory of international trade in the field of trade policy instruments rather relates to the reduction of imports. Much less attention is paid to issues strictly related to exports promotion. Its message should be rather considered more broadly, in terms of exports-imports relations, thus in terms of competitiveness.

The basic arguments for limiting free trade are: protection of the industrialization process; argument of the so-called an optimum duty for a large country that is also a large importer; the growing share of imports in the domestic market

[1] Speaking specifically about the differentiation of K/L relations between countries according to the basic model and the share of a country in the global pool of a given factor of production according to the E. Leamer's approach to defining the country's abundance in factors of production.

threatening so-called destruction of the domestic market; infant industry, denoting the protection of emerging industries. The latter argument is a good example of how trade policy instruments can be interpreted as a protection tool (against imports) and as an instrument of support (of exports). Newly emerging industries can not only be protected but also supported by the government. Other arguments for trade support include: improvement of trade balance, employment creation, removal or elimination of so-called domestic disturbances in the markets of production factors. In addition, one should mention a whole range of so-called sector arguments. They deserve for special attention in the context of SEZ-related considerations as they relate primarily to support (to a lesser extent protection). It should be noted, however, that due to the changing nature of international relations, the decline in the importance of tariffs or even the elimination of tariff and non-tariff barriers to trade, strengthens the role of the issue of levelling the rules of the game for market participants from home market and abroad. In the EU internal market, competition policy is therefore crucial. Derogations from the market allocation of resources, which are allowed under EU competition policy rules, support economic entities, but are also a "protection" against competition from other agents.

Under the so-called sectoral trade policy, one has to enumerate the following arguments: (i) support for industrial sectors that are subject to restructuring and/or threatened with collapse, (ii) the infant industry argument and (iii) strategic trade policy.

The basic premise for the realisation of strategic trade policy is the assumption that economic sectors can be identified, whose support brings a number of social and economic benefits. It is crucial to choose the criteria that define strategic sectors. Zielińska-Głębocka (1997, pp. 190–191) mentions: high-tech branches; branches producing for the protection of the environment; subcontracting industries providing intermediate goods for a large number of other sectors of the economy; arms industry; branches with high economies of scale. Common feature of the above-mentioned sectors is the generation of significant external benefits.

Supporting the strategic sectors of the economy is also justified by the strong spatial concentration of certain branches, whose development is significant from the perspective of the implemented regional policy. In addition, the occurrence of comparative advantages disclosed at the regional level is the foundation for the so-called intelligent specialization. There is also another argument, rather less "scientific", although it can be interpreted on the grounds of the game theory: we give support because other countries do.

The arguments for active economic policy, including trade policy, may also refer to the role of foreign trade in development. Traditionally, countries should specialize in the production and export of those products in which they have a comparative advantage. Less developed countries had most often these advantage in the group of low-processed products, raw materials, etc. The classical approach assumed an adaptation to the existing conditions, defined by first-nature factors,

primarily through natural resources. However, this could be unfavourable in the long run if the deepening specialization concerned products whose terms of trade worsened. This could lead to the so-called immiserizing growth. For developing countries or regions, it would be more advantageous in the long run not to adapt to the existing conditions of specialization, but their dynamic shift towards higher technology products. International trade is perceived in this approach as a driving force for beneficial structural changes.

On the relationship between international trade and economic growth, a lot is said about in the endogenous growth theory, while paying attention to the negative role of fluctuations which are transferred to the economy of a country or region through the so-called export (and import) channel. The basic question is: what level of openness of the economy can be considered beneficial (and safe). The new light on this subject is shed by the new, new trade theory that refers to data for individual firms, deliberating on intensive and extensive trade margins.

The argument for providing support for SEZs in the context of their export activity are also the benefits of export-oriented industrialization. In the literature of international economics, this is an alternative strategy to industrialization through import-substitution. The benefits of pro-export-oriented industrialization are primarily:

- expanding the market and thus achieving economies of scale,
- increase in efficiency, as indicated by the concept of heterogeneity in the new, new trade theory, according to which exporters are characterized by above average productivity,
- elimination of the restrictions resulting from the small size of the domestic market (as is in the case of import substitution strategy).

The arguments presented above, on the basis of a positive (not normative) approach, as justification/legitimation for interventions in the market mechanism, only address the basic issues. Many of the above topics have been committed in-depth analyses in the subject literature. Arguments can be sought by referring to the so-called standard trade model (comparative advantage), a new trade theory (emphasizing the importance of economies of scale), and the new, new trade theory focused on heterogeneous firm-level characteristics affecting export activity (Nazarczuk, Umiński, & Gawlikowska-Hueckel, 2018). One can also seek for them on the basis of regional development policy and policy as such – looking for the relationship between protectionism and the political situation, or trying to identify how the political situation shift influences, for example, support for the arms industry. One should also mention the game theory. The arguments at a national level are interwoven with the arguments and conditions at the regional level.

A careful reader will probably notice that at the beginning of the above divagations, a mental leap was made, because we started to consider the issue of support given to SEZs as such, immediately turning to foreign trade policy. However, this is justified as the research concerns exports originating from the SEZ, and SEZs are treated as an instrument for promoting/supporting exports.

Note on data acquisition

The main source of information on foreign trade was data obtained from the Customs Chamber in Warsaw, concerning the flow of goods between enterprises located in SEZs in Poland and beyond as well as the national economy as a whole. The time range of data acquired was from 2004 to 2014(5) and was conditional upon the possibility of obtaining consistent data over the longest possible time horizon. Unfortunately, data on foreign trade prior to 2004 were collected by GUS on the basis of a different methodology[2], which makes it difficult to compare the scale and, above all, the structure of trade turnover.

The process of data acquisition was as follows. Initially, information was gathered about entities having an active business permit in the SEZ in Poland, obtained from the Department of Support Instruments at the Ministry of Entrepreneurship and Technology. Subsequently, the collected collection was verified and transformed into a format allowing the purchase in the Customs Chamber in Warsaw. This task consisted, among others, an identification of REGON statistical numbers of individual companies operating in the SEZ, which were further aggregated by consecutive years of the analysis. The resulting aggregates, which were the subject of a subsequent order, were consonant with the legal restrictions on access to enterprise unit data in Poland[3] and allowed the collection of relevant data for the macroeconomic analysis.

However, the data obtained has some limitations[4], due to the way they were collected by public bodies. In order to limit the problem of attributing the entire activity of a company to its REGON statistical number, a survey was conducted. Thanks to the survey results, the authors obtained an average share of exports and imports generated in SEZs and beyond, for entities having more than one location or having a permit only for a part of their business activity. Such an approach has allowed researchers to estimate an error in the value of derived variables from existing sources. At the time of the study, there was no other possibility to know the abovementioned study restriction. Knowing the problem,

[2] Under the conditions of Poland's membership in the EU, statistical thresholds were introduced in the value of trade turnover above which an economic entity is considered an exporter / importer, which has resulted in the elimination of a part of commercial transactions from the system of public statistics. Since May 1, 2004, two distinct reporting systems, INTRASTAT, EXTRASTAT, operating parallel and with different threshold values, for example, were introduced. In 2016 the basic threshold (required for transaction registration) was 1.5 million zlotys (export), PLN 3 million (import). Another limitation stems from the change in the foreign trade commodity nomenclature system from 1 May 2004. *Cf.* Gawlikowska-Hueckel and Umiński (2005).

[3] Public authorities do not provide information on the value of exports / imports for individual companies in absolute terms. They may, however, prepare such information as ranges from a certain range (categorical variables).

[4] In Poland, data on foreign trade of enterprises are collected at the firm-level and assigned to its REGON statistical number, which is most often equivalent to assigning all turnover to the registered office of the entity conducting business activity.

the authors also did not decide to arbitrarily adjust (reduce) the value of exports/imports obtained from the secondary sources, which, in the absence of access to data at the level of individual companies, could cause even more errors. So, when discussing macroeconomic results of the impact of trade in SEZ on the economy of the country we only point to the scale of the above problem with appropriate interpretation.

1. Special economic zones in the foreign trade of Poland

1.1. The role of SEZs in the economy of Poland

Special economic zones in Poland were created in 1994 and were initially established within lagging-behind areas. The establishment of SEZs was intended at supporting the development of local economies by encouraging to engage capital, to improve the situation on the local labour market and to support the development of export activities and the restructuring of old industrial districts. The expected goals of SEZs were to improve the competitiveness of goods and services and to enhance technological advancement (Lizińska & Marks-Bielska, 2013).

However, the zones operating in Poland differ substantially in comparison to their foreign counterparts. There is a whole list of differences, among which few are the most important: (i) no. of subzones of SEZ locations (which is very high – more than 300 sites), (ii) zones are not fenced or surrounded by a wall separating from the rest of the country, (iii) no customs office monitoring commodities entering and departing the zone, (iv) 14 firms supervising the operation of 14 zones, (v) one co-partnership firm may manage investment sites in numerous regions, what results in inter-SEZ competition for investors/favourable investment sites, (vi) zones are not clustered in several locations in a country (fig.1.1, left) (i.e. to achieve benefits of agglomeration), but are scattered in numerous locations (in some of the cases one can observe numerous subzone plots in one city, which don't form one area).

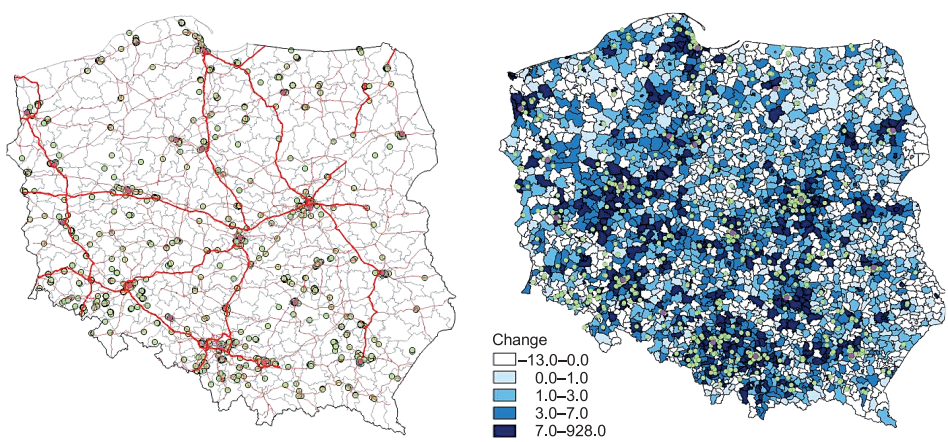

Fig. 1.1. Location of companies in SEZ on the background of the road network (left) and change in the no. of exporters between 2004 and 2014 (right)

Source: own compilation.

Explanations: Green dots represent sites in which firms in SEZs operate. Express roads and motorways are marked with thick red lines. The remaining pink lines indicate national roads; pink dots – regional capital cities.

At present, the factor differentiating the conditions for running business activity in SEZs in the spatial system is, apart from the so-called first and second nature factors, the value of the tax relief possible to obtain within the framework of the public aid, which depends on the location of the zone (regions with a lower level of prosperity are characterised by a larger share of public aid in relation to invested capital). Zones also differ in terms of the quality of investment sites, location, utilization of the available area and level of development of the local economy. Thus, their spatial distribution is not even. Most of the firms tend to locate in a close proximity to city agglomerations, industrial zones, on areas with good road accessibility, thus they most often tend to choose locations in the south-west and central Poland. However, their location corresponds to a high growth of the number of exporters (fig. 1.1, right).

After nearly twenty years of SEZs operation in Poland, their role in the national economy has seriously increased, even though zones only cover a small area of the country (19.8 k ha in 2015), and incorporate only a fraction of all economic entities in the domestic economy (1709 entities out of ca. 5 mln). Despite a relatively small number of enterprises, their contribution to generating basic macroeconomic values is quite high (table 1.1). This is confirmed especially by the zonal contribution to national exports and imports, which overhauls other economic indicators, like: the scale of invested capital, participation in creating employment in the private sector. The relatively high contribution of zones in Poland's foreign trade (and its growth) may indicate significant differences

Table 1.1. The role of special economic zones in Poland's economy

SEZs' contribution (%)	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Δ**
area	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,1	0,0
employment (total)	0,6	0,9	1,1	1,4	1,5	1,5	1,6	1,7	1,8	1,9	2,1	2,2	1,6
employment (private sector)**	0,8	1,2	1,5	1,8	2,0	2,0	2,1	2,2	2,3	2,5	2,6	2,7	1,9
investment (total)	4,2	4,8	7,4	6,9	5,5	4,5	3,0	3,0	2,5	3,1	3,8	3,9	-0,3
investment (private sector)	5,7	6,8	9,5	8,2	7,5	7,6	5,4	4,8	4,5	5,1	5,6	5,7	0,0
export	8,2	13,8	16,6	18,3	19,2	20,5	20,5	21,3	20,1	20,4	21,9	22,3	14,1
import	7,6	10,5	12,9	12,2	12,3	14,3	15,9	16,0	15,9	16,6	17,2	17,8	10,2
no. of exporters	0,5	0,9	1,1	1,3	1,6	1,8	1,9	1,8	1,8	1,8			1,3*
no. of importers	0,6	1,0	1,2	1,5	1,8	2,0	2,0	1,9	1,8	1,9			1,3*

Source: own compilation based on Customs Chamber and the Ministry of Entrepreneurship and Technology data.

Explanations: Exports and imports of companies having valid permits for operation in SEZs that have started their operation within zones. Δ difference between 2004 and 2015. * difference between 2004-2013. ** with agricultural employment.

among SEZs and non-SEZs firms and/or possible concentration of export-oriented industries located within the zones, producing goods of high value.

A relatively large share in investments is conditioned by the high capital intensity of the industries, where most investment expenditures are allocated, i.e. the automotive industry and also, to a lesser extent, manufacturers of rubber and plastic products, as well as remaining non-metallic products. A relatively high concentration of FOEs, representing 80% of the total investment expenditures in the territory of SEZs (or ca. 50 percent of the no. of firms), also determines a relatively high share of foreign trade flows. Many of the FOEs are parts of MNCs with globally scattered value chains, resulting in a more export-oriented strategy of operation. The benefits resulting from lower costs of doing business, support the price competitiveness of the goods produced by entities operating in SEZs, which in turn enables gaining a competitive advantage over the firms operating outside the zones.

As far as changes in time are concerned, one may observe differences in the intensity of investments realised and zonal employment share before and after the global financial crisis of 2008. The highest increments were observed after Poland's European Union entrance to the time of the economic slowdown in Poland. This fact may be linked with the opportunity of entering the whole EU market coupled with the benefits of a relatively cheap labour force or low costs of firms' operation, land value, or availability of decent investment sites. The high increments in the role of SEZ in the national economy were also in line with large number of new zonal permits issued at that time (fig. 1.2). Between 2004 and 2008 one could observe vibrant interest in the location in SEZs in Poland, which deteriorated during the post-crisis years, and re-intensified between 2013-2014.

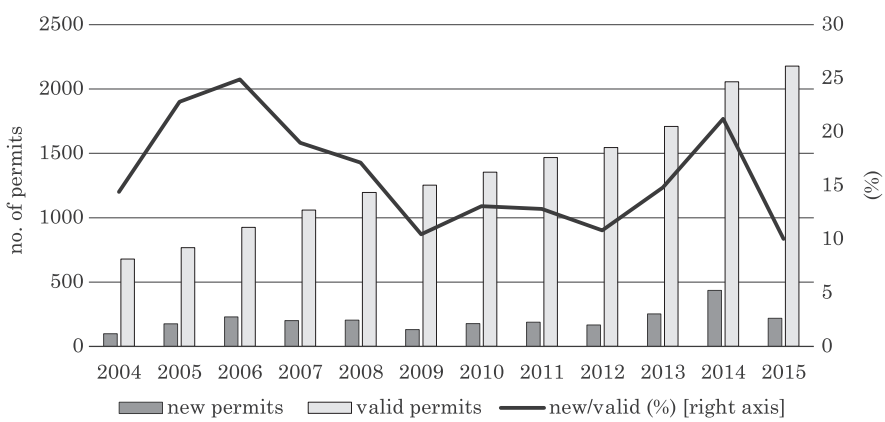

Fig. 1.2. No. of valid permits to operate in special economic zones in Poland
Source: own compilation.
Explanation: own compilation based on the Ministry of Entrepreneurship and Technology data. One firm may possess a number of permits (for operation in different sites or branches of economic activity).

Given the unknown character of SEZs in the total trade of Poland, the authors form a hypothesis referring to the balance of exports and imports generated within the zones of the following form:

H1: SEZs in Poland are characterized by a positive balance of foreign trade.

The positive verification of hypothesis no. 1 would allow to confirm a beneficial contribution of the entities operating in the SEZs to Poland's net exports coupled by a concurrent reduction of the negative foreign trade balance witnessed in Poland since the beginning of the 90s of the last century.

The anticipated role of SEZs in Poland's foreign trade turnover increased significantly starting from 2005 to 2008, as a consequence of the rise in the no. of economic entities functioning within the zones, slightly deteriorated during the economic slowdown in Poland, and rather stabilised from 2011 (with a slight upward trend). Imports have followed a similar path, having a few percent lower contribution to Poland's total import (fig. 1.3).

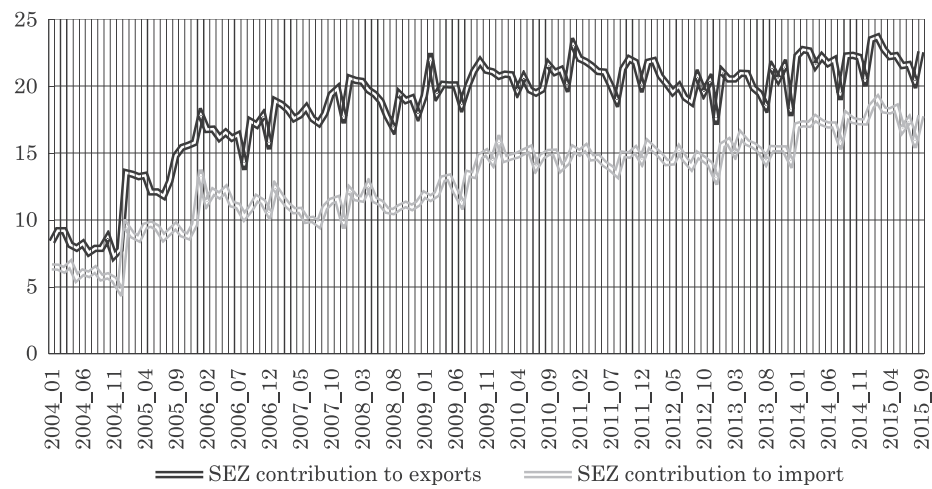

Fig. 1.3. SEZ contribution to Poland's foreign trade (in %)
Source: own compilation based on Customs Chamber (CC) and the Ministry of Entrepreneurship and Technology data (MET).
Explanation: Information on the inclusion of companies in the SEZ was updated annually. Monthly data on foreign trade.

In fact, foreign trade activity in SEZs can be characterized by a positive trade balance, contributing to the diminishing (in all years of the study) of the negative net balance observed in the national economy (until 2014). Its scale varied, bobbing an upswing direction (table 1.2). What also seems to be important is the fact of stability of the positive trade balance in SEZs, constituting a positive impulse for the economy of Poland as a whole, even during the economic slowdown. Therefore, one has to support the hypothesis no 1.

Table 1.2. Trade balance in SEZs, non-SEZ and Poland (EUR bn)

Scope	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
SEZ	0,6	2,3	3,0	5,5	6,0	6,0	4,9	6,7	6,3	7,4	7,3	6,3
non-SEZ**	-11,2	-11,8	-15,6	-23,9	-31,8	-15,1	-17,8	-21,8	-16,2	-8,8	-9,0	-3,5
Poland	-10,6	-9,4	-12,6	-18,3	-25,8	-9,1	-12,9	-15,2	-9,9	-1,3	-1,7	2,8

Source: own compilation based on CC and MET data.
Explanation: In 2005 the methodology of collecting data on foreign trade in Poland has changed. * data until September. ** The non-SEZ part of the economy was achieved by subtracting from Poland's total trade flows the ones generated in SEZs only.

The results indicate export-oriented character of activity carried out in SEZs, stemming to some extent from a higher concentration of FOEs, the strategy adopted by firms willing to internationalise their economic activity and the character of trade. Probably, in most of the cases, zonal imports is treated as an input to firms' exports, which in turn has a higher price and contributes to the net surplus in trade. Other explanation may result from a scarce location of firms mostly engaging in imports solely for the needs of the domestic market. Finally, the results may also indicate that SEZs entities (especially FDIs) rarely cooperate with local suppliers (Ambroziak & Hartwell, 2017), what however needs a further inquiry.

1.2. Product structure of export and import of SEZs

The comparison of the structure of products exported and imported in SEZs in relation to the economy as a whole or its non-SEZ[5] part reveals significant differences, even though the analysis is run at a very high level of data aggregation (1-digit HS). The high scale of the analysis stemmed from the need of fitting the table of reasonable size into the page, preserving the ability to compare the results with the non-SEZ part and Poland (cf. tables A.1 and A.2 in the appendix for 15 most important product groups of exports and imports in SEZ at 2-digit level).

The most vital differences between SEZ and non-SEZ part of trade turnover are observed due to: (i) higher concentration of 8th sector (machinery, electrical equipment, boilers, mechanical equipment, vehicles, aircrafts, ships, optical instruments, etc.) and a lower share of other branches in trade, especially considering sectors 0-3 (live animals, animal products, vegetables, mineral products) and 6-7 (clothing accessories, footwear, umbrellas, plaster products, ceramic products, glassware, metals) (table 1.3).

[5] The non-SEZ part of the economy was achieved by subtracting from Poland's total trade flows the ones generated in SEZs only.

Table 1.3. Sectoral distribution of exports and imports at 1-digit HS level

No.	SEZ				non-SEZ				Poland			
	2004	2008	2010	2013	2004	2008	2010	2013	2004	2008	2010	2013
						exports						
0	0,0	0,0	0,1	0,5	5,0	6,1	6,5	7,4	5,3	4,9	5,3	6,0
1	0,3	0,2	0,1	0,4	2,4	3,1	3,6	4,7	2,5	2,5	3,1	3,8
2	0,6	1,4	1,3	1,5	10,1	10,1	10,5	11,7	9,3	8,5	7,6	9,6
3	2,5	3,6	4,4	6,0	7,0	9,7	10,8	11,2	7,2	8,5	8,8	10,2
4	12,7	11,5	13,5	11,6	8,6	6,3	6,4	6,5	8,6	7,3	7,6	7,6
5	0,1	0,6	0,4	0,5	1,2	0,9	0,8	0,7	1,1	0,8	0,7	0,7
6	2,0	2,3	2,2	2,0	5,5	4,2	4,3	4,4	4,6	3,8	4,1	3,9
7	4,5	4,4	4,5	5,9	13,9	14,9	12,9	12,2	12,3	12,9	10,3	10,9
8	69,6	67,4	64,6	61,5	37,9	38,2	38,2	34,3	41,2	43,8	45,5	39,9
9	7,7	8,5	8,8	10,1	8,5	6,4	6,0	6,8	8,1	6,8	6,9	7,4
						imports						
0	0,1	0,1	0,5	0,8	2,7	3,6	4,3	5,0	2,6	3,2	3,8	4,3
1	0,3	0,2	0,4	0,8	1,8	2,4	2,3	2,7	1,7	2,1	2,0	2,4
2	1,7	3,1	2,4	3,1	15,3	18,2	18,8	20,0	14,6	16,5	16,4	17,4
3	9,0	9,1	9,3	11,3	14,3	12,8	14,0	13,6	14,0	12,4	13,3	13,2
4	7,1	9,7	9,4	10,2	6,6	4,9	5,2	5,0	6,6	5,4	5,8	5,8
5	2,9	2,1	1,9	1,9	3,9	2,0	1,9	1,7	3,8	2,0	1,9	1,8
6	0,7	0,6	0,7	0,9	3,0	3,5	4,2	4,1	2,9	3,1	3,7	3,6
7	9,0	10,9	9,5	10,4	9,9	10,9	9,8	9,5	9,9	10,9	9,8	9,6
8	64,8	60,7	58,7	56,7	38,8	34,1	32,4	31,6	40,3	37,1	36,3	35,4
9	4,6	3,5	7,3	3,9	3,6	7,8	7,0	6,9	3,7	7,3	7,0	6,5

Source: own compilation based on CC and MET data.
Explanation: In 2005 the methodology of collecting data on foreign trade in Poland has changed.

Imports in SEZs was slightly more diversified than exports, what resulted in a more even distribution among the sectors. However, similar observation as in the case of exports can be noticed – high concentration of imports in the 8th section, with a lower contribution of sectors 0-2 (live animals, animal products, vegetable products, beverages, tobacco, mineral products) and 6 (clothing accessories, footwear, headwear, articles of plaster, ceramic products). Between 2004 and 2013 section 8th decreased its role significantly in the global imports, while most of the other sectors increased their contribution to the zonal imports, resulting to some extent in a more similar distribution.

Therefore, the analysis of similarities or divergences in the structure of foreign trade generated in the SEZs relative to the Poland's foreign trade seems to be justified. Contrary to the above table the analysis is run at a more detailed, 4-digit HS level, having ca. 1265 product groups in total. In this regard, the Clark's divergence index of the following form may be used:

$$d = \sqrt{\frac{1}{n}\sum_{i=1}^{n}\frac{(f_i^1 - f_i^0)}{f_i^1 + f_i^0}} \cdot 100 \qquad (1.1)$$

where:

n – no. of product groups or countries,
f_i^1 – the share of i-th export's (import's) product group in Poland,
f_i^0 – the share of i-th export's (import's) product group in SEZs.

The Clark's index is a normalised measure, taking values close to zero in the case of a full similarity between the two distributions of shares. Its application allows to assess the extent to which exports (or imports) generated in the SEZs are similar to the Poland's trade turnover and whether the foreign trade generated in the zones was becoming more similar, in the subsequent years of the analysis, in terms of the commodity structure, to the trade turnover of the Polish economy as a whole.

The Clark's index has proved that the structure of exports in SEZs differs with the structure of exports in Poland (table 1.4). One has to also mention that some of the activities in SEZs are prohibited, therefore firms operating in SEZs cannot offer a wide range of variety of goods, but in turn have to conform to the zonal permit, in which the type of economic activity and place is specified.

Table 1.4. Diversification of exports and imports commodity structure in SEZs relative to domestic turnover

Trade flow	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	Δ
Exports	27,2	26,3	25,4	23,7	23,2	23,0	23,1	23,0	23,2	22,8	-4,4
Imports	25,4	25,4	24,9	24,7	23,9	23,7	23,5	23,8	23,9	23,2	-2,2

Source: own elaboration based on CC and MET data.
Explanation: In the table the Clark's divergence index is presented, which was computed at 4-digit HS nomenclature. In 2005 the methodology of collecting data on foreign trade in Poland has changed.

The level of diversification is moderate, which may be a result of frequent zero values for selected product groups of trade generated within the SEZs. Moreover, as the number of firms in the zones increased, the level of divergence between the two structures lowered. Exports in this regard converged with a higher pace than imports, what equalised the level of dissimilarities between the zonal and Poland's trade structure.

1.3. Geographical structure of exports and imports of SEZs against the background of Poland's foreign trade

The most important recipient of commodities produced within zones, similarity to the remaining part of the country is Germany (table 1.5). However, the intensity of this relationship is higher in the case of SEZs. The order of the other partners in trade in terms of geographical structure is different for zonal and non-zonal operations, but in both of the cases, these are the same countries (the United Kingdom, France, the Czech Republic). However, still EU15 countries play a dominant role in global exports in zones and outside the zones. The differences in the order of countries' importance may be a result of different foreign capital intensity (SEZs vs non-SEZs) resulting in different gravity forces towards specific countries, the dissimilar sectoral structure of firms locating within zones, and the fact that SEZs are only a fraction of the whole economy.

Table 1.5. Share of 15 most important export directions by countries (%)

	2004	2008	2010	2014	Δ		2004	2008	2010	2014	Δ		2004	2008	2010	2014	Δ
	SEZ						non-SEZ						Poland				
DE	39,7	26,3	28,9	28,8	-10,9	**DE**	29,2	24,7	25,3	25,4	-3,7	**DE**	29,8	24,9	26,0	26,1	-3,7
UK	6,7	8,6	8,2	7,9	1,2	**CZ**	4,5	5,9	6,1	6,6	2,1	**CZ**	4,3	5,6	5,9	6,4	2,2
FR	8,7	8,6	8,8	6,7	-2,0	**UK**	5,4	5,1	5,8	6,0	0,6	**UK**	5,4	5,8	6,3	6,4	0,9
CZ	2,4	4,6	5,2	5,9	3,5	**FR**	5,9	5,7	6,3	5,3	-0,6	**FR**	6,1	6,2	6,8	5,6	-0,5
IT	4,0	5,3	6,0	4,7	0,7	**RU**	4,2	5,4	4,4	4,6	0,5	**IT**	6,1	6,0	6,0	4,6	-1,6
ES	1,8	4,6	5,1	4,3	2,5	**IT**	6,4	6,2	6,0	4,5	-1,9	**RU**	3,9	5,3	4,3	4,3	0,4
NL	1,6	3,8	3,8	3,4	1,7	**NL**	4,5	4,1	4,5	4,4	-0,1	**NL**	4,2	4,0	4,4	4,2	-0,1
RU	1,6	4,8	3,6	3,1	1,5	**SE**	3,3	2,8	2,7	2,9	-0,4	**SE**	3,5	3,2	3,0	2,8	-0,7
HU	4,6	3,6	2,4	3,0	-1,6	**SK**	1,8	2,6	2,7	2,6	0,7	**HU**	2,6	2,8	2,8	2,6	0,1
US	0,9	1,3	1,9	2,9	2,0	**HU**	2,4	2,6	3,0	2,5	0,1	**SK**	1,8	2,4	2,6	2,5	0,7
SE	5,9	4,6	3,9	2,7	-3,2	**BE**	3,1	2,5	2,3	2,2	-0,9	**ES**	2,5	2,5	2,7	2,5	0,0
TR	1,5	1,7	2,1	2,7	1,2	**UA**	2,9	4,4	2,8	2,1	-0,8	**BE**	3,2	2,5	2,4	2,2	-1,0
BE	4,8	2,7	2,5	2,5	-2,3	**US**	2,6	1,5	1,8	2,0	-0,6	**US**	2,5	1,5	1,9	2,2	-0,2
SK	1,1	1,8	2,0	2,2	1,2	**NO**	2,0	1,9	1,7	2,0	0,0	**UA**	2,8	3,8	2,5	1,9	-0,9
AT	1,1	2,1	2,0	1,7	0,6	**ES**	2,5	2,1	2,1	2,0	-0,6	**NO**	1,8	1,7	1,5	1,7	-0,1

Source: own elaboration based on CC and MET data.
Explanation: In 2005 the methodology of collecting data on foreign trade in Poland has changed. Δ – the difference between 2004 and 2014 (in pp.). Table A.3 in appendix presents more detailed data.

Geographical structure of imports followed the similar scheme as exports. Germany, once again, played a crucial role in the zonal imports, also having higher contribution compared to non-SEZs part. Its role has albeit diminished significantly between 2004 and 2013, in favour of China. Starting from a second most important import direction one can observe growing dissimilarities between

the order of countries, but their real contributions (with the exception of China) are alike in SEZs and non-SEZs. To some extent, the pool of them is similar, but in the case of SEZs, we can notice the higher role of Far East direction, including China and South Korea. Spain also plays a more important role in SEZs, compared to non-SEZs, while Russia in comparison to non-SEZ part is ranked significantly lower.

In dynamic terms, as it was shown above, most of the changes are observed on the interchange in the role between Germany and China. Generally, most of the partners had a relatively stable position, with most of the EU15 countries losing significance in favour of Far East (excluding Japan). The new member states had no one clear shift, resulting in country-specific changes (table 1.6).

Table 1.6. Share of 15 most significant import directions by countries (%)

	2004	2008	2010	2014	Δ		2004	2008	2010	2014	Δ		2004	2008	2010	2014	Δ
	SEZ						non-SEZ						Poland				
DE	46,5	39,9	32,2	31,4	-15,0	**DE**	28,3	27,4	27,4	26,0	-2,3	**DE**	29,1	28,4	28,0	26,8	-2,4
CN	0,4	6,8	9,3	11,2	10,8	**RU**	7,7	11,2	12,1	13,0	5,4	**RU**	7,1	9,8	10,4	10,9	3,7
IT	8,7	6,7	5,0	6,4	-2,3	**NL**	6,4	6,0	6,4	6,1	-0,3	**CN**	2,3	4,1	4,8	5,9	3,6
KR	0,2	6,1	11,7	5,5	5,4	**IT**	7,2	6,3	5,6	5,2	-2,0	**NL**	6,1	5,5	5,8	5,6	-0,5
FR	4,4	3,9	3,1	4,2	-0,2	**CN**	2,4	3,8	4,1	4,8	2,4	**IT**	7,2	6,2	5,4	5,4	-1,8
NL	2,3	2,7	2,5	3,4	1,1	**CZ**	3,8	4,2	4,2	4,2	0,4	**FR**	6,2	4,7	4,3	4,0	-2,2
CZ	2,4	2,9	3,2	3,4	0,9	**FR**	6,4	4,9	4,6	4,0	-2,4	**CZ**	3,7	4,0	4,0	4,0	0,3
US	1,1	1,3	2,8	3,2	2,2	**BE**	3,6	3,3	3,6	3,7	0,0	**BE**	3,5	3,1	3,3	3,3	-0,3
HU	3,6	2,4	1,9	2,7	-0,9	**UK**	3,2	2,9	3,2	2,9	-0,3	**UK**	3,2	2,8	2,9	2,7	-0,5
ES	2,6	2,1	2,2	2,5	-0,1	**SK**	1,6	2,1	2,8	2,9	1,2	**SK**	1,6	2,0	2,6	2,7	1,1
AT	4,1	4,2	3,5	2,3	-1,8	**SE**	2,8	2,6	2,3	2,5	-0,3	**SE**	2,8	2,5	2,3	2,4	-0,4
JP	4,8	3,1	2,4	2,2	-2,6	**AT**	2,4	1,9	1,9	2,3	-0,1	**AT**	2,5	2,1	2,1	2,3	-0,2
SE	2,7	1,8	2,1	2,1	-0,7	**ES**	2,0	2,1	2,0	1,9	-0,1	**ES**	2,0	2,1	2,0	2,0	0,0
SK	1,1	1,6	1,4	1,8	0,7	**DK**	1,8	1,5	1,5	1,6	-0,3	**HU**	2,0	1,8	1,8	1,7	-0,2
UK	2,7	1,7	1,6	1,7	-1,0	**HU**	1,9	1,8	1,8	1,5	-0,3	**US**	1,2	1,6	1,8	1,7	0,5

Source: own elaboration based on CC and MET data.
Explanation: In 2005 the methodology of collecting data on foreign trade in Poland has changed.
Δ – the difference between 2004 and 2014 (in pp.). Table A.4 in appendix presents more detailed data.

Similarly to the evaluation of the product structure between Poland and SEZs, here the Clark's diversification index is calculated for the shares of countries contributing to exports and imports separately, as it was in the case of the product structure. Its application enables to monitor the scale and changes of similarities between the two distributions.

Given a lower number of countries than at 4-digit product groups, the resulting image, presented in table 1.7, indicates higher similarity of SEZs exports and national exports. In comparison to exports, imports was more divergent in terms of its geographical structure, even compared to the level of dissimilarities seen in the product structure.

Table 1.7. Clark's divergence index of diversification in exports and imports geographical directions structure in SEZ relative to Poland's total foreign trade

Trade flow	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Δ
Exports	29,3	26,4	24,0	20,9	18,9	19,4	17,0	17,4	17,6	18,3	-11,0
Imports	37,7	38,8	37,0	34,2	34,6	35,8	37,6	36,1	37,2	34,0	-3,7

Source: own elaboration based on CC and MET data.
Explanation: In the table, the Clark's divergence index is presented, which was computed at 4-digit HS nomenclature. In 2005 the methodology of collecting data on foreign trade in Poland had changed. Δ – the difference between 2014 and 2004.

Between 2004 and 2013 the product structure of SEZs exports became significantly more similar to the total Poland's exports, while imports featured only a minor change thereof. The more apparent differences in geographical structure observed in SEZs imports (towards national imports) stemmed from the character of products imported to Poland's economy as a whole, which were more diversified in general. In the case of SEZs, imports played a major role as an input to exports, therefore differed substantially opposed to total imports of Poland.

1.4. Geographical concentration and product specialisation

Given the unequal distribution of geographical and product structure of exports and imports, the authors decided to verify the hypothesis, based on the preliminary analysis of trade product/geographical structure, of the following form:

H2: Geographical and commodity concentration of exports in the SEZ is higher than in the case of the Polish economy.

The positive verification of hypothesis no. 2 referring to the geographical and product concentration of exports would allow to identify, i.e. the extent to which businesses located in the SEZs (and their turnover) could be sensitive to the transmission of negative demand shocks through the trade channel, coming from specific directions. The geographic concentration of foreign trade was assessed with the use of the Herfindahl-Hirschman Index (HHI) and based on the share of a few (3-5-10-15) key trade partners of entities operating in the SEZs relative to the total trade turnover generated by firms in Poland and the remaining part of it (excluding SEZs).

The geographical structure of exports is subject to a higher concentration in comparison to non-SEZ or Poland as a whole. There is a systematic few percentage points (or more) difference between the role of a selected number of business partners and the share of exports directed there (table 1.8).

As the number of trading partners increases, the difference in the concentration also follows an upward trend, indicating the further concentration of exports. Import, similarly to export is also more concentrated in a fewer no. of trade partners. Both concentration measures for SEZs (in exports and imports) declined in the analysed period, resulting in a lower geographical intensity than more a decade ago. The non-SEZ part followed the same direction.

Table 1.8. Share of 3-5-10-15 biggest partners in foreign trade in SEZs, non-SEZs and Poland

Scope	Trade flow	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
share of 3 biggest partners in foreign trade													
SEZ	exports	55,1	51,8	48,4	45,6	43,6	48,7	45,9	46,5	45,6	44,3	43,4	44,2
	imports	59,9	61,1	58,6	54,8	53,5	54,2	53,1	49,8	49,0	48,2	49,0	48,2
non-SEZ	exports	41,4	39,2	38,8	38,0	36,9	38,6	37,7	37,4	37,0	36,5	38,0	39,1
	imports	43,1	43,9	44,4	44,4	44,9	44,0	46,0	47,1	47,8	45,7	45,1	42,9
Poland	exports	42,0	40,3	39,9	38,4	37,1	39,9	39,1	38,6	38,1	37,6	39,0	40,0
	imports	43,5	44,7	44,9	44,1	44,4	43,2	44,1	45,3	45,7	44,0	43,5	42,3
share of 5 biggest partners in foreign trade													
SEZ	exports	65,8	61,6	60,1	57,0	53,7	60,2	57,0	56,2	55,0	54,0	54,0	55,3
	imports	68,5	69,9	67,1	63,9	63,8	63,9	61,6	58,9	59,6	59,2	58,8	56,6
non-SEZ	exports	51,3	49,5	49,6	48,9	48,0	50,4	49,5	48,5	48,0	47,5	47,9	49,1
	imports	55,9	56,1	55,9	55,6	55,8	55,0	56,1	56,6	56,8	54,8	55,1	53,6
Poland	exports	51,7	50,5	51,1	49,9	48,5	52,1	51,0	50,1	49,3	48,6	49,1	50,4
	imports	55,8	56,3	56,0	54,9	54,7	53,7	54,4	55,2	55,6	54,1	54,5	53,1
share of 10 biggest partners in foreign trade													
SEZ	exports	82,0	80,0	80,2	77,1	74,8	78,1	75,9	74,6	72,0	71,5	70,6	72,7
	imports	82,7	83,5	81,9	79,2	78,8	77,5	75,6	74,5	75,2	74,7	73,9	72,6
non-SEZ	exports	69,3	67,8	68,3	68,1	67,0	66,9	67,0	65,9	66,4	64,7	64,8	64,7
	imports	71,7	72,5	72,3	72,9	72,7	72,9	74,0	73,7	74,0	72,6	72,7	71,3
Poland	exports	69,4	68,2	69,1	68,5	67,6	68,0	68,1	66,9	66,8	65,0	65,5	65,9
	imports	71,4	72,1	71,6	71,4	71,2	71,3	71,6	71,8	72,2	71,2	71,1	69,7
share of 15 biggest partners in foreign trade													
SEZ	exports	90,2	88,7	88,9	86,7	84,7	86,6	86,4	85,1	83,3	83,1	82,4	83,5
	imports	92,4	91,3	89,5	88,6	88,0	86,6	85,6	85,4	85,9	85,0	83,9	82,7
non-SEZ	exports	81,3	79,4	79,8	79,6	78,2	78,0	78,1	77,0	76,5	75,3	75,1	74,8
	imports	81,6	82,5	82,2	82,8	82,3	82,8	83,6	83,5	83,7	83,0	82,5	81,1
Poland	exports	81,1	79,9	80,3	80,1	78,9	79,0	79,3	78,1	77,2	76,3	76,1	76,3
	imports	81,1	81,8	81,2	81,4	81,3	82,2	81,9	81,9	82,4	81,8	81,2	80,0

Source: own elaboration based on CC and MET data.
Explanation: In 2005 the methodology of collecting data on foreign trade in Poland has changed.
* data until September.

The second measure of concentration, namely the Herfindahl-Hirschman index, was computed according to the following formula:

$$HHI_e = (\sum_{i=1}^{n} f_i^2) \cdot 100 \quad (1.2)$$

where:

n – no. of countries with export(import) relations (no. of product groups),

f_i – the share of i-th country in export(import) (the share of i-th product group in total export or import).

The results obtained with the HHI index confirm the implications stemming from the analysis of 3-5-10-15 most important geographical directions of trade (table 1.9). Still, the exports and imports generated in SEZs are more concentrated in each year of the analysis. The decrease in the intensity of concentration in years 2004-2014 is especially apparent in the case of the zonal trade turnover. The exports and imports in non-SEZ part or Poland have also deteriorated, but only by a small fraction of SEZ's change.

Table 1.9. Geographical concentration of trade according to HHI index in SEZs, non-SEZ and Poland

Scope	Trade flow	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
SEZ	exports	18,3	15,5	12,9	11,3	10,1	12,5	11,5	11,5	11,0	10,7	10,9	11,2
	imports	23,6	26,4	24,4	18,5	18,1	14,7	13,7	13,6	12,6	13,0	12,8	11,7
non-SEZ	exports	10,9	9,6	9,5	9,1	8,7	8,9	8,9	8,8	8,4	8,3	8,8	9,2
	imports	10,8	10,6	10,4	10,8	10,7	10,5	10,9	10,9	10,8	10,2	10,3	10,1
Poland	exports	11,2	10,2	9,8	9,3	8,8	9,4	9,4	9,3	8,8	8,7	9,2	9,5
	imports	11,1	11,4	11,1	11,0	10,9	10,6	10,7	10,8	10,5	10,1	10,2	10,0

Source: own elaboration based on CC and MET data.
Explanation: To assess the geographical concentration the Herfindahl-Hirschman Index (HHI) was used. To make the index more distinguishable, its values were multiplied by 100.* data till September.

The product group analysis revealed more even distribution of trade considered at the 4-digit product group level as it was in the case of geographical concentration. However, as the no. of firms in SEZs grew, the role of the few most important product groups diminished (table 1.10). This tendency was especially noticeable for exports, where contribution of the three biggest product groups fell down by almost a half. At the same time import share of three most important product groups lowered only by nearly 5.5 percent points. Similar tendencies, indicating more rapid decreases in the role of few product groups in exports, were also apparent for other numbers of most important product groups.

Between 2004 and 2014 different tendencies were describing imports in SEZs and non-SEZ part. In case of the former, one observed lowering share of a few most important product groups, while for the latter the opposite tendency, indicating further increases in the role of several product groups in the after

Table 1.10. Share of 3-5-10-15 biggest product groups (at 4-digit level) in foreign trade in SEZs, non-SEZs and Poland (%)

Scope	Trade flow	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
share of 3 biggest product groups in foreign trade												
SEZ	exports	43,0	39,3	39,7	33,6	34,7	35,9	33,5	29,7	26,0	24,6	22,7
SEZ	imports	24,0	25,9	29,7	24,5	24,0	25,4	25,3	21,0	20,2	20,3	18,7
non-SEZ	exports	12,6	12,6	10,1	10,5	10,5	12,7	10,6	9,0	8,7	8,0	10,0
non-SEZ	imports	12,5	13,2	14,2	13,5	15,0	13,8	15,1	15,8	17,9	16,2	18,7
Poland	exports	14,1	13,9	14,1	13,9	14,3	17,2	15,3	13,2	11,2	10,5	10,4
Poland	imports	12,1	12,2	13,2	12,5	14,0	12,2	13,2	14,2	15,6	14,2	13,4
share of 5 biggest product groups in foreign trade												
SEZ	exports	55,0	53,4	54,8	47,1	45,0	43,7	41,0	38,0	35,0	33,0	31,4
SEZ	imports	33,5	33,3	35,7	29,8	29,0	31,4	32,4	27,1	25,8	25,6	23,2
non-SEZ	exports	18,9	18,9	15,6	15,3	14,8	17,6	15,5	13,6	12,9	12,4	14,7
non-SEZ	imports	18,1	18,4	18,8	17,9	20,0	18,5	19,5	20,7	22,0	20,5	23,8
Poland	exports	21,3	20,2	20,4	19,9	19,1	22,0	20,0	17,7	16,1	15,1	15,2
Poland	imports	17,6	17,7	17,9	17,1	18,8	17,4	18,4	19,0	20,2	18,8	17,2
share of 10 biggest product groups in foreign trade												
SEZ	exports	68,9	67,9	67,9	61,4	59,1	58,5	56,0	53,3	49,2	46,8	43,1
SEZ	imports	43,0	43,7	45,2	38,8	37,5	39,9	41,9	36,0	35,8	34,3	32,4
non-SEZ	exports	29,8	29,8	25,5	23,9	22,9	26,0	24,6	23,4	21,5	20,9	23,9
non-SEZ	imports	26,5	26,5	26,3	25,8	27,6	26,3	26,9	27,9	29,2	27,9	31,4
Poland	exports	31,5	30,1	30,4	28,8	27,8	30,3	28,1	26,5	24,1	23,3	24,2
Poland	imports	25,9	25,9	26,4	25,1	27,3	25,7	26,3	26,0	27,3	26,2	24,5
share of 15 biggest product groups in foreign trade												
SEZ	exports	75,1	75,4	75,8	69,3	66,0	66,8	64,0	60,4	56,0	53,8	50,9
SEZ	imports	49,1	51,4	51,8	45,0	43,4	45,7	47,3	41,9	41,8	40,2	38,7
non-SEZ	exports	35,7	35,7	31,4	29,5	29,3	31,9	31,4	29,5	27,7	27,2	30,3
non-SEZ	imports	30,8	30,8	31,1	30,6	32,3	30,7	31,4	32,5	33,5	32,5	36,2
Poland	exports	37,0	36,2	36,1	34,4	33,8	35,6	34,6	32,9	30,0	29,5	30,1
Poland	imports	30,7	30,4	31,2	30,1	31,9	30,7	31,2	30,9	31,9	30,7	28,9

Source: own elaboration based on CC and MET data.
Explanation: In 2005 the methodology of collecting data on foreign trade in Poland has changed.

crisis period. These dissimilarities could result from different strategies adopted by firms towards increasing the effectiveness of trade turnover that could stem from limiting the no. of distant directions in imports.

The product group concentration of trade, measured with the HHI index, reveals less intense level of its concentration. SEZs again featured more concentrated exports and imports over the non-SEZ or Poland's foreign trade turnover. The level of intensity has diminished by more than a half from 2004 to 2014,

while in the remaining part of foreign trade turnover the amendments were modest and followed different directions. In the case of exports product concentration has diminished, while in the case of imports increased (table 1.11).

Table 1.11. Product groups' concentration of trade according to HHI index in SEZs, non-SEZs and Poland

Scope	Trade flow	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
SEZ	exports	7,6	7,7	7,6	5,5	5,3	5,5	4,8	4,2	3,5	3,4	3,1	
	imports	3,0	3,4	4,1	3,0	2,9	3,0	3,1	2,4	2,2	2,2	1,9	
non-SEZ	exports	1,3	1,1	1,0	0,9	0,9	1,2	1,0	0,9	0,8	0,8	1,0	
	imports	1,1	1,1	1,2	1,1	1,4	1,1	1,3	1,6	2,0	1,7	2,1	
Poland	exports	1,4	1,3	1,4	1,3	1,3	1,5	1,3	1,1	1,0	0,9	1,0	1,0
	imports	1,0	1,1	1,2	1,1	1,2	1,0	1,2	1,3	1,6	1,4	1,2	0,9

Source: own elaboration based on CC and MET data.
Explanation: To assess the geographical concentration the Herfindahl-Hirschman Index (HHI) was used. To make the index more distinguishable, its values were multiplied by 100.

As it has been shown above, the foreign trade turnover generated in SEZs differs substantially in terms of geographical concentration and product specialisation in comparison to the non-SEZs exports and imports. Thus, it supports the H2 hypothesis, according to which foreign trade turnover in SEZs is more geographically concentrated and product specialised in comparison to non-SEZ. Being the result of a low number of firms and their sectoral concentration, stemming from the restrictions imposed on the kind of activity carried out within the zones, the scale of SEZs export and import concentration has diminished (between 2004 and 2014) as the number of firms operating in zones increased. The trend seems to continue in the upcoming years, due to relatively high number of new permits issued by the Ministry of Entrepreneurship and Technology.

Due to higher sectoral and geographical concentration, the foreign trade turnover generated in SEZs was potentially subject of a higher sensitivity during the 2008 financial crisis than in the non-SEZ part of the economy. The empirical evidence on firms being more open to trade and demand-dependent, lead to the conclusion that they tend to be also more susceptible to the negative impacts of the financial crisis (Claessens, Tong, & Wei, 2011), especially in open economies. However, the final outcome of the potential sensitivity is a more complex issue (e.g. given the uneven distribution of the crisis among sectors, the impact of the preferential tax exemptions, the role of FOEs), therefore it would be illegitimate to form conclusions only on the fact of higher concentration or anticipated higher trade openness of firms operating in zones. Thus, the issue is further analysed in chapter 4, where firm-level data, obtained in the survey are presented and compared for the two groups of firms (SEZs vs non-SEZs).

2. Special economic zones – regional dimension

2.1. Reasons for the diverse share of SEZs in regional economies

SEZs were created in Poland in the mid-1990s as one of the support instruments for less-developed areas with many socio-economic problems. The main problem was high unemployment, resulting from an industrial monoculture not fitting the requirements of an open, competitive economy. Unemployment was also an effect of the difficulties in managing the existing, uncompetitive production assets, which were the legacy of the previous centrally-planned economy system. In the light of dynamic changes at the initial stage of transformation, it was difficult to implement the necessary structural changes, which resulted in numerous socio-economic problems. In a particularly difficult situation were: (i) old industrial zones that needed rapid restructuring, (ii) cities with an industrial monoculture at risk of a recession, (iii) agricultural areas dominated by the State Agricultural Farms (Państwowe Gospodarstwa Rolne in Polish) situated mainly in the north and north-east of the country, (iv) agricultural areas of Eastern Poland, delayed in development (Domański, Gwosdz, & Biernacki, 2005; Siudak & Wątorek, 2011).

SEZs were deemed one of the elements of development policy which was supposed to foster development of regions with problems, most of all by attracting investors to areas which were, or were seen as being, areas below the threshold of profitability of economic activity (Smith, 1966; Wiedermann & Trojak, 2009). Introducing investment incentives in the form of, among others, exemptions from income tax, investment areas with utility infrastructure or assistance in investment implementation, was supposed to improve the investment attractiveness of those regions (Pastusiak, 2011) and to attract large industrial companies (Kryńska, 2000). SEZs were therefore aimed at supporting local economic growth selectively (originally, only a few SEZs were to be created) and at fixing the difficult situation in the local labour market.

The main goals of SEZs included (Ustawa z dnia 20 października 1994 r. o specjalnych strefach ekonomicznych, 1994):

- development of specific fields of economic activity,
- development of new technical and technological solutions and their application in the national economy,
- expansion of exports,
- increase in the competitiveness of products manufactured and services rendered,
- use of the existing industrial assets and economic infrastructure,
- creation of new jobs,
- use of unused natural resources in a sustainable manner.

Establishing privileged areas relatively quickly began to be regarded as one of the important instruments of the regional policy by attracting FDIs, among

others, (Cieślik, 2001) which was supposed to help reduce disparities in regional development. However, further decisions on the number and location of the zones themselves (and their sub-zones) became a subject of criticism (Cieślik, 2001, 2005; Godlewska-Majkowska, 2009; Gwosdz, Jarczewski, Huculak, & Wiederman, 2008; Jarczewski, 2012; Nazarczuk, 2012). A great number of zones/sub-zones posed a threat of competition among SEZs and limited possible positive effects of agglomeration of businesses in space (and of the possibility of successful impact on the economic environment).

In addition, privileged areas were more often established in relatively well-developed regions, which was a result of numerous deviations from the pre-established rules for locating them by economic criteria (economic peripheralisation). Over time, those criteria became less restrictive, thanks to regulations regarding the establishment of zones (e.g. reducing the unemployment rate threshold as a criterion for possible location of SEZ sub-zones in relation to the national average) (Rozporządzenie Rady Ministrów z dnia 10 grudnia 2008 r. w sprawie kryteriów, których spełnienie umożliwia objęcie niektórych gruntów specjalną strefą ekonomiczną, 2008). This process was encouraged by zones created in Poland which, being uninhabited areas, were not closed organisational or economic enclaves; often fragments of those zones were scattered across a larger area as well. For investors planning to incur high investment expenses, decisions were made on including areas preferred by them in SEZs, offering the same privileges as in the case of land managed by SEZs.

In reality, it turned out that a large part of the privileged areas (out of all the SEZs) were located in places with the highest levels of salaries and wages in Poland, the most economically developed, with large urban zones within their borders (Cieślik, 2001; Pastusiak et al., 2016). At this point, it is worth noting that in 2015, there were 14 SEZs with more than a few hundred sub-zones located in 173 towns and cities and 248 municipalities (LAU 2), which greatly exceeded the originally planned number of zones. Individual investment areas differed significantly in terms of location as well as communication and technical infrastructure quality, which resulted in a wide diversity of the level of use of available investment areas in the individual zones: from 18.24% (Legnica SEZ) to 76.67% (Kraków Technology Park), with the average use of 69.5% (MR, 2016).

Pre-accession EU laws, which viewed the activity of SEZs as regional public aid, were considered a remedy for that situation and a return to a more "market-based" procedure of selecting sites for SEZs. Those laws were also seen as an opportunity to decrease the negative impact of the privileged areas on market competition.

Percentage thresholds, introduced in 2001 that depicted the maximum amount of public aid, depended on the amount of capital expenditure (the so-called "map of regional public aid"). Their introduction partially limited the competitive edge of highly developed regions because those thresholds defined the maximum extent

of regional public aid which was inversely proportional to the level of regional prosperity and the size of the business being supported (Ambroziak, 2015).

However, only urban areas associated with the largest cities in the country, had a decreased extent of public aid in the original version of the map, with no differences between Eastern and Western regions. A later version of the map of regional public aid (i.e. for 2007–2013) took into account interregional income differences with a greater level of detail. The maximum range of differences in the extent of public aid between the poorest regions of Eastern Poland and the most prosperous city of Poland – Warsaw – was 20pp, whereas the range of differences in the extent of public aid between the already mentioned poor regions of Eastern Poland and heavily industrialised areas was set at 10pp. Differences resulting from the size of a business applying for public aid were also considered, regardless of the location of an investment. In this respect, small businesses were treated differently (+20pp of the extent of public aid) than medium-sized (+10pp) or large businesses.

It was only the map of public aid for 2014–2020 that strongly individualised the extent of public aid among the regions. The eastern voivodeships which were delayed in economic growth (Warmińsko-Mazurskie, Lubelskie, Podkarpackie and Podlaskie voivodeships) had the maximum extent of public aid (50%). On the other hand, relatively wealthy and industrialised regions (Dolnośląskie, Śląskie and Wielkopolskie voivodeships) had a lower extent of public aid (25%) and the capital city of Warsaw had the lowest extent of public aid (until 2018 – 15%, from 2018 – 10%).

The direction of the evolution of regional public aid may be deemed proper and justified since, as far as public aid is concerned, SEZs are more of an instrument of the regional policy. Of significance, however, is the question of the possible positive impact of aid granted, in accordance with the guidelines set forth on the last of the presented maps on regional differences, bearing in mind the expected date of terminating the activity of SEZs in Poland (2026), the time needed for implementation of investments and the use of tax exemptions. Since there is no indication of another extension of the operation of SEZs in Poland, the attractiveness of this instrument supporting investors will regularly decline over the years to come, thus both the above-mentioned impact on the existing spatial business structure in the country as well as the regional differences will be limited.

One should remember that the operation of a single SEZ is not limited to one voivodeship (NUTS 2), which results in competitive pressure between the managers of zones to acquire/include land attractive in terms of investments, often under the management of the same local governments. For example, in 2015, the SEZ in Mielec and the Pomeranian SEZ stretched across five voivodeships, and the Tarnobrzeg SEZ – which is the leader in this comparison – stretched across as many as six voivodeships. On the other hand, other SEZs were more concentrated spatially and offered land for investments in a fewer number

of regions (usually 2–3 regions). Such large differences in the number of locations, their territorial coverage and the level of spatial development were most likely a result of various quality of land held, its locational attractiveness, the effectiveness of SEZs in acquiring new areas, as well as the readiness of local governments to cooperate with the managers of SEZs in preparing land for investment.

According to Cieślik (2001), the "urge" to establish new locations of SEZ subzones was a result of the desire to achieve short-term benefits by local/regional decision-makers, which translated into an increase in regional disparities in Poland. This tendency to create privileged areas also resulted from the pressure exerted by foreign investors who recognised the zones as an important factor increasing the investment attractiveness of individual locations (Nazarczuk & Kisiel, 2013). When negotiating terms of location, they also used competition (of a sort) that emerged between local governments for investors. In an attempt to further increase the investment attractiveness, local governments widened the extent of tax exemptions in the fields they were responsible for (e.g. real estate property tax), creating a broader offer of temporary exemptions from taxes.

Therefore, the final effect of the functioning of SEZs under such principles was a strong concentration of companies in prosperous regions, situated close to foreign markets with high-quality technical infrastructure (Pastusiak et al., 2016). It reflected the strong role of the second nature factors in deciding on a location within the new economic geography. To a small extent, however, this arrangement contributes to eliminating regional disparities in terms of wealth, which was one of the original purposes for establishing SEZs. Obviously, one can identify a relatively stronger concentration of economic operators in the regions of Warmia and Mazury, Suwałki, and Podkarpacie which represent areas with relatively low incomes. However, the largest concentration of economic operators in the zones occurs in the Dolnośląskie, Śląskie, Małopolskie, and Mazowieckie voivodeships (Fig. 2.1), which are important centres of economic growth. Those are the voivodeships where SEZs were not actually needed from the perspective of the original purpose of SEZs (with certain local exceptions resulting from the need for restructuring of declining industries).

Thus, it should be said that the influence of companies in SEZs will be different on the economies of individual regions, which may be caused by their unequal contributions to creating the basic economic categories. On one hand, a high share of SEZs in the economies of the regions will be a result of large-scale operations and the number of businesses operating in the zones, especially those operating in industries with high capital intensity. On the other hand, the relatively high relevance of the zones can be associated with the so-called low base problem, present in peripheral regions. A comprehensive analysis of the impact of SEZs on peripheral regions requires taking into account a whole array of factors, such as: the existing structure of industry and capital, technological advancement, the tendency and ability of companies located in individual SEZs

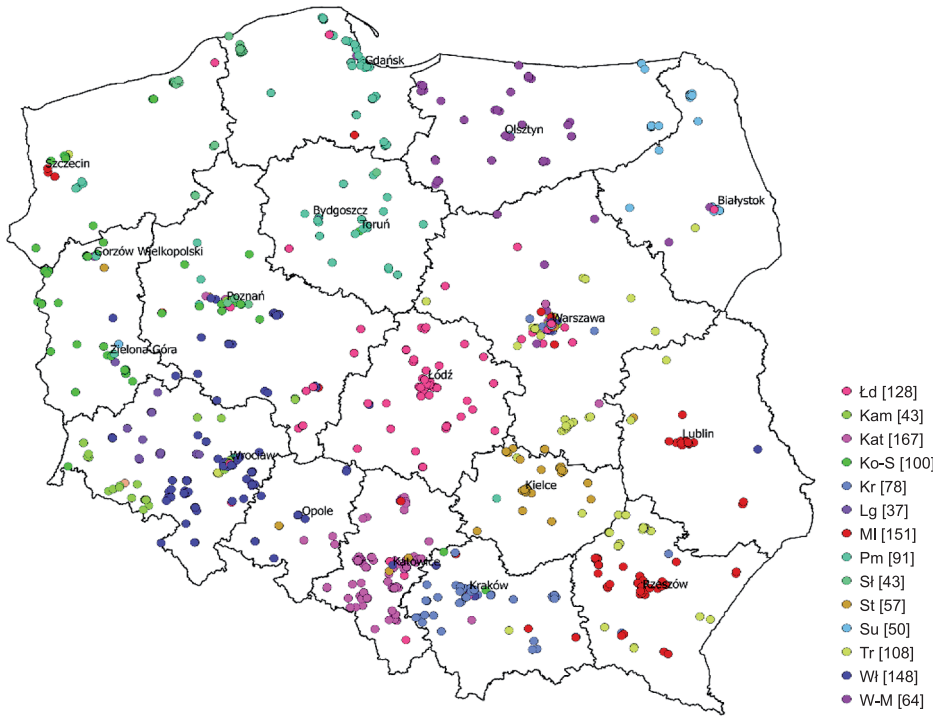

Fig. 2.1. Location of active businesses in SEZs in 2014 by the managers of SEZs
Source: own elaboration.
Explanations: Special economic zones: Łd – Łódź SEZ, Kam – Kamienna Góra SEZ, Kat – Katowice SEZ, Ko-S – Kostrzyn-Słubice SEZ, Kr – Kraków SEZ, Lg – Legnica SEZ, Ml – EURO-PARK Mielec, Pm – Pomeranian SEZ, Sł – Słupsk SEZ, St – Starachowice SEZ, Su – Suwałki SEZ, Tr – Tarnobrzeg SEZ EURO-PARK WISŁOSAN, Wł – Wałbrzych SEZ, W-M – Warmia and Mazury SEZ. Regional city capitals are labelled on the map.

to engage in foreign trade and their relative similarities in, or divergences from the economic structure of the region. Knowing them, will allow for the formulation of conclusions and recommendations for a development policy relating to the importance of SEZs in regional development as well as particular implications for (regional) export promotion policy.

2.2. Role of SEZs and entities with foreign capital in international trade of voivodeships

SEZs are diverse in terms of their importance in the economies of voivodeships. Such diversity is an effect of numerous factors that affect the characteristics of both the voivodeship and the entities in the SEZ. The most important features of the economies of voivodeships include: the economic potential (GDP),

the geographical location, the availability of means of transport, the structure of the economy in terms of three sectors (agriculture, industry, services), the structure of industry and wealth (GDP per capita). The share of SEZs in the economies of voivodeships is a result of a combination of location factors ("offered" by the region) and the equivalent factors for economic operators, including the structure of the sector they operate in.

When a voivodeship is a part of a highly competitive region with considerable economic potential (high regional GDP or added value), then even if a SEZ is home to a substantial number of large, competitive, export-oriented entities, the share of the SEZ in the economy of the voivodeship does not need to be high. If, on the other hand, a region is considered a smaller and less competitive area, then SEZs play a relatively larger role in the economy of the region, even if SEZ sub-zones are home to a relatively small number of companies.

The role of SEZs in the economies of individual voivodeships can be characterised using various measures/categories, i.e. employment, capital expenditure, export, import (including the balance of trade), the number of entities, added value, regional GDP, etc. It is difficult to interpret them conclusively. Due to the nature of SEZs, it seems more reasonable to present their role in the economies of voivodeships statically, rather than dynamically. It makes sense to employ a dynamic presentation when changes are presented over long run. For most of the SEZs in the base year (e.g. 2004) and in the year being compared (e.g. 2014), one may notice a completely different population of entities in terms of their size. A comparative analysis in time is exposed to the low base effect; often, it is even impossible to identify dynamics, if in the base year the value under analysis equals zero. An example of dynamic changes may be the Małopolskie voivodeship, where the share of SEZs in the total exports of the voivodeship in 2008–2014 doubled (from 11% to 22%), or the Świętokrzyskie voivodeship where the SEZ share grew from 4.8% to 14.6%. One has to remember that in 2014, the Polish SEZs comprised about 1,200 entities in total. Therefore, in individual zones a significant impact could be noted of transactions made by individual entities on the general picture of, for example, export activity or another feature under analysis.

Figure 2.2 presents a synthetic indicator of the SEZ share being an average of the SEZ share in employment, capital expenditure, exports and imports in each of the voivodeships. SEZs are most important (synthetically) in the economies of two voivodeships – the Dolnośląskie and Podkarpackie (28.7%), they are also very important (the synthetic indicator at 20–25%) for the Lubuskie, Warmińsko-Mazurskie, and Łódzkie. The synthetic indicator for the Śląskie voivodeship is 19.2%. SEZs are of the least importance (below 7%) for the economies of the Lubelskie, Kujawsko-Pomorskie, Opolskie, Mazowieckie and Podlaskie voivodeships.

The voivodeships, where the share of SEZs in employment in total was the highest in 2014, ebraced the Dolnośląskie (5.8%), Podkarpackie (4.6%) and Lubuskie

(4.3%). As far as capital expenditure is concerned, they included the Łódzkie (14.9%), Dolnośląskie and Podkarpackie (13%), and Wielkopolskie (12%). When it comes to the importance of SEZs in the export activity of the voivodeship, the following voivodeships stood out: the Podkarpackie (48.7%), Warmińsko-Mazurskie (42.6%), Dolnośląskie and Lubuskie (ca. 37%), and Śląskie (36.1%); whereas in terms of the import activity, the following stood out: Dolnośląskie (59%), Lubuskie and Podkarpackie (ca. 50%), Warmińsko-Mazurskie and Łódzkie (ca. 38%).

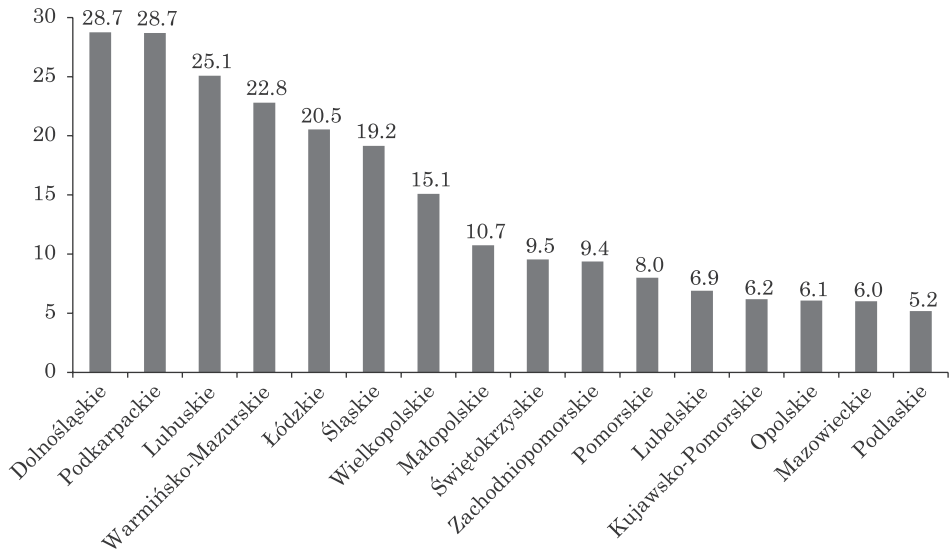

Fig. 2.2. Synthetic indicator of the share of SEZs in the economies of the voivodeships in 2014 (%)

Source: Own calculations based on the data of Customs Chamber, the Ministry of Entrepreneurship and Technology and CSO in Warsaw. Data according to the headquarters of the economic entity.

The use of an economic policy instrument in the creation of privileged areas is reasonable due to their positive impact on the development of less-developed regions. According to the foregoing, one may expect a negative correlation between the synthetic indicator of the share of SEZs in the economy of the voivodeship and the GDP per capita. In that way, the requirement would be met to allow for "distorting" the market mechanism of allocation of resources by creating SEZs in order to support less-developed regions.

A comparison of the synthetic indicator of the share of SEZs in the economies of the voivodeships with GDP per capita shown in fig. 2.3 does not confirm the presence of the above relation. However, the issue of possible endogeneity should be highlighted as well as the difficulties in interpreting a relationship among the aforementioned variables. One may also assume that the GDP per capita of a given voivodeship is high due to a SEZ created there which attracts various competitive economic operators.

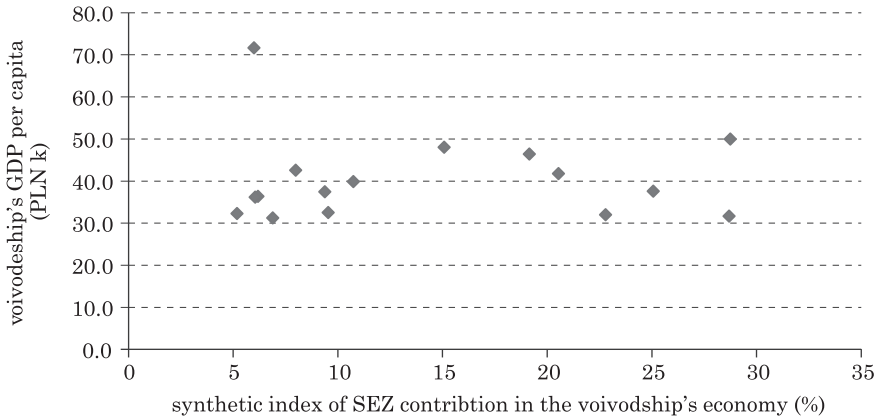

Fig. 2.3. Relation between GDP per capita and the synthetic indicator of the share of SEZs in the economies of the voivodeships in 2014.
Source: Own calculations based on the data of Customs Chamber, the Ministry of Entrepreneurship and Technology and CSO in Warsaw. Data relevant for the seat of the declaring entity.

Entities seated in SEZs showed a total surplus of exports over imports. In 2014, it amounted to EUR 5.3 billion, and the balance of each of the zones was positive or negative. The highest positive balance in 2014 was recorded for entities located in the Śląskie voivodeship (EUR 2.4 billion); it was also high in the Wielkopolskie voivodeship (EUR 1.7 billion). The lowest negative balance was noted in the Dolnośląskie (EUR -1.5 billion) and Łódzkie (EUR -1.2 billion) voivodeships (fig. 2.4).

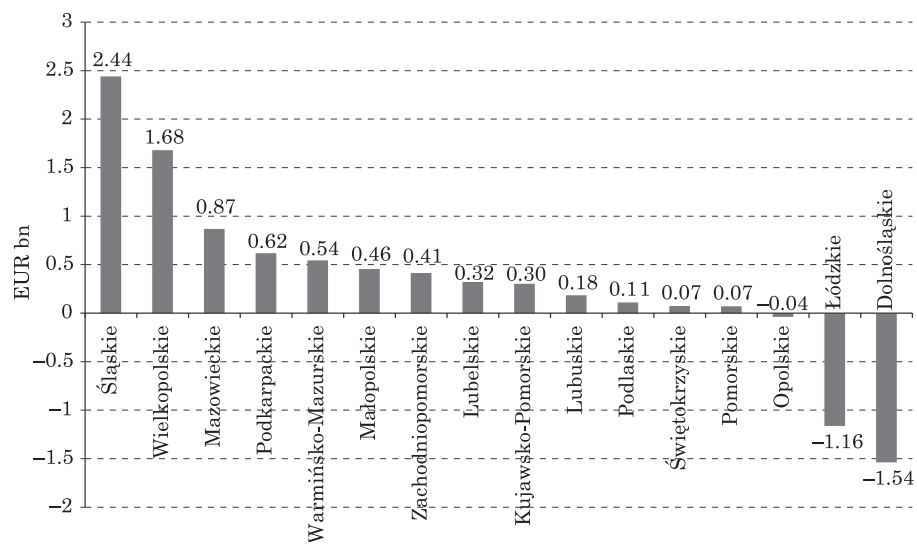

Fig. 2.4. Balance of foreign trade (exports minus imports) in 2014 (EUR bn) by voivodeships
Source: Own calculations based on data of the Customs Chamber. Data relevant for the seat of the declaring entity.

Relatively high extreme values in the balance of trade depended on the location and concentration (the Śląskie and Dolnośląskie voivodeships) of the automotive industry in Poland, characterised by a high share of SEZs in the total sales in Poland. The "+" or "-" sign of the balance most likely results from the extent of exports or imports of cars and car parts as well as from various strategies for conducting economic activity in Poland by manufacturers with factories in those SEZs.

Due to the lack of access to individual data for specific SEZs, it is not possible to identify the share of entities with foreign capital in exports and imports. Such a comparison may be carried out only at the voivodeship level. Because of the fact that there is a high correlation between the share of entities with foreign capital in the exports and imports of the voivodeships (94.3% in 2013), Fig. 2.5 presents only the share in exports.

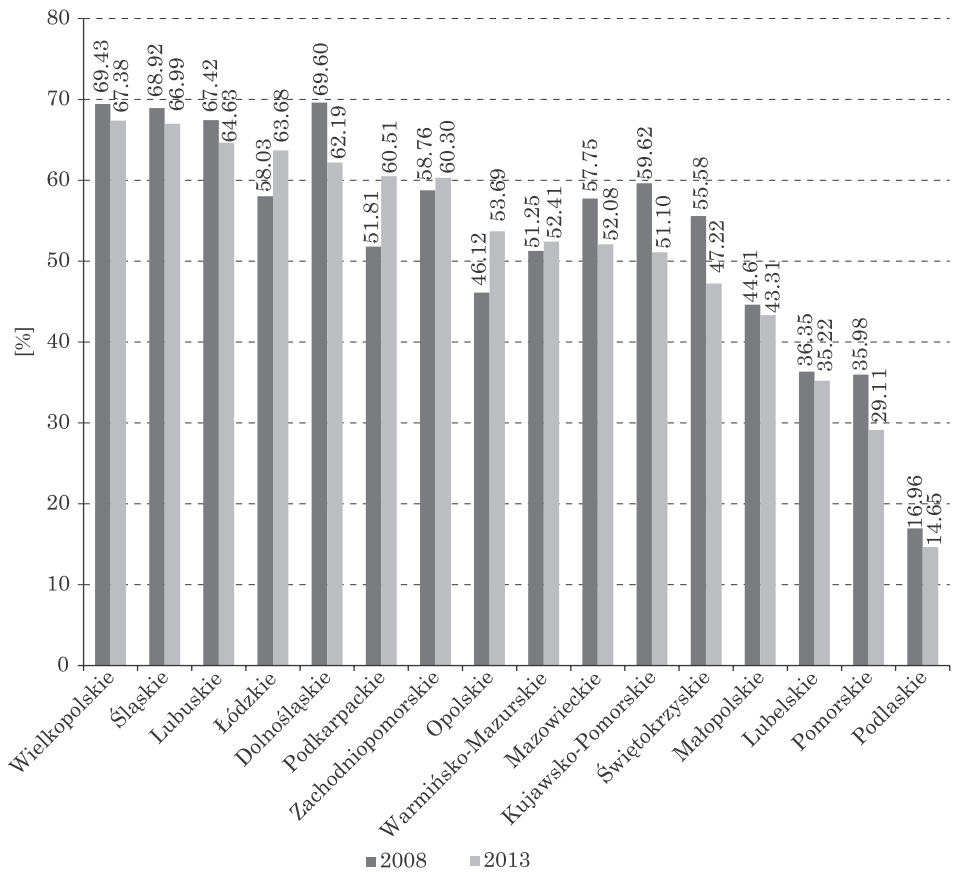

Fig. 2.5. Share of entities with foreign capital in the export activity of voivodeships in 2008 and 2013 (%)

Source: Own calculations based on data of the Customs Chamber. Data relevant for the seat of the declaring entity.

There are three groups of voivodeships. In the first group, the share of entities with foreign capital in total exports exceeded 60%. It included the Wielkopolskie, Śląskie, Lubuskie, Łódzkie, Dolnośląskie voivodeships. In the second group, that share was lower, between 44% and 52%; it comprised the Podkarpackie, Zachodniopomorskie, Opolskie, Warmińsko-Mazurskie, Mazowieckie, Kujawsko-Pomorskie, Świętokrzyskie, and Małopolskie voivodeships. The third group with the lowest share (below 36%) consisted of the Lubelskie, Pomorskie, and Podlaskie voivodeships. In 2008–2013, the share of entities with foreign capital in exports and imports in 11 voivodeships has decreased. The largest decreases were noted in Kujawsko-Pomorskie (-8.5pp), Świętokrzyskie (-8.4pp), Dolnośląskie (-7.4pp), and Pomorskie (-6.9pp); the largest increases were noted in Podkarpackie (8.7pp) and Opolskie (7.6pp).

As mentioned before, it is impossible to obtain more accurate statistical data on the share of entities with foreign capital in individual SEZs in the export activity of voivodeships. It can be said with high probability that the largest exporters in SEZs are entities with foreign capital. However, it is not possible to verify the aforementioned hypothesis. This subject is definitely worth studying further.

To put some context to the research results, it is possible to identify the openness of the economies of individual regions[6] calculated using a synthetic indicator, taking into account the share of exports in the GDP of a voivodeship, the value of exports per capita, and the value of exports per square kilometre. Due to different units of measure within the individual categories being analysed and their extent, to calculate the synthetic indicator according to the formula (2.1), values normalised in relation to the maximum value within each of the categories were used.

$$OPEN_i = \frac{\sum_{j=1}^{j=3} x_{ij} / max(x_{ij})}{3} \tag{2.1}$$

where:

x_{ij} – variable "j" for voivodeship i: j = 1 – export / GDP [%], j = 2 – export per capita [PLN thousand], j = 3 – export per km^2 [PLN thousand].

The openness synthetic indicator values are presented in fig. 2.6.

One may ask what the cognitive value and usefulness of this indicator for research on SEZs is. When interpreting the foregoing, cumulative causation and the gravity model should be taken into account. As Brodzicki and Uminski; Umiński (2017; 2012) proved using their concept of gravity in modelling foreign trade relations, establishing commercial relations between Polish voivodeships and particular nations of the world is easier since the economies of both a region

[6] Nazarczuk and Umiński (2018) deliberate on the different indices used to proxy trade openness and investigate the spatial distribution of local trade openness in Poland at LAU 1 level (counties), with particular focus put to the role of foreign owned entities and special economic zones thereof.

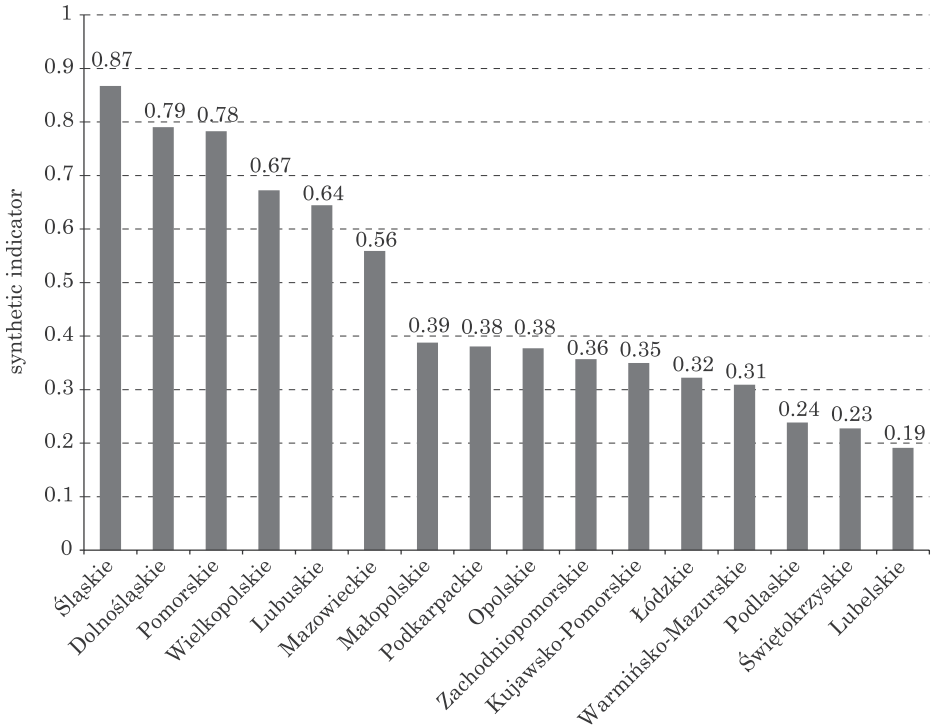

Fig. 2.6. Openness synthetic indicator in 2014 for voivodeships
Source: Own calculations based on data of the Customs Chamber. Data relevant for the seat of the declaring entity.

and a country are more open. In addition, of significance are also previous exports and the presence of entities with foreign capital in the region. SEZs where competitive entities with foreign capital operate positively affect the openness of the economies of regions. Such a hypothesis requires, however, to be empirically verified based on unit data for individual entities. From a more aggregated perspective, there can be shown a small positive correlation ($r = 0.3604$) between the synthetic indicator of the share of SEZs in the economies of voivodeships and the synthetic indicator of the openness of the economies of voivodeships.

2.3. Cluster analysis of the importance of SEZs in the economies of voivodeships

On the basis of available statistical data, it is possible to make more complex comparisons of voivodeships, illustrating the importance of SEZs in employment, capital expenditure and exports or imports. Such comparisons are doubtlessly relevant, they are particularly useful for representatives of voivodeships responsible for preparing the regional policy and monitoring its implementation.

They provide detailed information on the activities of economic operators in various zones. But a great level of detail is also a drawback, since it makes a synthetic comparative analysis more difficult to carry out. A debatable issue is which of the partial measures is most adequate to describe differences between the individual zones. One may also wonder whether you should apply weights to individual partial measures being components of the synthetic measure.

A synthetic comparison may be made carrying out a cluster analysis. Its purpose is to classify cases (objects) into possibly homogeneous groups. One variant of that method is the hierarchical/agglomeration approach, a result of which is a tree diagram or, in other words, a dendrogram. The horizontal axis represents grouped objects, each of which is unique. Moving upwards, the decision threshold gets gradually lower and, based on that threshold, it is decided whether individual cases are exceptional. They are grouped into bigger clusters. Ultimately, all of the objects are combined into one.

As part of that hierarchical approach, various object agglomeration methods and distance measures were employed. Eventually, Ward's method (1963) and the Euclidean distance were chosen for its effectiveness in creating homogeneous clusters and a tendency to form equinumerous groups. The analysis of robustness confirmed that also with other methods of agglomeration – the single linkage, the centroid linkage, the complete linkage, and the mean weighted linkage – similar (though not identical) results were achieved. The dendrogram presented on fig. 2.7 indicates that the voivodeships were grouped by certain similarities/differences. The longer vertical line indicates greater differentiation.

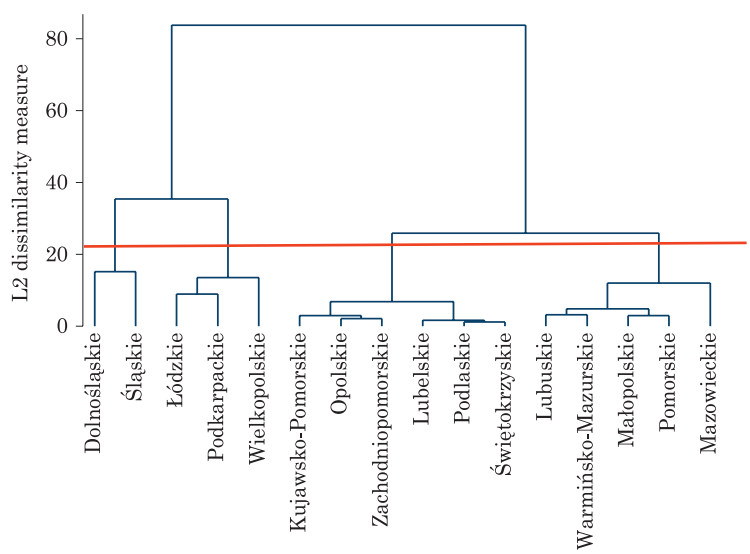

Fig. 2.7. Dendrogram – distance between individual clusters – share of SEZs in the economies of regions

Source: own compilation.

The cluster analysis was performed on the basis of the share of SEZs in capital expenditure, employment, exports and imports of each and every voivodeship. Based on the Duda and Hart Je(2)/Je(1) index and the Duda/Hart pseudo-T-squared statistics, it was found that the optimum number of clusters is four, with each of them composed as follows (see tables A.9 and A.10 in appendix):

– cluster 1: the Dolnośląskie and Śląskie voivodeships,
– cluster 2: the Podkarpackie, Łódzkie, and Wielkopolskie voivodeships,
– cluster 3: the Kujawsko-Pomorskie, Lubelskie, Opolskie, Podlaskie, Świętokrzyskie, and Zachodniopomorskie voivodeships,
– cluster 4: the Lubuskie, Małopolskie, Mazowieckie, Pomorskie, and Warmińsko-Mazurskie voivodeships.

The voivodeships were grouped into clusters based on various measures of the share of SEZs in their economies. It is worth making an attempt at identifying other factors that had an impact on the clustering result. Cluster 1 consists of two well-developed and competitive voivodeships located in the south or southern west of Poland[7], characterised by the easy availability of means of transport, the proximity of receptive export markets and the increased activity of foreign direct investors. Those regions also have a high GDP per capita. One should note that they are also similar to each other in the taxonomy of Zaucha, Ciołek, Brodzicki, and Głazek (2014b) concerning the sensitivity to challenges of the global economy. They are characterised by the above-average exposure to risk (a result of high openness), the average sensitivity and a high or average ability to respond.

Cluster 2 consists of two adjacent voivodeships – Łódzkie and Wielkopolskie – and the Podkarpackie voivodeship. As already mentioned, their common feature is a relatively high share of entities with foreign capital in exports. Those regions are also characterised by great internal diversity and the well-defined profile of activities of the above-mentioned foreign investors. In the case of the Wielkopolskie voivodeship, it is the automotive industry, whereas in the Podkarpackie voivodeship it is the aviation industry.

Cluster 3 has a sub-group, comprising the Podlaskie, Świętokrzyskie and Lubelskie voivodeships. They are located in the east of the country and are characterised by a low GDP per capita and a low share of entities with foreign capital in exports. In their case, according to Zaucha et.al. (2014), low exposure to challenges of the global economy (which is a result of low openness) is associated with a poor ability to respond. Cluster 4 has a sub-group comprising the Warmińsko-Mazurskie and Lubuskie voivodeships. They are located in different parts of the country. However, they have a similar export profile

[7] The results of clustering may signal uneven distribution of SEZs in regional economies. SEZs seem to matter more in well-developed regions, due to agglomeration of firms in SEZs there, as well as they also imply significant SEZs contribution in lower-developed regions, due to low economic base of that regions and/or historical reasons (e.g. well-functioning aviation cluster, being the first SEZ in Poland).

with a considerable share of products for the automotive industry but also for the wood/furniture and food industries. When it comes to other voivodeships of the fourth cluster, i.e. the Małopolskie, Pomorskie, and Mazowieckie voivodeships, it should be emphasised that they represent highly competitive regions with different levels of openness; what they have in common is a low share of entities with foreign capital in exports. According to Zaucha et.al. (2014), two of them (the Pomorskie and Mazowieckie voivodeships) are among the regions most exposed to challenges of the globalisation, though they are characterised by high adaptability. A common feature of the Mazowieckie and Małopolskie is very high sensitivity to external crises.

In the second approach, a more in-depth analysis of the clustering results achieved with the application of the Ward's method was performed in order to identify determinants of the position of individual clusters. Table 2.1 shows the characteristics of individual clusters. For each of the variables, the maximum value applies to cluster 1 (table 2.1). Though it is not the purpose of the cluster analysis to identify the "best" or "worst" clusters, one should note that cluster 1 has the maximum values of each of the characteristics[8].

Table 2.1. Share of SEZs in the economies of voivodeships in 2014

Variables	Cluster			
	1	2	3	4
share in capital expenditure	13.9	12.9	2.5	3.6
share in employment	19.0	9.4	1.4	5.0
share in exports	19.8	8.2	1.1	5.8
share in imports	21.8	8.5	0.7	5.4

Source: own computations.

For cluster 1 comprising the Śląskie and Dolnośląskie voivodeships, the share of SEZs in the economies of the voivodeships in terms of each of the above-mentioned features is high. The share in other clusters is lower. Relatively, the "worst" cluster is the third cluster consisting of the Kujawsko-Pomorskie, Lubelskie, Opolskie, Podlaskie, Świętokrzyskie, and Zachodniopomorskie voivodeships. The regions in that group were characterised by the lowest importance of SEZs in their economies, regardless of the variables applied to the analysis.

[8] When interpreting the results obtained, one has to be aware of the fact that grouping is done according to a specific algorithm. Unique, individual objects are classified into clusters. This results in a greater or smaller consistency of the clusters, which is reflected by various distances of the objects from the centre of each cluster. In one cluster there can be found voivodeships which differ from each other in terms of one feature. Thus, the decisive factor of their classification into a given cluster are the remaining features.

2.4. Interregional differences in the contributions of SEZs to the economies of regions

Differences in the activity of economic operators operating in SEZs can also be presented as a benchmark of a sort by comparing the share of SEZs of individual voivodeships in exports originating from SEZs in Poland in total with the share of regions in generating GDP. Such an approach allows highlighting the pro-export orientation of SEZs.

The diagram below (fig. 2.8) compares the share of the region in generating exports within SEZs with the share of the voivodeship in the GDP of Poland. The 45° line shows the points for which the share of the voivodeship in exports within SEZs in Poland is equal to the contributions of the voivodeship to GDP of the country. The points to the left of that line mean a higher share of SEZs in exports than in GDP generation, whereas the points to the right mean that the above-mentioned share is lower.

For example, the Śląskie voivodeship is to the left of the 45° line which means that the share of entities from that voivodeship in the national exports of SEZs (about 23%) is higher than the share of that voivodeship in the GDP of Poland (about 13%). The diagrams drawn up for the remaining variables – capital expenditure, employment, and import – should be interpreted accordingly (cf. figures A.1-A.3 in appendix). The foregoing proves that the Śląskie voivodeship is highly export-oriented, which is also visible when it comes to entities operating in the zone. Tackling the problem from such a perspective allows for identification of interregional varieties in terms of export capacity, understood as a measure of competitiveness of economic operators operating in the zone. For comparison, the Małopolskie voivodeship was a region from which entities operating within the SEZ were relatively (with respect to the region's share in the GDP of Poland) less effective as exporters. This is largely a result of differences in terms of business owners' reasons for investing (including entities with foreign capital). Many of them focus primarily on the domestic market.

Six voivodeships are on the left side of the 45° line. In addition to the already mentioned Śląskie voivodeship, those were the Warmińsko-Mazurskie, Lubuskie, Podkarpackie, Wielkopolskie, and Dolnośląskie. One may conclude that firms operating in those regions in the SEZs are characterised by relatively high exportability.

A synthetic comparison of the activity of SEZs in individual voivodeships is presented in table 2.2. The share of each of the voivodeships in the GDP of Poland was a point of reference. The results shown in the table should be interpreted as follows (on the example of the selected Wielkopolskie voivodeship). The share of the Wielkopolskie voivodeship's SEZ in overall exports of the SEZs nationwide is larger (as indicated by the "+" sign) than the share of that voivodeship alone in the GDP of Poland. It is similar to imports generated by the SEZs

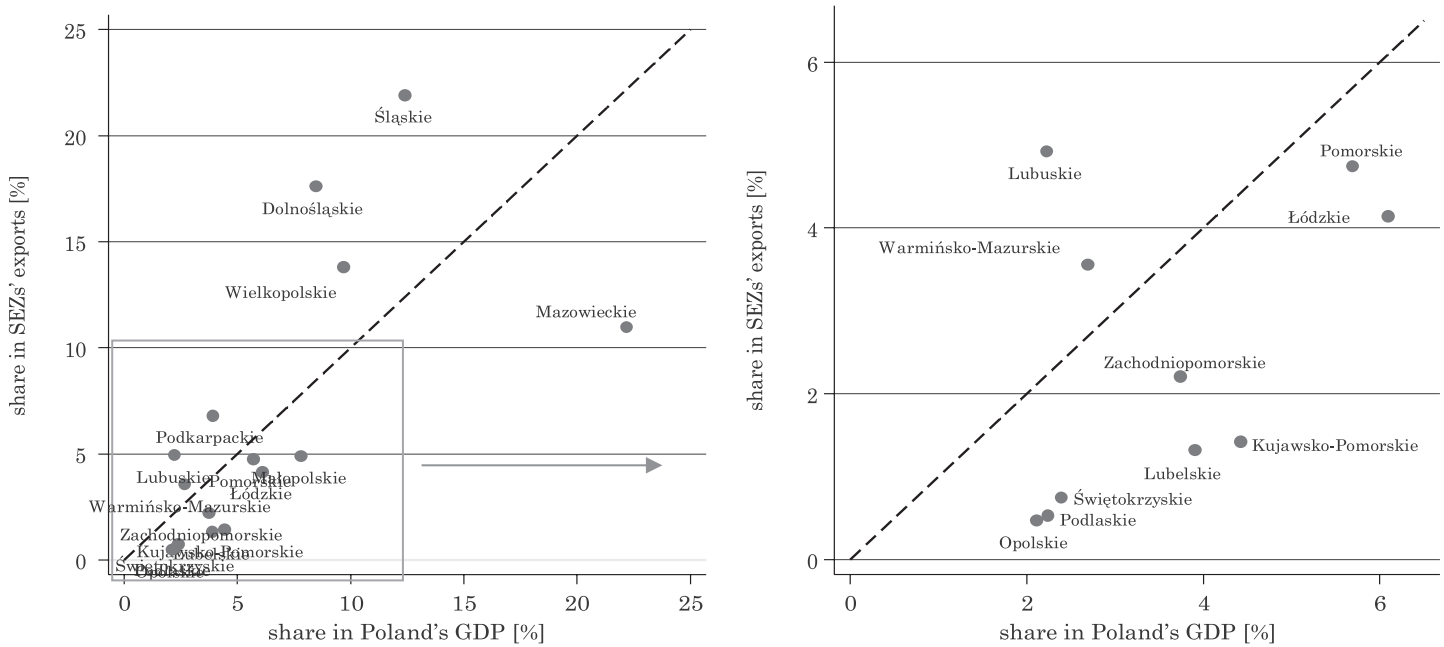

Fig. 2.8. Share of exports generated within SEZs by voivodeships compared to the share of voivodeships in the GDP of Poland in 2014
Source: own compilation.

in the Wielkopolskie voivodeship and to capital expenditure. In the case of employment, the situation is reverse ("-" sign), which means that the share of the SEZs in that voivodeship in SEZ employment in Poland in total is lower than the share of the above-mentioned voivodeship in the GDP of Poland. An attentive reader will notice that the "+" sign in the export column refers to those six voivodeships which on fig. 2.8 were on the left side of the 45° line.

Table 2.2. Overall summary of the contributions of SEZs to the economies of voivodeships and of the importance of regions in the national population and in the value of sold production of industry in relation to the share of the region in generating the GDP of Poland in 2014.

Voivodeship	Exports	Imports	Employment	Capital expenditure
Dolnośląskie	+	+	+	+
Kujawsko-Pomorskie	-	-	-	+
Lubelskie	-	-	-	-
Lubuskie	+	+	+	-
Łódzkie	-	+	+	+
Małopolskie	-	-	-	-
Mazowieckie	-	-	-	-
Opolskie	-	-	-	+
Podkarpackie	+	+	+	+
Podlaskie	-	-	-	-
Pomorskie	-	-	-	+
Śląskie	+	+	+	-
Świętokrzyskie	-	-	-	-
Warmińsko-Mazurskie	+	-	+	-
Wielkopolskie	+	+	-	+
Zachodniopomorskie	-	-	-	-

Source: own compilation.

It is clear that the activity of economic operators in the SEZs in the voivodeships "creates" exports, imports, employment or capital expenditure to a different extent. The summary presented in the table shows specific comparative advantages of each of the SEZs. It is definitely useful information for evaluation of the impact of the SEZs on the economies of each of the voivodeships.

The existence of differences in regional development is a fact. The original/primary purpose of establishing SEZs in Poland was to contribute to eliminating those differences by fostering the development of less developed regions dealing with numerous socio-economic problems. Over time, however, that original purpose was forgotten and SEZs or their sub-zones were also established in relatively well-developed areas or even in the most developed ones. The location of sub-zones was also a result of pressure exerted by larger investors (most often with foreign capital) using their strong bargaining position, especially because of local governments competing over investment capital. Therefore, it is appropriate to ask whether SEZs contributed to eliminating differences

in regional development or rather to increasing them. Many researchers in Poland (i.a. Cieślik, 2001; Ciżkowicz et al., 2014; Godlewska-Majkowska, 2009; Godlewska-Majkowska, Komor, & Typa, 2016; Pastusiak et al., 2016) have sought a comprehensive answer to the above question. Taking into consideration data on the activity of foreign trade operators operating in SEZs allows for more comprehensive assessment of the functioning of SEZs.

When mentioning the synthetic indicator of the share of SEZs in the economies of the voivodeships (for 2014) which is based on the information on employment, investment, exports and imports, it should be noted that the role of the zones is not obvious. The voivodeships, in the economies of which SEZs are most significant, include the Dolnośląskie, Podkarpacke, Lubuskie and Warmińsko-Mazurskie. One should note that two of them are located in the west of the country and the other two are in the east. The Dolnośląskie voivodeship is one of the most developed regions of Poland (in terms of GDP per capita, second after the first Mazowieckie voivodeship) which for many years has been developing at a high rate, though it is characterised by its internal diversity (when compared the city of Wrocław to other, peripheral areas of the voivodeship). The Dolnośląskie voivodeship is a region with high potential accessibility (proximity of foreign markets and easy access to them thanks to well-developed transport infrastructure) and a large presence of entities with foreign capital.

The identical value of the synthetic indicator (as for the Dolnośląskie voivodeship) is characteristic for the Podkarpackie voivodeship. That region, almost symmetrical to the Dolnośląskie voivodeship, is located in the southern-eastern corner of Poland; it is characterised by one of the lowest GDP per capita (15^{th} among the voivodeships, penultimate to the last Lubelskie voivodeship), poor potential accessibility, a long distance from major European markets, etc. One may claim that the Dolnośląskie and Podkarpackie voivodeships are diametrically (and even symmetrically) different from each other. However, SEZs in those voivodeships play the same role, as per the synthetic indicator calculated. In fact, in the Podkarpackie voivodeship, there is a so-called aerospace industry cluster where many entities operate within an SEZ.

As already mentioned, it is difficult to unanimously evaluate the role of SEZs in the economies of individual voivodeships. SEZs are most important in the well-developed Dolnośląskie voivodeship, but also in the less-developed Podkarpackie, Lubuskie, and Warmińsko-Mazurskie voivodeships. The low synthetic indicator of the share of SEZs in the economy relates to both the voivodeships with a relatively high GDP per capita (the Mazowieckie and Pomorskie voivodeships) as well as the voivodeships where SEZs should be much more relevant (the Podlaskie, Opolskie, Lubelskie, and Kujawsko-Pomorskie). Thus, we identify two simultaneous relationships: (i) many (sub)zones were established in more developed regions, where most of the SEZs investments is carried out due to superior infrastructure, accessibility of trained workforce, efficient local and regional institutions, etc. thus given the agglomeration

of firms in SEZs they contribute to a larger extent in economies of these regions; (ii) in lower developed regions, the opposite situation occurs; owing to the low economic base even relatively minor additional increments in basic economic indicators (e.g. investments, employment) due to SEZs operation, contribute to a relatively high final SEZs contribution observed there.

It should be emphasised that in the case of Poland, GDP per capita is distributed at the regional level in a special manner. When it comes to the four voivodeships, the GDP per capita is higher than the average for the country, and in the case of the remaining voivodeships, the GDP per capita is lower. The high share of SEZs in the economies of such competitive/ highly developed voivodeships as the Dolnośląskie voivodeship, but also the Śląskie, Wielkopolskie, and Małopolskie voivodeships rather supports the thesis that the function of an SEZ is no longer to eliminate differences in regional development. However, the foregoing statement requires a reminder that even highly-developed regions are at different levels of development, which can be considered an argument justifying/sanctioning the location of SEZs or their sub-zones in those voivodeships.

Taking into account only the export activity, the importance of entities operating in SEZs is particularly high for the export activity of the Podkarpackie, Warmińsko-Mazurskie, Dolnośląskie, Lubuskie, and Śląskie voivodeships. More accurate statistical data on the share of entities with foreign capital in exports of individual SEZs are not available. Thus, it is not possible to verify the thesis that those entities are responsible for such a state of affairs. However, it is very probable given the fact that in those voivodeships, foreign direct investors play a huge role in exports and most of them operate within the SEZs.

What conclusions for the regional policy can be drawn based on the above observations? It is extremely difficult to answer that question due to the fact that there is no unanimity as to whether development should be more regionally balanced or rather concentrated, especially in metropolitan areas. Those areas are considered as nodes of globalisation. SEZs are not established directly within metropolises; however, the distribution of active businesses operating in the SEZs presented on fig. 2.1 leaves no doubt as to the existence of a positive correlation between the location of entities in SEZs and the metropolitan processes (at this point, the direction of that relationship from the cause-and-effect perspective is not discussed). The fundamental question is how effective counteracting the natural tendency of economic activity to agglomerate can be. The challenge is to attract investors to areas perceived as areas where conducting an economic activity is not profitable. In the context of the foregoing, once again it should be recalled that investors very often force the establishment of SEZ sub-zones in locations convenient for them, not necessarily being places that require assistance in development. The logic of business suggests that the agglomeration processes are indeed reasonable since they are beneficial in numerous ways, particularly in terms of knowledge, technology transfer and business costs reduction. They occur mainly in those regions (in accordance with the rule of cumulative causation) which are already more developed.

3. Evaluation of SEZ entities' export competitiveness

3.1. An overview of the basic concepts and terms with respect to competitiveness

Competitiveness is a concept used often in economic studies. An increase in the number of publications about competitiveness reflects the "spirit of the times" we live in. In an open, global economy, where competitive pressure is increasingly present in many aspects of life, the demand for various comparisons and rankings is growing. These rankings are intended to review the position of a firm, a region, a country, a group of countries, etc. when compared to a wider grouping. The imperative of growth/improvement of competitiveness has been ranked very high in the objectives of economic activity, as well as in other areas, including the public sphere. The increased popularity of the concept of competitiveness should not be surprising. It is in human nature the desire to improve one's life and to maximise the fruits of one's efforts. Because others do the same, there is a natural need for an economic person to know his or her status.

An important voice in the debate on competitiveness was a publication of P.R. Krugman (1994), in which he warned against misusing the concept of competitiveness, arguing that countries are not necessarily large corporations, competing for a place in the global market. In his arguments, P.R. Krugman quotes U.S. President Bill Clinton, as well as Jacques Delors, the President of the European Commission, on unemployment in the EU Member States. This publication is cited very frequently; it can be even said that the thoughts of P.R. Krugman are the basis for further lively debate on competitiveness. The later Nobel Prize winner formulated an important admonition in his paper, claiming that economists and/or political leaders could make serious mistakes in the decision-making process by being, so to say, blinded by the idea of competitiveness. An "obsession" with competitiveness may, in fact, result in a failure to understand the real nature of the problems.

The concept of competitiveness is certainly defined ambiguously and its boundaries are vague. W. Bieńkowski (1995) highlighted many of the nuances of competitiveness and also referred to terms similar (or related to) competitiveness. He also mentioned the following: the competitive ability, the ability to face competition, the competitive position and the consequences of competitiveness. An overview of various definitions and presentations of competitiveness provided by W. Bieńkowski (1995, pp. 22–31) shows how many perspectives competitiveness can be tackled from: the relations of a given country with the rest of the world, structural changes in industry, the ability to sell products at a profit, the acceptance of industrial products by the market, the ability to maintain a balance between imports and domestic output, halting a decline in employment in the industry, the ability to employ the national workforce, the terms of trade,

the ability to comply with the international market requirements to increase the incomes of people and the ability of the economy to keep up with the evolution of the international division of labour.

The literature on the subject is filled with serious discussions about the determinants of competitiveness. P. Tesch (1980) was among those who spoke out and noted the co-relations between the core determinants of competitiveness (the advantages of benefits in the spheres of production and sales, e.g. an advantage resulting from experience, a locational advantage, economies of scale, a price advantage and a non-price advantage). The determinants of competitive advantages for firms and the national economy were also classified by M.E. Porter (1990) and supplemented by J.H. Dunning (1992b). In their view, in the international market there are competing firms whose competitive edge is defined by more or less favourable conditions in their home countries. In the so-called "Porter Diamond" created by M.E. Porter and developed by J.H. Dunning, the following determinants of competitiveness are defined: factor conditions, demand conditions, opportunity (understood as a favourable coincidence), firm strategy, structure, and rivalry, related and supporting industries, economic policy of a nation/government, as well as the activities of transnational corporations (Dunning, 2002, p. 231). The optimum situation occurs when there is a synergy among the aforementioned determinants. Interestingly, M. Porter did not define competitiveness in his extensive scientific work. J. Misala (2003, p. 113) listed three core groups of competitiveness measures: general national economic development indicators, structural change indicators, and international economic exchange indicators.

M. Gorynia (2002, p. 48) found competitiveness to be a theoretical concept "relating to market regulation", believing that it cannot be defined directly. Therefore, the concept of competitiveness has to be broken down and their individual aspects have to be identified. Such a point of view is extremely interesting as it makes it possible to analyse competitiveness from different angles. It is of importance when it comes to deliberations on the functioning of SEZs since it allows for a multidimensional analysis of the nature and effects of activities of entities operating in privileged areas. Referring to a paper by S. Flejterski (1984), M. Gorynia (2002, p. 49) highlighted the following dimensions of competitiveness: micro (a firm), meso (a branch, an industry), macro (a country) and mega (a group of countries). It has to be emphasised that M. Gorynia omitted the regional dimension of competitiveness on the grounds of in-depth studies of the literature on competitiveness. The regional dimension of competitiveness is mentioned as one of the main levels of the hierarchy of economic systems, though it is understood as pertaining to "a group of countries". Regional policy is present in the work of M. Gorynia (2002, p. 56) as one of the determinants of the so-called "meso-economic competitiveness".

Taking into consideration the view of M. Gorynia, in order to interpret competitiveness in various dimensions it is worth presenting various perspectives

of competitiveness and, since each of them has its advantages and disadvantages, it is advisable to juxtapose them in a critical manner.

As far as the definition of competitiveness is concerned, P.R. Krugman argued that "productivity is not everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker" (Krugman, 1997). From such a point of view, competitiveness primarily has a microeconomic dimension and is about firms' efficiency in using natural, capital and labour endowments. The condition of economic operators is thus a crucial determinant of competitiveness. A similar stance is also adopted by other economists who consider productivity the "key" to understanding what competitiveness is (Porter, Delgado, Ketels, & Stern, 2008, p. 44). It is difficult to disagree with such a statement, however, adverse consequences of productivity growth – at least over a short period of time – should be noted as well. An increase in productivity may result in a deteriorating situation in the labour market (increased unemployment), particularly if the mobility of employees is at a low level or a single industry or a single large employer in the region dominates, etc.

Mentioning productivity with regard to competitiveness takes the discussion to an open economic level, where production can be oriented not only towards the domestic market, but also towards exports. Productivity is the heart of the so-called "New" New Trade Theory. It assumes that only the most productive economic operators are able to become exporters. An emphasis is put on the diversification of economic operators, i.e. on their heterogeneity. This means that foreign markets are the area where the competitiveness of economic operators is verified, out of which only a few become exporters and the key to exports is high productivity. Exports require bearing the costs of entry, which can be covered exclusively by the most productive economic operators (Bernard, Jensen, Redding, & Schott, 2007; Helpman, Melitz, & Yeaple, 2004; Melitz, 2003).

Emphasizing the international dimension of competitiveness is obviously not a new perspective. M. Casson (1995) proposed the surplus of exports over imports as a measure of competitiveness. On the other hand, R. Dornbusch and S. Fischer (Dornbusch & Fischer, 1984, pp. 660–665) emphasised the terms of trade as a measure of competitiveness. The terms of trade are often mentioned in international economics handbooks. For instance, it is recalled in the already mentioned context of so-called "immiserising growth" (Bhagwati, 1958a, pp. 217–219, 1958b, pp. 217–219; Salvatore, 2011, pp. 217–219). In fact, it may be concluded that international economics handbooks, which very often use graphics to interpret international economic relations, refer mainly to the terms of trade.

With regard to the foregoing, one has to look at the international dimension of competitiveness in a more critical manner. First of all, one has to ask the question whether such a strong emphasis on the external aspect of competitiveness is justifiable in all cases/countries. Second, one has to note that a (negative) trade balance has to be interpreted carefully. As far as the first issue is concerned,

it is worth mentioning the fundamental fact in international economics (or in open economy macroeconomics), that small economies are characterised by great openness, whereas large economies are characterised by poor openness. Therefore, for example, if exports have a low share in the GDP in the economy of a country or its region, then focusing on exports in an analysis of competitiveness de facto analyses only "part" of competitiveness.

As far as the second issue is concerned, P.R. Krugman (1994, p. 31) argued in the case of Mexico, the interpretation of a foreign trade balance can be misleading. The case of Poland also proves that, if a negative balance of trade is related to investment imports, then it can turn into a trade surplus in subsequent periods of time. It is even more difficult to interpret a negative foreign trade balance at the regional level (Camagni, 2002, p. 45; Umiński, 2012, p. 45). In so-called strong (competitive) regions, there is a permanent foreign trade surplus which is balanced by high taxes, low public transfers, a higher savings rate and a capital account deficit. The opposite situation is observed in weaker, less competitive regions. Such a perspective on regions allows for an interesting interpretation of the exchange rate (one for the whole country) and its undervaluation for stronger regions and overvaluation for weaker regions.

In the above context, it is worth mentioning the concept of absolute and comparative advantages. As P.R. Krugman noted, when referring to the so-called myths about absolute and comparative advantages, we tend to interpret commercial relationships through the prism of the first of the advantages. Meanwhile, it is more reasonable to refer to the second advantage. For example, this can refer to a situation in a region considered less competitive, with low technological potential and a surplus of imports over exports. There is a new investment project in the region which, in its initial period, has contributed to increasing the already substantial trade deficit (by import of investment nature). Over time, however, it will improve the balance.

The discussion on competitiveness which initially concerned countries was over time taken to the regional level. As noted by K. Gawlikowska-Hueckel (2008, p. 40), various concepts and notions are used in the literature on the subject; these include the competitiveness of regions/regional competitiveness, competitiveness of places or spaces and competitiveness of locations/locational competitiveness. R. Martin made an important point in the discussion. Although he wrote many publications on the subject, readers interested in competitiveness probably missed one of his lectures, of which only a multimedia presentation is now available R. Martin (2004). In it, the author expressed some interesting thoughts. When it comes to the scepticism of P.R. Krugman as to whether countries (or their regions) are competing in the same way as corporations, R. Martin believes that in many cases regions compete for market share. This applies particularly to markets with shrinking demand or excess production capacity. Secondly, regions – contrary to firms – may not, as a matter of fact, "go out of business", though they may find themselves in a peculiar situation

of "development deadlock" and the cumulative, comparative disadvantage embodied by emigration, a low employment rate, low productivity, low income and low innovativeness. Thirdly, R. Martin believes (in complete opposition to what P.R. Krugman argued) that the so-called basis for regional competitiveness provides absolute advantages rather than comparative ones (Martin, 2004, p. 14). However, it is worth mentioning that both authors quite often disagreed, for example as regards the NEG.

The discussion about the competitiveness of regions in both theoretical/conceptual and empirical terms has greatly developed. It gave rise to countless interesting papers. For instance, Cellini and Soci (2002) claim that the specifics of the competitiveness of regions is stuck in the middle, meaning they are not a lower level of the country, but they are not an aggregation of businesses either. Many interesting works relating especially to the determinants of competitiveness of regions were written at Ecorys and R. Martin also contributed to them (de Vet, Maarten, J., 2004; de Vet, Maarten, J., Baker, Dalgleish, Pollock, & Healy, 2004; Martin, 2003). When it comes to the regions in Poland and their competitiveness, as far as comprehensive studies conducted over the recent years are concerned, one has to mention the analyses of territorial potential and of territorially dependent development factors by J. Zaucha and D. Ciołek (2014), the evaluation of the ability to compete by K. Gawlikowska-Hueckel and S. Umiński (2014), the attractiveness of voivodeships in terms of investment activities by D. Ciołek (2014), and the sensitivity of the Polish regions to challenges of the global economy by J. Zaucha et.al. (2014a).

3.2. Significance of SEZs in shaping competitiveness – theory

If such an expert as P.R. Krugman warned us many years ago against misusing the notion of competitiveness, one should ask the question why we decided to apply it to the analysis of various aspects of the functioning of SEZs. The question is all the more appropriate since we, as authors of various scientific publications, have frequently published economic research on competitiveness. The most important argument in favour is that when writing about SEZs we focus de facto on the activities of economic operators. Therefore, at least partially, we comply with the statement of P.R. Krugman, according to which competitiveness most of all refers to business activity. Secondly, a reference to competitiveness is just very convenient as it is an "umbrella" concept for many aspects describing the nature of economic activity and its effects. Last but not least, one of the most important objectives of SEZs and their functioning is to improve competitiveness of a country, a region, the export activity, the structure of an economy, the rank in the so-called ladder of technological development, etc.

SEZs affect competitiveness in several ways, though an attentive and critical observer of their functioning will try to find counter-arguments for their establishment and operation, even if their influence on competitiveness is positive.

(1) One of the purposes of the establishment and functioning of SEZs is to activate less developed regions. Such regions may be called regions of low competitiveness. They are of a peripheral nature, in which the transport infrastructure is less developed; they have a relatively low share of technologically intensive industries, etc. Thus, giving preference to investors results, in fact, in increasing competitiveness of those places from the perspective of their locational attractiveness. Shortfalls and shortages, e.g. low development of transport infrastructure, are compensated by tax exemptions or preferential treatment. In such a case, SEZs lead to improved competitiveness of less developed regions and create conditions for those regions to catch up with technological advancement when compared to more competitive regions. However, if SEZs are created in already competitive regions with substantial political/bargaining power, they result in a surge in regional diversity.

(2) Membership of Poland in the EU means that discrimination of investors due to their country of origin is prohibited. Domestic and foreign investors should be treated the same. Nonetheless, to attract FDIs to SEZs is often an implicit goal of an economic/local policy. Foreign investors are larger than the domestic ones, they possess assets that include not only financial resources, but also technology, access to distribution channels in foreign markets, experience and a wide range of other advantages described in the literature on the subject in numerous ways. They include a set of advantages arising from ownership as part of the Ownership–Location–Internalisation paradigm of J.H. Dunning (Dunning & Lundan, 2008). Two main distinctive features of FDIs, when compared to domestic entities, are higher productivity and an export-oriented approach to business. As mentioned earlier, they are attributes of high competitiveness. However, those objecting to establishing privileged areas will point to the fact that SEZs often become zones isolated from the economic environment and collaboration between modern members of the zones and less competitive entities from their surroundings is difficult or impossible.

(3) The operation of SEZs can be interpreted in terms of concentration/agglomeration of economic activity. Thanks to the economies of scale and externalities, a process takes place within the SEZ which can increase the concentration/agglomeration of the competitive potential. However, those opposing SEZs will argue that agglomeration entails costs, especially if the critical threshold is exceeded, beyond which congestion costs appear and employees' salaries and land costs rise, etc.

(4) The competitive potential may undergo accumulation processes. By cumulative causation, the presence of important investors in the SEZ is a signal for other entities that the zone is a location facilitating economic activities.

A critic may argue though that SEZs, on the basis of the backwash and spread effect, "take" the most valuable resources (e.g. human capital) for them.

(5) Entities operating in SEZs are usually more open (as measured by the share of exports in total income, for example). It is partly because of the aforementioned high activity of entities with foreign capital. The benefits of exports are widely known and describing them once more is unnecessary. In addition, some studies referring to the concept of firms' heterogeneity, point to learning by exporting. However, a reader who is more critical about SEZs, will argue that exports lead to a number of unquestionable advantages, though there are numerous related risks, including a possible sharp decline in the demand for exported products during an economic downturn.

3.3. Theoretical determinants of FDIs inflow to SEZs

An analysis of the functioning of SEZs should be supported by deliberations on FOEs. Usually, these are FOEs[9] that are the most active in the zones, even though in the privileged areas equal treatment and privileges are guaranteed regardless of the "origins" of the (domestic or foreign) investor. FOEs have more bargaining power, especially if they belong to transnational corporations. Amongst the roles played by corporations in economic processes, M. Forsgren (2008) mentioned the politicising multinational. It can be interpreted in such a way that due to their great bargaining power, resulting from the scale of their operations, capital resources, size, experience in operating in foreign markets and in negotiating terms and conditions of operation (including privileges/ investment incentives), corporations have a significant impact on the economic and political environment in which they operate. M. Forsgren referred principally to the political influence of corporations in less developed countries or regions of the world. However, when combined with the so-called dominating function, the influence of investors on the environment where they operate is significant. This causes that SEZs or their sub-zones become located in particular areas, even if under the socio-economic circumstances or under the assumptions and reasonableness of the economic policy establishing a SEZ in a given area is not justified. When analysing the investment attractiveness of a location, investors usually compare several alternative locations, though such alternatives are in different countries. Decision-makers responsible for establishing zones are aware of that, hence they can be influenced by investors. Investors, however, are aware of their strong position.

Analysing the determinants of FDIs is one of the most important research problems tackled both theoretically and empirically. An answer to the question

[9] In 2014 FOEs constituted for ca. half of the no. of entities (and ca. 80 percent of investments) operating in SEZs in Poland.

of why investors prefer specific locations may be found both in the location theories and in the FDI theories. The application of the location theory is justified regardless of whether an investment is implemented by a foreign entity or a domestic entity; it is about choosing a location for conducting an economic activity. However, it would be a mistake to omit the specifics of foreign entities in deliberations on decision-making when it comes to locations.

A majority of worldwide FDIs are implemented by private operators which come from market economies – their goal is to maximise their rate of return. It is the main reason for investing which, and it is worth recalling, was highlighted by J.H. Dunning (1992a) "above" other reasons. When speaking of a return on investment, J.H. Dunning (1992a) named two crucial aspects. The first aspect is the profitability of foreign assets, i.e. the rate of return on assets located abroad "in isolation" from the entire complex structure as, for example, a transnational corporation. The second aspect is about the impact of such assets on the whole corporation. One should also note that the reasons for investing may vary as they are the resultant of a number of factors. Decisions about investments are made in the presence of risk (and uncertainty) within a market framework far different from perfect competition (usually, it is oligopolistic competition), information asymmetries (as far as assets available to the investor are concerned, the most important thing is tacit knowledge which, being so-called private good, constitutes a unique competitive advantage of the foreign investor). In addition, the investor may follow various business strategies which, for example, may entail hostile takeover of an entity in the country (region) of investment in order to wind it up (liquidate it).

Due to the nature of this monograph, the foregoing reference to reasons for which a foreign investor invests highlights the fact how many factors determine location decisions. Such decisions may seem incomprehensible or irrational. People negotiating terms and conditions which are to apply to an individual investor in an SEZ find it difficult to identify a number of variables affecting investor's decisions, especially if such terms and conditions are applicable in remote places in many countries. The locational attractiveness of a particular SEZ is thus defined on the basis of a set of variables related not only to that zone or other locations in a given country, but also to other countries and locations therein.

The aforementioned notion of "competitiveness" accurately pinpoints the nature of the ongoing competition for foreign capital. A manifestation of globalisation is a change in the attitude towards foreign capital. A few decades ago, people were often very suspicious of FDIs as they were concerned that they could, among others, become dependent on FDIs, but now FDIs are considered more desirable as supplementing limited domestic capital resources, technology, know-how, etc.

When speaking of the determinants of location preferences, one has to mention the standard division by J.H. Duning (1992a) into four main reasons for FDIs: resource seeking, market seeking, efficiency seeking and strategic asset seeking. Other reasons for investing (Dunning & Lundan, 2008) include escaping (when

the investor "escapes" e.g. restrictive tax regulations or when the investor gets rid of its "nationality" through routing investments in other countries). In addition, one can also single out supporting investments and passive FDIs. The aforementioned classification of J.H. Dunning is a point of reference for most of theoretical and empirical research on location determinants. As an example of how strong an impact that classification had on both theoreticians and practitioners may be a discussion held during the European Trade Study Group in Birmingham in 2013. In a plenary session devoted to location preferences of investors attended by site selectors, i.e. representatives of counselling companies that search for attractive locations for investors, the discussion was held mostly by practitioners and it began with the observation that investors are driven in their actions by various reasons, which were further illustrated in the classification of J.H. Dunning.

In the real economy, when it comes to actual location decisions, it is not possible to "assign" investor's preferences to one of the aforementioned reasons for investing. It is rather a mixture of various reasons. In addition, their structure may change over time, which obviously does not affect the original location decision that was made. However, it is actually of significance in the event of reinvestments, closing plants and possible reallocation to another region or country. For example, the initial, decisive reason behind the investor's decision could be low costs of resources (low salaries and wages), but over time the prevailing reason could be market access. The original location, e.g. in a peripheral region, away from large and receptive markets, but providing access to employees agreeing to lower salaries and wages, may "lose" to a location whose advantage is better access to a large market. It is worth considering such changes in location preferences also in the context of the new economic geography that makes it possible to interpret agglomeration processes in a broader sense at the economic level in one or more countries.

As far as deliberations on the determinants of FDI inflow are concerned, it should be noted that the success of an investment project with participation of FOEs is also determined by a locational advantage "offered" by a specific location. There is an ongoing discussion in the literature of the subject on which of those three advantages is more important. J.H. Dunning frequently expressed an opinion (Dunning, 1998), that a location seems to be an underrated/neglected element of the OLI paradigm. However, in reality, the role of location-bound assets is bigger. In fact, entities investing abroad look for assets (offered by individual locations) which can complement their advantages resulting from ownership and subject to internalisation.

C. Franco, F. Rentocchini, and G.V. Marzetti (2008) presented a comprehensive overview of research on reasons of foreign direct investors for investing. They highlighted two issues which are discussed in the literature on the subject more often. The first issue is the quality of an institution, the second one – so-called localised knowledge spill-overs. When it comes to institutional

determinants, C.Franco et.al., (2008, p. 19) listed (i) such social and political circumstances as bureaucracy, corruption and infrastructure condition, (ii) the technological environment and (iii) the property rights protection. The relevance of the institutional determinants as key factors "attracting" FDIs was proven by the research of A. Benassy-Quere, M. Coupet, and Mayer T., (2007), S. Wei (2000), as well as S. Globerman and D. Shapiro (2002). As far as localised knowledge spill-overs are concerned, the so-called collocation of economic operators (not only foreign investors) is a fact and is a result of external benefits and agglomeration benefits (Brodzicki & Kuczewska, 2012; Cieślik, 2005; Duranton & Puga, 2004; Fujita & Thisse, 2002).

The division of reasons for FDIs suggested by J.H. Dunning is considered to be the standard classification. Apart from that classification, it is worth mentioning two other determinants of FDIs: agglomeration and functional specialisation.

Agglomeration was discussed earlier, though there are other terms used for it in the literature on the subject, such as collocation or clustering. They reflect the existence of the so-called imitation effect which is a result of the above-mentioned localised knowledge spill-overs or arising from the fact that the activity of a specific investor in a particular area is a signal for others that the location is attractive. The process of cumulative causation may then begin, according to which over time a given location starts to attract new investors. Research under the new economic geography shows that strong agglomeration effects can be detrimental to peripheral regions characterised by low development potential. It can be the case that production resources are re-allocated to more developed central regions. Re-allocation may be fostered by the development of supra-regional transport infrastructure which leads to so-called "backwashing" resources out of peripheral regions.

Another issue is the so-called functional specialisation, reflected in the spatial concentration of functions shared by different sectors. It is a sign of departing from the sectoral specialisation. In the functional specialisation and cities are crucial figures. Larger urban centres especially offer a wide variety of specialised services which are of relevance mostly for head offices, headquarters, other service providers and research and development institutions. On the other hand, manufacturing activities are concentrated outside cities[10]. A variety of special factors determine the location of the next type of investments, i.e. R&D. Apart from the standard locational determinants, i.e. those of the first nature, such as gathering resources (including human capital), of importance are also the determinants of the second nature, primarily relating to the potential of technology and innovation (and also to regional innovation systems).

[10] More about the functional specialisation, the specifics of investing in the services sector, and about locating central offices may be found in Brodzicki, Umiński, Migdał-Najman, and Gawlikowska-Hueckel (2010).

The question of when and under which conditions capital is attracted, more easily can be answered by looking at the so-called "stylised" facts on FDIs. P. Antras and S. R. Yeaple (2014, pp. 61–66) highlighted the following features of contemporary FDIs:

(1) The flow of FDIs is concentrated in developed countries and it is usually a two-way flow. Investing countries are "recipients" of investments as well, and if there is increased intensity of FDIs in respect of developing countries, then they are rather a place to which the capital is attracted. The aforementioned statement of the cited authors is justified, but it is also worth mentioning that along with short-term economic cycles, the structure of worldwide FDIs when divided into both developing and developed countries also undergoes changes (UNCTAD, 2015, p. 2).

(2) International corporations are active mostly in sectors characterised by high capital and R&D intensity. A majority of reciprocal FDI flows are of an intra-industry nature. The foregoing observation is an important piece of information on the essence of FDIs, from the perspective of receiving countries in the light of their foreign savings-led growth. One of the objectives of attracting FDIs is an expected, positive impact on the technological position of countries/regions where capital flows to. However, one should note that services prevail in worldwide FDIs. When compared to industrial activities, services are labour intensive, although comparing features of services vs. industrial activities, one has to be very careful since the sector of services is seriously diverse. Capital, as a production factor in market services, relates most of all to buildings as well as information and communication technologies and it is usually intangible capital. K. Uppenberg, and H. Strauss (2010, p. 4) indicated another feature of services – the nature of innovations, resulting primarily from the interaction of service providers with their customers, suppliers and competitors. On the other hand, innovations in industrial activities are characterised as in-house knowledge creation.

(3) P. Antras and S.R. Yeaple (2014, p. 64) said that the intensity of capital relations through FDIs is distance-dependent, which reminds us that the concept of gravity – successfully applied especially in modelling international trade – is also useful in studying the intensity of capital relations. However, one should also remember that an FDI-related problem is trans-routing (also referred to as trans-shipped investments) and the activity of special purpose entities (SPE) which disrupt the nature of so-called genuine FDIs. This is the name for that part of FDIs which remains after subtracting the value of capital flows from SPEs from the total value of capital flows. It is difficult to question the interdependence between the intensity of FDIs and distance. The concept of gravity is useful in modelling international trade. Even if it works worse when it comes to FDIs, it is still difficult to deny the relationship between FDIs and distance. However, one should remember that so-called new players appear in the global market as foreign direct investors. They also include sovereign wealth funds (SWF). Their

activity may lead to a situation where the importance of distance, as a negative determinant of the intensity of capital relations, is reduced.

(4) The fourth feature noted by the cited authors is the fact that both "parent companies" as well as their foreign subsidiaries within multinational corporations are larger, more productive, more "intense" in R&D and more export-oriented when compared to non-multinationals. The foregoing observation is difficult to question. However, what should be analysed is to what extent domestic entities catch up with entities with foreign capital – if, and to what an extent, the gap between multinationals and non-multinationals is reduced.

(5) P. Antras and S.R. Yeaple (2014, p. 66) analysed the functional diversities within corporations regarding specialisations of their individual sections. Parent companies specialise chiefly in R&D, whereas subsidiaries specialise in sales[11]. The cited authors stated that sales to countries where investments are implemented is their principal function. This should be understood more widely, i.e. functional specialisations (including production) other than R&D are "assigned" to subsidiaries.

One may try to relate the aforementioned stylised facts to FDIs implemented in SEZs in Poland. They can serve as a basis for predictions concerning the nature of FDIs. First of all, one should expect that foreign investors in the zones are mostly all entities from countries "similar to Poland". The message of the stylised facts (referred to in point 1) is that the basis for the flow of FDIs are similarities, not differences, between countries. However, Poland is different from countries from where capital flows in, especially in terms of GDP per capita and technological advancement. Poland is actually catching up, which in trade is reflected by the increased importance of intra-industry trade. A SEZ-related issue, which will soon most probably become an interesting subject of research, are investments implemented abroad by entities located in SEZ. With reference to the second stylised fact, it is justified to expect the positive role of FDI on technological competitiveness, provided that the main reason for investing is not seeking low salaries and wages. In SEZs, there should be expected investors from foreign countries, which are rather close to the zones, and their activity, when compared to domestic entities, should be characterised by higher productivity and export-oriented business profile. It is not easy to interpret stylised fact no. 5 in the case of SEZs, since not all investors belong to corporations, they can be smaller, independent foreign investors.

It is a good practice to present an overview of empirical research results after a theoretical, general discussion, in this case – with respect to the determinants of FDIs.

Using the Bayesian statistical techniques, B.A. Blonigen and J. Piger (2011) chose from a large set of variables those which were most probably the determinants of FDI location. The application of the Bayesian Model Averaging

[11] The sixth stylised fact is omitted as it is of less importance in analysing SEZs.

(BMA) was designed to allow for selecting the most probable combination of exogenous variables from a large set of such variables, which best explained the dependent variable. The idea behind that method involved the so-called pooling of knowledge. Conventionally, insignificant variables are discarded, whereas the Bayesian model takes into account uncertainties connected with the selection of a model. Moreover, the selection of a model is an additional parameter, subject to evaluation. The application of the BMA allows for considering a much larger number of interactions that are not dependent on the selection of only one of the models. The modelling applied to countries was performed in accordance with the concept of gravity. According to the authors, the number of variables which turned out to be the most significant is not high. They include: cultural distance, GDP per capita, relative labour endowments and open trade agreements. B.A. Blonigen and J. Piger (2011, p. 28) highlighted the low efficiency of support instruments for investments due to the lack of robustness of models when selecting exogenous variables.

Based on the results of the survey for Poland and the logit model, which takes the specifics of FDIs into account, A. Chidlow, L. Salciuviene, S. Young (2009) claimed that investors looking for agglomeration, knowledge and a market find the Mazowieckie voivodeship the most attractive region. Other regions are attractive for entities seeking low costs and available employees and resources. The authors also referred to SEZs in Poland, stating that they were established in regions where investors primarily seek efficiency.

Based on data for 38 developing countries, E. Demirhan and M. Masca (2008) identified the following statistically significant determinants of FDIs: the size of the market, the quality of infrastructure and the willingness to accept foreign capital. The research of J.P. Walsh and J. Yu (2010) also regarded countries, but they clearly indicated the importance of the agglomeration factors (the presence of clusters), especially for investments in the manufacturing and services sectors.

Na Lv and W.S. Lightfoot (2006) identified three statistically significant variables that determine the inflow of FDIs for 30 regions of China. They include: the size of a region's economy (GDP), the quality of labour resources offered by the region and the extent of openness[12].

On the other hand, P. Nunnenkamp (2002) proved that globalisation did not contribute to changing the "rules of the game" when it comes to the relevance of the determinants of FDIs inflow. Seeking large and receptive markets remains the most important reason for investing (which is even more and more significant than earlier), although such determinants as costs, the availability of complementary production factors or the openness to trade are not becoming more significant. In reference to this research, it is worth noting the great importance of the market determinant; J.H. Dunning also pointed to that.

[12] This category also includes the extent of reform advancement, which relates to China. The smaller the share of state property in the economy of a region, the lower inflow of FDIs to it.

That reason is very popular in empirical research, though it is not important that most of markets are analysed at the national level. At the regional level, it refers to the national market potential, but it should be interpreted in a broader sense, e.g. as the access to the market, although it may be a domestic market or a foreign market (e.g. the EU internal market).

Based on the example of three European regions (Baden-Württemberg, Catalonia, and Lombardy), L. Artige and R. Nicolini (2006) confirmed the statistical significance of a positive relation between regional GDP and FDIs inflow (considering it per capita). However, when it comes to other determinants, they emphasised that due to local determinants and different interpretations of the FDI theory (e.g. the structure of the industry, a lower or higher level of analysis), it is impossible to come to coherent and "robust" conclusions. The authors also put an emphasis on the lack of accurate statistical data which would allow for more substantial econometric research on regions.

L. Casi and L. Resmini (2010) carried out comprehensive research based on the FDIRegio database for 109 thousand entities with foreign capital in 264 NUTS2 regions in 25 industrial and services sectors by FDIs: intra-EU FDIs and extra-EU FDIs. The authors tackled upon an interesting issue: whether, and to what extent, the determinants of FDIs for countries coincide with the determinants for regions. The authors showed that the so-called traditional reasons for FDIs, i.e. the size of the market and its growth potential (identified on the basis of GDP, the dynamics of GDP, labour costs, and labour productivity), are still important determinants of FDIs for regions. At the same time, inflowing FDIs are more frequently determined by functional specialisations of regions (and less frequently by sectoral specialisations). An exception are FDIs in financial, transportation, and communications services. L. Casi and L. Resmini (2010, p. 113) also highlighted the important role that cumulative causation plays in locating FDIs.

Very extensive research on FDIs at the regional level was presented by Copenhagen Economics and M. Blomström (2006); it is probably the most comprehensive study of the effects of FDIs for regions of the EU relating to the determinants of investments. According to the authors, location decisions regarding FDIs are principally influenced by a set of factors specific to investing entities, thus the role of national/regional level determinants is limited. They emphasised that such decisions depend on both domestic and regional factors. The most crucial factors determining the choice of regions in individual countries include: the access to a large domestic market; the common border with a country of an investor or a common language (geographical and cultural proximity); a considerable knowledge of English (especially business English) which is a measure of internationalisation; low taxes imposed on companies (fiscal incentives); high purchasing power of consumers (measured as GDP per capita); and low unemployment (which is a proof of the proper functioning of the labour market, particularly in terms of its flexibility) (Economics & Blomstrom, 2006,

p. 6); the agglomeration factors and clustering processes, including the presence of other foreign investors (the so-called signal effect) and competitors, customers, and suppliers; high-quality infrastructure; the wide availability of means of transport; the educational background of employees; as well as substantial investments in R&D are also of great importance.

The determinants of locating FDIs in regions of the UK were analysed by C. Wren and J. Jones (Jones & Wren, 2016, 50 and subsequent). The authors emphasised a distinction between the so-called standard determinants of FDIs (the provision of resources, costs, etc.) and the agglomeration variables, though they admitted such a distinction is often difficult to make. The authors provided an overview of research on the determinants of locating FDIs for the UK, highlighting a diversity of methods and interpretations. In their study on FDIs in Wales, S. Hill and M. Munday (1991) stated that from among the four determinants, i.e. labour costs, increased production, investment incentives and infrastructure, labour costs are the most important. In their analysis of the determinants of FDIs for the UK, S. Hill and M. Munday (1992) claimed that the ability of regions to "attract" FDIs depends on fiscal incentives offered and on the access to the market.

The importance of the access to the market is also indicated in the research of K. Head and T. Mayer (2004) on location decisions made by Japanese companies in the EU. The authors referred to a particular decision-making problem of Toyota in 1997, when the company was planning the construction of a car factory in Northern France. Briefly speaking, that problem went like this: "we want to build a factory in a place where the market is", though when making a location decision, alternative locations in EU countries were taken into consideration. As part of the joint EU market consisting of national markets without barriers to trade, investors prefer locations that ensure good market access or high market potential. Toyota has so far manufactured cars in the United Kingdom, but it did not ensure sufficient access to the French market. K. Head and T. Mayer (2004, p. 969) took into account both the national dimension of the market potential as well as the regional one. They believe that demand, determined by the market potential, is relevant for location decisions.

J. Taylor (1993) analysed the determinants of Japanese FDIs in the UK in 1984–1991 by the statistical analysis method (the Poisson distribution), though he distinguished two sub-periods (1984–1988 and 1989–1991) when investors' reasons for investing changed from time to time. It should be noted that the study covered an interesting period because of the so-called impact effect connected with the construction of the EU internal market. As noted by J. Taylor (1993), only a few exogenous variables were of statistical significance, although the most important of them was whether a region was a so-called assisted area. Another important issue were structural determinants, which suggests that the existing industry mix affect the type and size of new investments being attracted. By referring to the publication of J. Taylor, C. Wren and J. Jones (2016, p. 54)

raised an interesting issue concerning the interpretation of the determinants of FDIs. It could be understood in the context of whether a given variable – for the UK, it was specifically about the situation in the labour market – was a stimulant or a deterrent. Investors preferred such locations that guaranteed them access to cheap manpower. However, the rate of unemployment should not be to high that such regions are in a socio-economic depression.

On the example of the UK, M.P. Devereux, R. Griffith, and H. Simpson (2007) discussed the efficiency of public aid offered in less developed regions and the benefits for foreign greenfield investors resulting from agglomeration. They asked (Devereux et al., 2007, p. 414) whether "potential benefits from locating near other firms lessens the effectiveness of fiscal incentives." The question asked is about the efficiency of the regional policy: to what extent can the regional policy encourage investors to choose less favourable locations (through fiscal incentives), provided that the implementation of investments in attractive areas (which is reflected by the presence of other investors – collocation) means a number of benefits for the firm arising from agglomeration. The authors' conclusions are of a conditional nature, meaning that when evaluating the efficiency of privileges offered to investors it is taken into account the fact that they naturally prefer locations near already existing facilities of the same industry. Fiscal incentives granted have a slight positive impact on location decisions made by investors, though that impact is all the greater, the more incentives relate to areas where there are already some locational advantages.

Based on the analyses of SEZs in Africa and China, D.Z. Zeng (2016) offered a number of observations which are largely universal. He noted that the functioning of SEZs is in fact decentralisation in the sense that efforts to guarantee a favourable environment for business become a responsibility of a lower-than-government level. If, for less developed countries, it is more difficult to achieve at the national level, then it is easier to achieve on a smaller scale, in SEZ. SEZs are a place of substantial concentration of economic, technological, and innovation potential, qualified staff, etc. Through a network of relations with domestic entities, such potential is subject to diffusion; this also applies to the culture of innovation and entrepreneurship. D.Z. Zeng (2016) also highlighted unfavourable proliferation of areas of support which began to emerge in a chaotic manner as various industrial zones/parks. Fiscal competition (racing to the bottom) results in a decrease in the effectiveness of the entire scheme of privileged areas. Environmental pollution and low social standards are also a serious issues. According to the cited author, having regard to numerous, positive and negative effects of the functioning of SEZs in individual countries, one may not say they are a universal panacea for socio-economic problems and growth stimulation. They should be tailored to specific national and local circumstances.

According to UNCTAD (2000, p. 11), based on an overview of experiences of over 45 countries, both failures and successes in terms of attracting FDIs through fiscal incentives can be noted. Foreign investors usually apply

a two-stage method when selecting places for investments, as part of which investment incentives are a secondary factor with respect to such fundamental (original) determinants of investment climate as the size of the market, the availability of natural resources and the quality of manpower. The report's authors concluded that "investment incentives have only moderate importance in attracting FDIs" (UNCTAD, 2000, p. 11). They also claimed that in the case of export-oriented footloose investments, fiscal incentives are the main determinant of location decisions. In addition, the role of incentives is greater when more countries with similar conditions for investing exist and the conditions are defined by the original/fundamental factors (difficult to modify over a short period of time). Similar conclusions about a limited role of fiscal incentives in attracting investments were drawn by the OECD (2008), which noted that, first and foremost, the most important are: market factors, production costs, the availability of resources, transparency, stability and predictability of the "rules of the game". On the example of privileged areas in North Korea, C.W. Nam and D.M. Radulescu (2004) showed that even generous investment incentives, taking into account an additional cost being high inflation, are not an effective tool to attract investors.

Based on the example of the United States, C.J. Coyne and L. Moberg (2015) revealed negative consequences associated with offering fiscal incentives: mainly the inadequate allocation of resources and behaviour rent-seeking investors, where private operators strongly affect political decisions.

Offering investors fiscal incentives is reasonable if their activity is profitable. According to UNCTAD (UNCTAD, 2000, pp. 12–13), the core goals of offering incentives to investors, especially foreign investors, include technology transfer, directing investments to particular regions (a regional policy instrument), fostering the development of particular sectors (a sectoral policy instrument), performance enhancement (fostering export, the creation of work places, the creation of added value, locating head offices, etc.). M. Forsgren (2008) also mentioned the creation and distribution of knowledge as roles of FDIs.

In FDI theory, one of the components of the OLI Framework is an advantage resulting from ownership, including from being able to use better technology (Dunning, 1992a; Dunning & Lundan, 2008). S. Hymer (1976) noted that FDIs are not exclusively about transferring capital, but rather transferring all the assets (including technology, management methods, etc.) by expressing his dissatisfaction with the imperfections of the investment portfolio theory in explaining FDIs.

P. Krugman (1985) stated that there are technological gaps between countries by referring to the visual concept of the so-called ladder of countries by technological advancement. It is a reference to an important trend in international economics which refers to the Heckscher–Ohlin theorem. The literature on technology transfer is rather extensive; significant publications on that topic include those of J.A. Schumpeter (1912), A. Marshall (1919), M.V. Posner (1961)

and P. Krugman (1985). Capital moving between countries is the so-called technological change agent; technology is transferred between companies in various countries.

A visible technological comparative advantage is characteristic primarily of large international corporations. In fact, a majority of technological innovations these days are their outcome. The role of international corporations is discussed by J. Cantwell, whose research is based on the technological competence theory of international production (Cantwell, 1989; Cantwell, 1995, 2000). J. Cantwell and his collaborators expanded that theory with new elements relating to the agglomeration processes, cluster formation and the role of technological leadership. J. Cantwell and L. Piscitello (1999) claimed that the dispersion of technological competencies in various locations allows transnational corporations to source knowledge from alternative places. It is a dynamic approach to the activity of corporations. J. Cantwell and S. Iammarino (2001) dubbed such locational advantage as endogenous because of importance are dynamic relations between an investing company (whose competencies and competitiveness are defined by ownership-related advantages) and location conditions in individual places. The cited authors emphasised that the technological potential is to a great extent determined by individual features of an investing company as well as to the characteristics of a particular region, cumulative causation and path dependence playing an important role in location patterns.

According to the concept of the so-called optimal technological gap, technology transfer is an increasing function of the technological gap to a certain critical point which, if exceeded, makes the intensity of the transfer decline due to an excessively large technological gap. A graphic interpretation of the optimal technological gap was presented by E.K.Y Chen (1994, p. 389) as an inverted "U" (Umiński, 2012, p. 66).

Divagations on which mechanisms are the drivers of technology transfer, could take a long time. In the discussion, however one should not forget an interesting illustrative concept of contagion, proposed by R. Findlay (1978), according to which technology resembles contagion. The closer economic relations are, the faster contagion spreads. The three most important ways, which technology is transferred through FDIs (and through international trade as well) should be listed. In accordance with the demonstration effect, a product offered on the market is information for competitors about the product's features and demand for it at a given price. The competition effect connected with the investor entering the market, forces other entities to increase their efforts to keep their share in the market. Learning by watching entails observing and imitating what the leader does.

3.4. SEZ entities – analysis

An overview of the literature on the subject and of the empirical studies regarding the functioning of SEZs, including the purposes of their establishment, proved beyond any doubt that technology-related issues are of key relevance. They can be analysed from several perspectives concerning the role of Poland in the international division of labour, Poland's position on "technological ladder", as well as the role of SEZs in technological advancement.

An analysis of the technological advancement of economic activity within SEZs was performed in two stages. First of all, the subject of the studies was the structure of businesses operating in SEZs by technological advancement (chapter 3.4). A relatively high proportion of high technological advancement in the economic activities of SEZs in total when compared to the economy of Poland should have a positive impact on the competitiveness of the country in terms of exports. Second of all, the importance of high-tech products in imports and exports generated by SEZs was analysed, and then compared to their proportion in Poland's foreign trade flows (chapter 3.5).

In the analysis of the structure of businesses, data on entities with a valid permit to operate an economic activity in the SEZ as on the 31st of December, 2014 were used. The entities which did not bear any capital expenditures or did not employ any employees were excluded from the analysis. The researchers intended to limit possible overestimation resulting from the manner of collecting statistical data in Poland (including data on foreign trade), in accordance with which a single statistical number (REGON) is assigned to the entire economic activity of a business. For economic operators operating in and outside SEZs, it could lead to a material (and unjustified) increase in the value of reported cash flows for entities operating outside SEZs prior to obtaining a permit to operate an economic activity in the SEZ.

The remaining entities were assigned four-digit NACE rev. 2 codes which – after having been reduced to three-digit numbers – were used to classify types of industrial activity and – after having been reduced to two-digit numbers – to group services activities of individual economic operators by technological advancement of products and knowledge intensity of services. To that end, the Eurostat classification was employed (GUS, 2015, pp. 197–198) (cf appendix – tables A.5-A.6) corresponding to the (less accurate) two-digit classification (Eurostat, 2016a).

The results of the calculations are presented in table 3.1 for industrial activities and in table 3.2 for services. In industrial activities, an interesting structural regularity can be observed. When it comes to firms operating in SEZs, most of them (43.1%) are included in medium low-technology and (28.2%) medium high-technology. For the remaining categories presented in the table (capital expenditures and jobs/employment), a shift can be observed towards technological advancement. The combined proportion of low technology as well as

Table 3.1. Structure of entities conducting an industrial activity in SEZs in 2014 by technological advancement

Level of technology	No. of firms	Investment expenditures	New jobs	Maintained jobs	Total employment
		SEZs			
high-technology	5,5	8,2	11,2	7,0	10,0
medium high-technology	28,2	41,6	41,8	50,1	42,6
medium low-technology	43,1	30,2	30,6	24,7	30,3
low-technology	23,2	20,0	16,4	18,1	17,1
		Poland			
high-technology	2,3	-	-	-	4,6
medium high-technology	13,5	-	-	-	22,4
medium low-technology	36,6	-	-	-	29,9
low-technology	47,5	-	-	-	43,1

Source: Own compilation of data of the Ministry of Entrepreneurship and Technology and GUS (2015).
Explanations: the table includes only the entities operating in an industrial activity, which constituted around 84% of all the economic operators in SEZs. Values in %.

medium low-technology in the number of entities was 66.3%; the same proportion in capital expenditures was 50.2% and in employment – 47.4%.

A similar shift is visible in services (table 3.2). The proportion of less knowledge-intensive services in the overall number of entities in SEZs was 66.5%, though it was lower in capital expenditures and employment. Both in industrial

Table 3.2. Structure of entities rendering services in SEZs in 2014 by knowledge intensity

Services	Level of technology	No. of firms	Investment expenditures	New jobs	Maintained jobs	Total employment
			SEZs			
KIS	high-tech services	15,3	10,6	37,0	30,1	32,3
	market services*	12,3	15,1	17,2	39,8	21,7
	financial services	0,0	0,0	0,0	0,0	0,0
	other services	5,9	22,5	5,4	6,0	5,8
LKIS	market services	64,0	51,1	39,8	23,7	38,8
	other	2,5	0,7	0,7	0,3	1,4
			Poland			
KIS	high-tech services	-	-	-	-	3,8
	market services*	-	-	-	-	8,1
	financial services	-	-	-	-	4,1
	other services	-	-	-	-	38,3
LKIS	market services	-	-	-	-	42,0
	other	-	-	-	-	3,7

Source: Own compilation based on MET and GUS (2015) data.
Explanations: the table includes only the entities rendering services. * excluding financial and high-tech services. Values in %. KIS – knowledge-intensive services, LKIS – less knowledge-intensive services. – no data.

activities as well as in services, one may note that "high technology" had a higher contribution in creating new jobs when compared to retaining jobs. Such a state of affairs means positive changes in the structure of employment.

The comparison of the level of technology of SEZs and the economy of Poland in general (regardless of whether one takes into consideration entities rendering services or entities operating an industrial activity) is positive for SEZs. When it comes to the number of businesses, in SEZs a higher percentage of high-tech businesses can be noted when compared to Poland; it was similar when considering SEZ businesses in terms of employment. Yet in many cases in SEZs were locating new investors (frequently foreign), what has enabled them to start the process of technological advancement from a slightly higher level as compared to domestic entities outside SEZs. Thus, at this stage it is difficult to unambiguously ascertain if operation of SEZs had positive effect on the level of technological advancement in Poland. Obviously, this thesis needs to be verified on the basis of data on the value and structure of imported and/or exported products manufactured / services rendered (the verification can be found in the next chapter). In addition, due to the structure of entities operating in SEZs, one should expect a higher impact on industrial activities rather than on services.

3.5. Technological advancement in imports and exports within SEZs

An empirical analysis of the technological advancement of imports and exports was carried out on a comparable basis: SEZ vs non-SEZ when compared to Poland's foreign trade flows in total. When it comes to foreign trade in SEZs, which is the main subject of the research, the following hypothesis was proposed:

H3: The export activity of SEZ businesses is more technologically intensive when compared to non-SEZ businesses.

This hypothesis is based on the following prerequisites:

- Businesses operating in SEZs are more technologically advanced than non-SEZ businesses;
- Therefore, the competitiveness of those entities is above average;
- Such competitiveness is positively verified in foreign trade.

In the analysis of the product structure of imports and exports (Eurostat, 2016b), the classification developed for SITC rev. 4, based on the OECD definition, including product groups characterised by high R&D costs was employed (cf. table A.7 in appendix). Due to the different classification system for product groups under that classification (SITC rev.4) and the available data (HS), correspondence tables were used (UN, 2016) to render all of the data consistent and comparable. However, in some cases the available data were slightly less accurate (4 digits)

when compared to the aforementioned classification (5 digits), which could lead to the incorrect inclusion of a few product groups more than the official available statistics suggest. However, that does not limit the possibility to compare foreign trade within SEZs and domestic trade flows because of the consistent methodology of calculations.

In 2004 and 2005, the proportion of high-tech products in exports generated in SEZs was equal to or higher when compared to non-SEZ entities. Since 2006 there has been the opposite situation: the proportion of high-tech products in exports is higher for non-SEZ entities than for SEZ entities (in 2014, it was 13.2% and 8.2% respectively) (table 3.3). Hence, hypothesis H3 has to be rejected. Since 2004 an increasing importance of high-tech products in exports generated by non-SEZ businesses can be observed. For SEZs, the situation is not stable, mainly because there are fewer entities operating inside than outside SEZs. Thus, the activity of individual businesses may significantly affect the calculation results. Similarly, as it was already mentioned, the scope of firms' operation in SEZs is limited to particular branches only[13]. For imports, however, it is opposite to exports. Over all the years under analysis, the proportion of high-tech products in imports was higher for SEZ entities than for non-SEZ entities (see table 3.3).

Table 3.3. Share of high-tech products in imports and exports between 2004 and 2014 (in %). A comparison of SEZ, non-SEZ, and Poland in general

Scope	Flow	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
SEZ	exports	12.1	6.9	5.7	5.4	5.2	4.4	5.0	4.6	5.7	7.3	8.2
	imports	15.1	20.1	20.3	17.2	20.3	25.5	28.3	22.0	22.9	21.5	23.0
non-SEZ	exports	6.1	6.9	7.2	8.3	9.9	11.3	12.3	10.6	11.3	11.9	13.2
	imports	14.7	15.1	14.8	14.4	14.9	16.5	16.2	14.0	14.2	14.7	14.7
Poland	exports	6.6	6.9	7.0	7.7	9.0	9.9	10.8	9.3	10.1	11.0	12.1
	imports	14.7	15.5	15.4	14.7	15.6	17.7	18.0	15.2	15.5	15.8	16.2

Source: own data.
Explanations: in 2005, the foreign trade data collection methodology was changed. 4-digit calculations, SITC rev. 4.

Fig. 3.1 presents the share of SEZs in the import and export activities of Poland for high-tech products. In 2008–2014, the proportion of SEZs in exports of high-tech products by Poland was lower when compared to their imports. Over the period under analysis, the situation changed significantly. In 2014, the difference between the proportion of SEZs in imports and exports of high-tech products by Poland decreased from 8.9 pp. (in 2004) to -11.1 pp. (in 2014). The negative value means the already mentioned greater participation of SEZs in imports of high-tech products than in their exports.

[13] New regulations in special economic zones in Poland put more attention to firms' technological advancement.

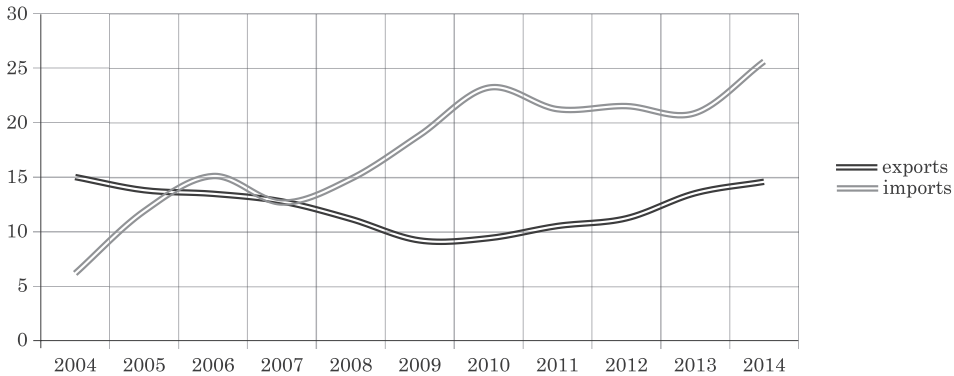

Fig. 3.1. Participation of SEZs in import and export of high-tech products by Poland (in %)
Source: Own data.
Explanations: in 2005, the foreign trade data collection methodology was changed. 4-digit calculations, SITC rev. 4. Values in %.

Table A.8, in appendix, presents the structure of high-tech exports broken down into SEZ and non-SEZ as compared to Poland in general. The fundamental differences in the structure of exports of high-tech products between SEZs and non-SEZs are differences related to aviation equipment. The share of that product group in high-tech exports in SEZs between 2004 and 2013 gradually increased. From 2010, it was between 31% and 54%. For non-SEZ entities, from 2004, it was between 6% and 9%. Other important groups in high-tech exports generated by SEZs include electronics and telecommunications as well as scientific research equipment. One may note more exports in SEZs. For instance, in 2013, two product groups: aviation equipment, as well as electronics and telecommunications, stood for a total of 81.8% of SEZ exports. The export activity of non-SEZ entities was more diversified. Greater fluctuations in the proportions of individual product groups for SEZ businesses when compared to non-SEZ businesses were a result of a smaller number of exporters in SEZs.

3.6. National trade flows and comparative advantages in the export activity of SEZs

Another aspect of the research involved the identification of relative competitiveness of SEZ entities' exports. In particular, the competitiveness of exports was analysed. Comparative advantages in trade flows are often identified with the use of the revealed comparative advantage index (Balassa, 1965). The RCA index in the so-called standard form, adapted for the purpose of research on SEZs, is as follows:

$$RCA^{i}_{SSE} = \left(X^{i}_{SSE} / X^{i}_{PL}\right) / \left(X_{SSE} / X_{PL}\right) \quad (3.1)$$

where:

RCA^{i}_{SSE} – revealed comparative advantage of the SEZ in export of product i,
X^{i}_{SSE} – export of product i by SEZ businesses,
X^{i}_{PL} – export of product i by Poland,
X_{SSE} – total exports generated by SEZ businesses,
X_{PL} – total exports generated by Poland.

Such an index may be interpreted as the contribution of SEZs to exports of product i by Poland when compared to all exports generated by Poland. In certain situations, however, results achieved with the use of that method may be artificially overstated for economies (or products) characterised by a low share in the global trade. In addition, different distributions of the RCA index for individual countries make it difficult to compare them (Hinloopen & Marrewijk, 2001).

The additive index of revealed comparative advantage (Hoen & Oosterhaven, 2006) and normalised index of revealed competitive advantage (Yu, Cai, & Leung, 2009) are not biased, as described above. Both indices are characterised by the symmetry of values, where values greater than zero mean a comparative advantage in the export of a given product group. The additive index, adapted for the research on SEZs, can be described as follows[14]:

$$ARCA^{i}_{SSE} = \left(X^{i}_{SSE} / X^{i}_{PL}\right) - \left(X_{SSE} / X_{PL}\right) \quad (3.2)$$

Values of the ARCA index can be in the range from -1 to 1, where 0 means the comparative-advantage-neutral point. Positive values indicate the existence of a revealed comparative advantage; negative values indicate the existence of a revealed comparative disadvantage. Due to the additive property of the index (its values add up to 0 in product groups), comparisons between various product groups are possible. However, comparisons between countries (between SEZs) and over time are problematic because of inconstant values of the index for various years.

In order to avoid problems with interpretation, in the end the normalised index was used, which is not limited as described above, but it has the advantages of the previous index. It is the version of the ARCA index supplemented with weights of the participation in exports of SEZs in the exports of Poland (Yu et al., 2009):

$$NRCA^{i}_{SSE} = ARCA^{i}_{SSE} \cdot X^{SSE} / X^{PL} \quad (3.3)$$

[14] The key is the same as for the previous formula.

The NRCA index defines – on a relative scale in relation to the volume of export of the reference area (Poland) – the extent to which the export activity of SEZs "deviates" from the comparative-advantage-neutral point in relation to a larger export market. Under the probability framework, the following equation is employed (Yu et al., 2009):

$$NRCA^{i}_{SSE} = X^{i}_{SSE}/X - X_{SSE}X^{i}/XX \quad (3.4)$$

where:

X^{i}_{SSE} / X – probability that product i will be exported by the SEZ,

$X^{i}_{SSE} / X - X_{SSE} X / XX)$ – difference between the expected share (with determined probability) and the actual share of the SEZ in exports (the concept of comparative advantage is interpreted in such a way).

Values greater than (smaller than) 0 indicate that the export of products i by the SEZ is greater (smaller) than its comparative-advantage-neutral point, which points to the existence of a comparative advantage or lack thereof. Greater values of the index indicate a greater comparative advantage.

The NRCA index should be directly interpreted in relation to the size of its comparative advantage. A greater value of the NRCA index (e.g. 0.1 compared to 0.01) means that the exports of a given product group by the SEZ have a 10 times greater advantage.

Important benefits of the foregoing approach to interpretation of a revealed comparative advantage include: (i) being independent of the level/manner of classification of product groups and countries which is determined by the additive nature of the index (both with respect to the countries concerned and the product groups concerned); (ii) the nature of changes observed which fits well in the concept of comparative advantage (when one country gains an advantage in exports of a particular product, other country loses it at the same time); (iii) a totally symmetric distribution of values in the range from -0.25 to 0.25, with 0 as the comparative-advantage-neutral point; and (iv) the comparability of values over time between countries and sectors.

The calculation of the NRCA indices for SEZs was carried out for the four-digit product groups. Due to their large number (about a thousand product groups, depending on the year), the tables below present only those product groups, for which entities located in a SEZs are characterised by the greatest comparative advantages or disadvantages. The NRCA indices have low values, which results from the way they were calculated. However, they were multiplied by 100, as certain researchers do, which has to be taken into account when interpreting the results obtained.

The greatest comparative advantages in the export activity of businesses in SEZs (when compared to Poland in general) are advantages related to accessories for motor vehicles. Then there are advantages related to vehicles and third

are those related to combustion engines (table 3.4). The fourth are advantages related to household appliances. The general conclusion which can be arrived at is that advantages of SEZs relate mainly to products of the automotive industry (usually parts) and household appliances as well as laundry machinery, lighting equipment, heating and paper.

Table 3.4. Product groups (4-digit CN), for which SEZ entities have the greatest comparative advantages in exports (2013)

HS code	Product	NRCA
8708	Parts and accessories of the motor vehicles	1,64
8703	Automobiles and other motor vehicles (station wagons) and racing cars	0,67
8408	Compression-ignition internal combustion piston engines (diesel or semi-diesel engines)	0,65
8528	Audio-visual apparatus	0,57
8704	Motor vehicles for the transport of goods	0,53
8409	Engine parts	0,36
9401	Seats	0,28
9403	Other furniture and parts thereof	0,28
4011	New pneumatic tyres, of rubber	0,28
8450	Household or laundry-type washing machines, including machines which both wash and dry	0,28
8451	Other washing and cleaning machines and equipment	0,21
8411	Turbojets, turbopropellers and other gas turbines	0,2
7007	Safety glass, consisting of toughened (tempered) or laminated glass	0,2
8803	Parts of goods of heading 8801 or 8802	0,18
8512	Electrical lighting and signaling equipment, electric windscreen wipers	0,18
8422	Dishwashers; Bottle cleaning or drying equipment, filling, sealing, sealing or labeling machines	0,18
4802	Paper and paperboard	0,15
8407	Spark-ignition reciprocating or rotary internal combustion piston engines	0,15
8516	Electric instantaneous or storage water heaters and immersion heaters; electric space-heating apparatus and soil-heating apparatus	0,13
6909	Ceramic wares for laboratory, chemical or other technical uses; ceramic troughs, tubs and similar receptacles of a kind used in agriculture	0,13
8414	Air or vacuum pumps, air or other gas compressors and fans	0,12
4804	Uncoated kraft paper and paperboard, in rolls or sheets,	0,12
4016	Other articles of vulcanised rubber other than hard rubber	0,11
4902	Newspapers, journals and periodicals, whether or not illustrated or containing advertising material	0,1

Source: Own compilation of data of the Customs Chamber.
Explanations: The NRCA values were multiplied by 100. The names of the product groups in the table were simplified and abbreviated.

Table 3.5. Product groups (4 digits CN) for which SEZ entities have the greatest revealed comparative disadvantages in exports (2013)

HS code	Product	NRCA
2710	Petroleum oils and oils obtained from bituminous minerals, other than crude	-0,46
8471	Automatic data-processing machines and units thereof; magnetic or optical readers, machines for transcribing data, etc.	-0,28
7403	Refined copper and copper alloys, unwrought	-0,26
8517	Telephone sets, including telephones for cellular networks or for other wireless networks; other apparatus for the transmission or reception of voice, images or other data	-0,23
3004	Medicaments	-0,19
2704	Coke and semi-coke of coal, of lignite or of peat, whether or not agglomerated; retort carbon	-0,17
8544	Insulated (including enamelled or anodised) wire, cable (including coaxial cable) and other insulated electric conductors	-0,16
1806	Chocolate and other food preparations containing cocoa	-0,14
3304	Beauty or make-up preparations and preparations for the care of the skin (other than medicaments), including sunscreen or suntan preparations; manicure or pedicure preparations	-0,12
0203	Meat of swine, fresh, chilled or frozen	-0,12
8212	Razors and razor blades (including razor blade blanks in strips)	-0,12
7408	Copper wire	-0,11
0207	Meat of sheep or goats, fresh, chilled or frozen	-0,11
8539	Electric filament or discharge lamps, including sealed beam lamp units and ultraviolet or infra-red lamps; arc lamps	-0,1
7106	Base metals or silver, clad with gold, not further worked than semi-manufactured	-0,09
7204	Ferrous waste and scrap; remelting scrap ingots of iron or steel	-0,08
4418	Builders' joinery and carpentry of wood, including cellular wood panels, assembled flooring panels, shingles and shakes	-0,08
6204	Women's or girls' overcoats, car coats, capes, cloaks, anoraks (including ski jackets), windcheaters, wind-jackets and similar articles	-0,08
7214	Other bars and rods of iron or non-alloy steel, not further worked than forged, hot-rolled, hot-drawn or hot-extruded	-0,08
2009	Fruit juices (including grape must) and vegetable juices, unfermented and not containing added spirit, whether or not containing added sugar or other sweetening matter	-0,08
0305	Fish, dried, salted or in brine; smoked fish	-0,08
7308	Structures and parts of structures of iron or steel; plates, rods, angles, shapes, sections, tubes and the like, prepared for use in structures, of iron or steel	-0,06
1905	Bread, pastry, cakes, biscuits and other bakers' wares	-0,06
1602	Other prepared or preserved meat, meat offal or blood	-0,06

Source: Own compilation of data of the Customs Chamber.
Explanations: The NRCA values were multiplied by 100.

The product group for which SEZs show the greatest comparative disadvantages with respect to exports is less homogeneous (table 3.5). The lowest, negative NRCA index relates to petroleum oils, automatic data processing machinery and equipment, copper, telephone equipment, medicines, coke and wires.

A comparison of the summary presented in the tables as "greatest advantages vs greatest disadvantages" shows a fundamental difference reflected in the fact that in the case of "top-NRCA", the NRCA index for the "leader", i.e. "automotive parts and accessories", is clearly higher than for other product groups. However, in the case of "anti-top-NRCA", the disadvantage of the leader, i.e. "petroleum oils and oils from bituminous minerals", is lower. In addition, the differences among the RCA indices are lower in other product groups.

As already mentioned, an advantage of comparative advantage indices calculated as per the NRCA formula is their comparability over time. Between 2005 and 2016, the largest was the increase in the advantage related to automotive parts (by 1.1pp) and to "other furniture and parts thereof" (by 0.5pp). The largest drop was noted for automotive vehicles (by -1.3pp). The above observation is a proof of the serious change that occurred in the automotive industry, the greater part of which is concentrated in SEZs. Poland lost its comparative advantage (compared to other countries in the region) in the export of automotive vehicles to automotive parts.

To define the export competitiveness of SEZ businesses when compared to non-SEZ businesses, an array of indices was calculated with respect to the unit value of products traded with foreign countries. The simplest measures are unit values of products exported, calculated as per the following formula:

$$UV_i = \frac{X_i}{M_i} \tag{3.5}$$

where:

UV_i – export unit value index for product i,
X_i – value of exports of product i,
M_i – mass of product i exported in kilogrammes.

The calculation results are presented below (fig. 3.2) by SEZ, non-SEZ, and Poland in general. Exports generated by SEZ entities are of more value per kilogramme when compared to non-SEZ entities. However, one has to note that in 2004–2013 that advantage became lower. In 2004, the export kilogramme value for SEZ entities was four times higher when compared to non-SEZ entities, but by 2013 that advantage was only twice higher.

Among the products with the highest kilogramme value (in EUR), navigation products, aeroplanes, other aircraft (i.e. helicopters), turbojet engines, image recording and playing equipment, precision instruments and elements of metal ceramic tools dominated in SEZs. They fell into the category of high-tech products.

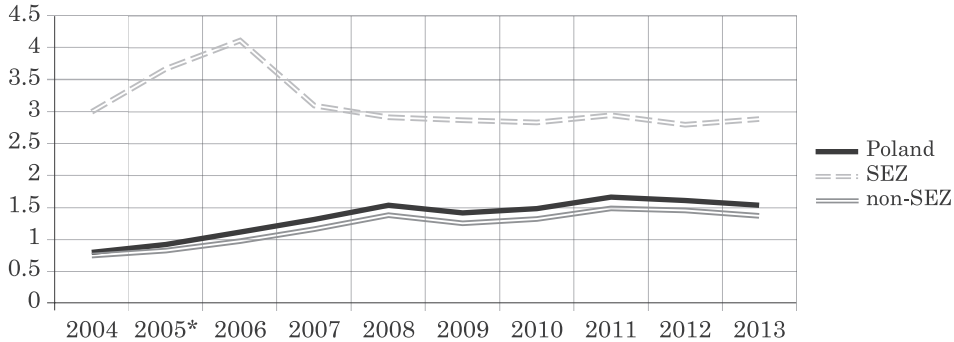

Fig. 3.2. Indices of export unit values (value of one export kilogramme) in EUR over 2004–2013 by SEZ, non-SEZ, and Poland in general

Source: Own compilation of data of the Customs Chamber.

Explanations: in 2005, the foreign trade data collection methodology was changed.

3.7. Intra-industry trade within SEZs when compared to Poland

Empirical analysis of international trade can be done from various theoretical perspectives. As a rule, two types of trade are distinguished: inter-industry and intra-industry (IIT). Brodzicki (2016) exemplifies several reasons why IIT deserves attention, the most important being that IIT indicates the convergence of real income: the highest intensity of IIT is observed among the countries at a similar level of development, measured by GDP per capita. High intensity of IIT characterises trade among countries that are integrating their economies. IIT trade – contrary to inter-industry trade – is reckoned as a higher development trade. Moreover, IIT brings synchronisation of business cycles of trading partners, which leads to symmetrizing of economic shocks.

From the demand-side point of view, IIT is driven by love-for-variety, which traditionally has been treated as the main determinant of this kind of trade. From the point of view of the supply side (which is more important in trade analysis performed for SEZs), the main determinants of IIT are diffusion and spatial defragmentation of the production process, falling trade costs and liberalisation of trade due to globalisation. As noted by Cieślik (2008), through defragmentation, the production process is broken down into stages that are in distant locations that also can embrace SEZs. The role of FDI and multinational enterprises in IIT has been underlined by OECD (2002), Marrewijk (2008), Yoshida (2009) and Krugman (1979). An important characteristic feature of intra-industry trade, as opposed to inter-industry trade, is that the former is supposed to be less disruptive to labour market adjustments. If labour adjustments occur due to IIT, they take place within the same industry or between industries that represent industries characterised by small sectoral or occupational "distances" (Brülhart, Elliott, & Lindley, 2006).

IIT intensity of entities operating in SEZs has not yet been subject to thorough inquiry. However, it deserves attention for several reasons:

- it is another aspect of comparisons between SEZ and non-SEZ,
- it is interesting to inquire how entities in SEZs contribute to IIT intensity of Poland's foreign trade (a positive or negative contribution?),
- foreign-owned entities are active in SEZs and they are assumed to positively contribute to the intensity of IIT,
- IIT can smooth adjustments on the labour market, once they happen, due to the aforementioned sectoral and occupational proximities.

After the review of literature and because of FOEs activity in SEZs, two hypotheses have been formulated:

H4: Intra-industry trade in SEZs plays dominant role – confronted with inter-industry trade,

H5: The intensity of intra-industry trade in SEZs is higher than for Poland, on average.

The intensity of IIT in total trade has been measured with the use of the Grubell-Lloyd index, according to the following formula:

$$R_i = \sum_{i=1}^{n} a_i \frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} \tag{3.6}$$

where:

$X_i + M_i$ – represents global value of foreign trade of branch i,
$|X_i - M_i|$ – is the absolute value of difference between imports and exports of branch i,
a_i – denotes the share of branch i in the sum of imports and exports.

Contrary to our expectations, both hypotheses were not proven. H4 and H5 were rejected. For entities operating in SEZs, the intensity of IIT is lower than 0.5 – therefore intra-industry-type trade is not the dominant trade in SEZs, however its role has increased since 2004 (table 3.6). Entities operating in non-SEZs reveal superiority over those in SEZs in terms of IIT intensity. It is difficult to unequivocally judge why the expected superiority of SEZs vs. non SEZs has not been proven.

Table 3.6. Aggregate IIT for SEZ entities, non-SEZ entities, and Poland in general in 2004–2013(4)

Scope	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
SEZ	0,336	0,359	0,376	0,366	0,386	0,348	0,373	0,408	0,419	0,446	0,462
non-SEZ	0,524	0,511	0,525	0,540	0,554	0,563	0,569	0,574	0,579	0,604	
Poland	0,525	0,520	0,532	0,550	0,570	0,564	0,569	0,577	0,586	0,607	0,613

Source: own data.
Explanations: * change in the data arrangement for SEZs.

However, several reasons might contribute to it. The probability that imports and export flows overlap is lower if IIT assessment is done at below a national-level analysis. For instance, an exporter of a certain product can be localised in region X of a country and an importer in region Y. If the number of localisations is reduced (as is the case when SEZs are inquired) the intensity of IIT therefore might be lowered. A similar effect has been reported by Umiński (2014) in a study devoted to an assessment of IIT for Poland's regions.

Secondly, entities in SEZs have developed strong economic links with the internal market in Poland (with companies operating on the Polish market). For instance, they are active only in "one way" of foreign trade (they import production components) but the final product is not exported, but instead sold to Poland's domestic market.

Thirdly, if an IIT analysis is restricted to SEZs only, the probability that imports and exports flows overlap is also lower because of the reduced number of products traded. Top IIT intensity products do not necessary have to be traded by entities operating in SEZs.

Finally, contrary to expectations, FOEs active in SEZs (and in Poland in general) are more oriented towards the domestic market. The obtained results for FOEs IIT intensity might indirectly show their orientation towards the Poland's domestic market.

4. Microeconomic assessment of export activity of firms in SEZs in Poland

Exporting activity of firms within SEZs can be performed from various perspectives. The research at a firm level is crucial for obtaining consistent results, especially knowing the inability of attaining firm-level data in Poland. Therefore, the research scheme was organised in the way, which enabled the most accurate data acquisition, including further verification of the obtained dataset in the survey study (for details please refer to the following section and the part of the book "note on data acquisition").

4.1. The background of microeconomic analysis for SEZs

Having a list of firms operating in zones obtained from the Ministry of Entrepreneurship and Technology and knowing the limitation of the data acquisition in Poland, it was decided to verify if all the firms having valid permits, started to operate within the zones. This procedure involved verifying the value of capital investments already allocated in the zonal operation and the number of persons employed. The verified list of firms was furtherly used in the study.

The data used in the analysis, the results of which are described in this chapter, generally come from the survey conducted among 310 firms in Poland, run in two stages: (i) among SEZs firms, and (ii) non-SEZs firms, mainly due to the necessity of balancing the structure of the inquired firms in the second stage to make them as comparable to the first group as it was possible. The idea stemming behind that approach involved reduction of the impact of firms' economic standings on their export performance or exporter status, in case substantial dissimilates among two groups would emerge.

Therefore, in the first stage 155 of firms in SEZs were randomly drawn out of 1271 entities operating in SEZs in Poland. The structure of the first sample was selected for the population of all entities operating in the SEZ on the basis of the following criteria: (i) employment (small, medium and large), (ii) share of foreign capital, (iii) nature of export activity (exporter/non-exporter), (iv) branch of economic activity (2-digit NACE rev. 2). Furtherly, the data on entities operating in SEZs were weighted to fully conform to the structure of all of the firms operating in SEZs.

In the second stage, a list of 6564 firms operating outside the zones was randomly picked from the large InfoCredit database. The firms were subsequently drawn out with respect to the similar characteristics as in the first stage (presence of foreign capital, branch, size) to sustain similar structure of the firms as in the first research sample.

Finally, the datasets were merged to achieve one consistent and comprehensive dataset. The balance between the groups was verified. Additionally, having registration information on firms' branch of economic activity, presence of foreign capital, the size, etc., selected answers given by the respondents were confronted with the data from the InfoCredit database. The differences in the answers of firms and register data were scarce, therefore one can accept the quality of the survey-obtained information. The remaining dissimilarities could be a result of outdated official information on firms' activity presented in the official registries.

4.2. Differences between SEZs and non-SEZs firms – selected aspects

There are several reasons, why firms in SEZs are supposed to differ – compared to non-SEZs ones. The main ones are as follows:

- there are large FOEs operating in SEZs; they are engaged in capital intensive activities; often being part of multinational corporations they show higher export orientation, which is supposed to result in a higher sensitivity or/and vulnerability to the consequences of the crisis;
- if situated within larger, international structures, the firms can have access to financing at preferential conditions, which for instance reduces budgetary constraints; it however might well work opposite, as for instance the affiliate can be forced to transfer any financial surpluses to the mother enterprise/ holding;
- another feature of FOEs (especially if are a part of multinational structures) is their experience in managing geographically dispersed activities which results in networking and accumulation of competences related to various types of activities on foreign markets; this for instance shall influence, how soon the firm becomes an exporter after its business activity has been started;
- public aid provided in SEZs is supposed to positively contribute to economic performance (ceteris paribus). Therefore the perception of a zonal firm of i.e. crisis, demand or supply shocks etc. is expected to differ vs. non-SEZs firms;
- firms in SEZs can be less elastic in their reactions and adaptations to the altering business cycle (and to the crisis) because of the commitments imposed on the ground of the public aid provided; it implies that for instance employment cannot be so easily adjusted/reduced – if justified by the business cycle circumstances.

The analysis performed at microeconomic level enabled the identification of the most important differences between SEZs and non-SEZs. They shed light on possible dissimilarities in export behaviour, resilience to crisis etc., which provides better understanding of the effects of SEZs functioning on firms performance (cf table 4.1).

Table 4.1. Selected differences among SEZ vs non-SEZs firms

Label	non-SEZs (Mean)	non-SEZs (SD)	SEZs (Mean)	SEZs (SD)	T-stat	Difference
Exporter	0,63	0,49	0,85	0,36	-4,51	0,219***
Importer	0,56	0,50	0,81	0,39	-4,95	0,252***
Neither exporter nor importer	0,45	0,50	0,12	0,32	7,03	-0,335***
No foreign trade involvement in the past 3 years	1,00	0,00	0,88	0,32	2,86	-0,116***
No. of exporting product/services	48,87	321,41	16,66	91,66	1,08	-32,209
Share of exports in incomes from sales*	33,85	28,83	41,60	28,91	-2,00	7,75**
Share of imports in total costs*	21,42	25,57	31,15	24,58	-2,87	9,735***
No. of export directions*	4,74	8,90	8,18	7,73	-2,86	3,435***
No. of import directions*	4,70	9,69	8,12	7,34	-2,81	3,418***
Foreign trade aid beneficiary	0,00	0,00	0,04	0,20	-1,94	0,041*
R&D department in the firm	0,16	0,37	0,42	0,49	-5,17	0,257***
Share of investment expenditures on R&D	7,26	5,42	5,75	5,18	1,19	-1,511
External R&D cooperation	0,17	0,37	0,38	0,49	-4,32	0,216***
No. of innovations introduced	1,73	3,22	2,99	2,51	-3,83	1,258***
new to the firm	2,45	2,75	3,33	1,92	-2,60	0,876**
new to the market	1,46	1,57	1,50	1,33	-0,17	0,036
No. of employed	87,68	208,50	248,65	426,31	-4,22	160,974***
Foreign affiliates present	0,13	0,34	0,34	0,47	-4,42	0,206***
No. of foreign affiliates	4,45	5,77	4,88	9,95	-0,18	0,435
Share of foreign capital	13,38	32,98	31,39	41,31	-3,49	18,009***
MNC	0,04	0,19	0,25	0,43	-5,39	0,207***
Firm's age	21,45	13,69	17,31	13,04	2,15	-4,149**

Source: Own compilation. * in 2015.
Explanation: *** p<0.01, ** p<0.05, * p<0.1.

The following main conclusions can be formulated as regards the differences between SEZs vs. non-SEZs:

- firms in SEZs are more intensively engaged in foreign trade and it is a status of being an importer in which the superiority of the SEZs' firm is revealed the most; the share of firms that are neither exporters nor importers is almost four times lower for SEZs vs. non-SEZs;
- exports of the zonal firms is more concentrated in terms of the number of products (services) exported;
- exports intensity for SEZs' firms is higher, as measured by the share of exports in the revenues from total sales. The same constatation relates to imports;
- number of both exports and imports directions is higher for the SEZs firms. In case of exports, it proves their higher competitiveness (an ability to serve more markets);

- although the difference is only slightly significant and with small magnitude, firms in SEZs are more often beneficiaries of foreign trade aid; however, the export aid is granted independently to the SEZ operations; this may show that the zonal firms are more inclined to get this kind of aid, as they see the challenges stemming from openness and in their strategy of doing business they see the necessity to expand internationally of to broaden the presence on foreign markets;
- in case of the zonal firms, there is higher number of entities possessing R&D department;
- firms in SEZs are more engaged in external R&D cooperation, which proves their role as networkers;
- the number of innovations introduced by the SEZs' firm is higher compared to the ones outside the zones, which is in line with expectations, and corresponds to the nexus between innovation activity and exporting predicted by the heterogeneity theory;
- firms in SEZs report higher employment, more often are foreign owned and are part of the multinational corporations.

In most of the aspects inquired, there are statistically significant differences reported between the two groups of firms. The strongest differences can be seen as regards employment and the share of foreign capital. In general firms within the zones tended to be bigger in terms of the size and younger as compared to non-SEZs firms. They were also more innovative and willing to cooperate with external R&D research units. Thus, they were more exposed to foreign trade, and exports/imports played a more important role in relation to their sales or costs.

4.3. Firm-level export activity among SEZ vs non-SEZs firms

The following table (4.2) presents the reasons for starting and increasing the scale of exports over the last 3 years. Four types of motives have been distinguished. The main differences between firms in SEZs vs. outside SEZs have been reported in terms of the small domestic market in Poland as main reason for exporting, the favourable legal system as well as availability of financial aid supporting exports. In case of the above mentioned aspects, there is a positive difference in the structure of answers given, for SEZs firms. On the other hand, the aspects that the non-SEZs' report as relatively less important – compared to firms in SEZs – are proximity to foreign markets and chances to obtain higher profit rate.

Respondents were asked to evaluate the strengths of barriers to start exporting activity. Generally, firms operating in SEZs reported lower barriers to start exporting (table 4.3), which probably stems from the support obtained (helpful in financing the costs related to expansion to foreign markets) and from their experience in foreign markets as relatively more respondents are FOEs,

Table 4.2. The reasons for starting exports or increasing the scale of exports in the past 3 years (% answers)

Motives	Total	non-SEZ	SEZ	Difference*
M: The size of the foreign market	12,3	12,7	11,9	-0,8
M: High dynamics of foreign growth	3,1	4,1	2,4	-1,7
M: Existence of too small domestic demand	8,1	3,2	11,3	8,1
M: Proximity to foreign markets	12,8	15,8	10,7	-5,2
M: Inquiries / orders from overseas	9,9	11,3	9,2	-2,1
E: Possibility to increase the scale of production or making full use of available production capacity	17,5	18,6	16,6	-1,9
E: Possibility of obtaining a higher profit rate	15,5	17,6	14,2	-3,4
E: Difficulties with sales on the domestic market	1,1	1,4	1,2	-0,2
E: Reduce risk by diversifying business activity	0,7	0,0	1,2	1,2
L: Favorable legal system abroad	13,7	11,3	15,1	3,8
L: Foreign trade aid granted by Polish institutions	2,7	1,8	3,3	1,5
L: Possibility of applying for co-financing of export activity	1,3	0,0	2,1	2,1
O: Other motives	1,4	2,3	0,9	-1,4

Source: own elaboration based on the survey data.
Explanation: M – market motives, E – economic motives, L – law motives, O – other motives. % of firms. * difference between SEZ and non-SEZ perceptions (in pp.).

compared to non-SEZs firms. The most serious differences between two groups of firms are depicted as regards small scale of operations and strong competition on foreign markets. The obtained results are in line with expectations. Firms in the SEZs – compared to non-SEZs ones – are bigger. Moreover, as relatively many of them are FOEs, they are more experienced in operating on foreign markets. Therefore they report less competitive challenge related to foreign expansion.

Heterogeneity theory assumes that only a fraction of enterprises becomes exporters, due to high sunk costs that have to be carried in order to expand to foreign markets. The distribution of expenditures required to start the exporting shows that in case of firms in the SEZs relatively higher costs are reported. Almost 30 per cent of the zonal firms indicated that the mentioned costs represent 21-50 percent of the total costs (for non-SEZs it is 12,5% respectively). The obtained results confirm that exporting activity is "only for a few", for those who are able to incur these costs. As already mentioned, these are bigger firms and often with participation of foreign capital.

In order to verify the role of special economic zones in firm-level export behavior a logit model on data obtained from the survey research was estimated. The dependent variable was the firm's exporter status (dummy variable). The model's estimation, revealed the significant firms characteristics, affecting firm's export behaviour. Among significant other factors, the role of SEZs is furtherly verified.

Table 4.3. The strength of barriers to start export activity

Barriers	Total	non-SEZs (Mean)	non-SEZs (SD)	SEZs (Mean)	SEZs (SD)	T-stat	Difference*
Internal barriers							
Small scale of production	3,09	3,69	1,35	2,00	1,18	5,15	-1,69***
Reluctance to taking the risk related to export activity	2,99	3,40	1,09	2,29	1,23	3,95	-1,11***
High costs of foreign expansion	2,80	3,19	1,07	2,10	1,09	4,09	-1,10***
export transaction risk	2,98	3,31	0,93	2,43	1,25	3,47	-0,88***
Insufficient quality of offered products	2,37	2,56	1,20	2,05	1,20	1,70	-0,51*
High prices offered products	2,19	2,53	1,09	1,62	0,86	3,51	-0,91***
Low qualifications of staff	2,17	2,54	1,20	1,52	0,68	3,70	-1,02***
Lack of knowledge about export procedures	2,46	2,88	1,13	1,76	0,83	4,21	-1,12***
External barriers							
Difficult access to external financing	2,43	2,62	1,04	1,81	0,93	3,20	-0,81***
No public support	2,56	2,81	1,05	1,76	0,77	4,21	-1,05***
No information about foreign markets	2,65	2,91	0,93	1,81	0,81	4,90	-1,10***
Constricted access to distribution channels	2,31	2,54	0,87	1,57	0,68	4,69	-0,97***
Strong competition on foreign markets	2,93	3,25	1,01	1,90	0,94	5,40	-1,35***
High shipping costs of goods	2,89	3,16	1,00	2,00	1,14	4,50	-1,16***
Exchange rate risk	2,99	3,26	0,97	2,10	1,26	4,48	-1,17***
Tariffs and customs barriers	2,82	3,06	1,01	2,05	1,12	3,92	-1,01***

Source: own elaboration based on the survey data.
Explanation: *difference (SEZ – non-SEZ). Two-sample T test on the difference between non-SEZ and SEZ firms perceptions presented in the last column. *** *p<0.01, ** p<0.05, * p<0.1. The scale of barriers' intensity: 1 (the weakest) to 5 (the strongest).*

The general equation in the logit model is the following:

$$P_i = F(Y_t) = \frac{1}{(1 + exp\{-Y_i\})} \tag{4.1}$$

where:

P_i – a probability that a firm is an exporter,

$F(Y_t)$ – logistic cumulative distribution function,

$exp\{-Y_i\} = \frac{P_i}{(1 - P_1)}$ – odds ratio, which is the ratio of firm's probability of being an exporter to the probability of not being an exporter,

If the natural logarithm is taken of both sides of an odds ratio, the following equation appears (Demirbas, 2009):

$$Y_i = ln\left[\frac{P_i}{1-P_i}\right] = \beta_1 + \beta_2 X_{i2} + \cdots + \beta_k X_{ik} \quad (4.2)$$

In the logit model, the dependent variable is a log of odds that an individual firm is an exporter. The models were estimated using maximum likelihood method with robust standard errors applied. Set of regional fixed effects and sectoral fixed effects (based on PAVITT revised classification – see (Bogliacino & Pianta, 2016) were added to increase the model fit. Two information criteria are supported to compare the quality of models' fitness to the data (Akaike's and Bayesian Information Criteria).

Six specifications of the logit model have been estimated (cf table 4.4). In selected ones (estimations 4-6), it was possible to control the estimations

Table 4.4. Export propensity of firms – logit estimates

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	exp	exp	exp	exp	exp	exp
SEZ	1.743*	0.559	0.492*	0.450*	0.484	0.431
	(0.535)	(0.214)	(0.199)	(0.185)	(0.261)	(0.240)
ln_employ	2.313***	2.461***	2.220***	2.316***	2.877***	3.147***
	(0.299)	(0.380)	(0.333)	(0.357)	(0.536)	(0.615)
foe_share		1.019***	1.020***	1.021***	1.028***	1.030***
		(0.00736)	(0.00750)	(0.00768)	(0.00917)	(0.00895)
rd_coop			3.128**	3.125**	4.515**	5.000**
			(1.791)	(1.804)	(2.851)	(3.345)
Constant	0.103***	0.0698***	0.0841***	0.0661***	0.0185***	0.00992***
	(0.0475)	(0.0382)	(0.0439)	(0.0478)	(0.0211)	(0.0131)
Observations	310	224	220	219	220	219
Sector FE	NO	NO	NO	YES	NO	YES
Region FE	NO	NO	NO	NO	YES	YES
Pseudo R2	0.209	0.245	0.256	0.268	0.357	0.378
LogLik	-141.7	-109.8	-106.9	-104.9	-92.37	-89.09
LR	47.48	40.64	43.82	50.56	58.76	67.05
p	0	7.80e-09	6.98e-09	1.12e-08	4.11e-07	1.41e-07
AIC	289.5	227.7	223.7	225.7	216.7	216.2
BIC	300.7	241.3	240.7	252.9	271	280.6

Source: own elaboration based on the survey data.
Explanation: Robust standard errors in parentheses. Sectoral FE based on revised PAVITT Classification (Bogliacino & Pianta, 2016). Odds ratio in the table is presented. *** p<0.01, ** p<0.05, * p<0.1. The authors did not decide to include the ln_age (log of firm's age) variable in the regressions due to a high multicollinearity with the SEZ dummy.

for regional and sectoral fixed effects. Only in one specification localisation in a SEZ (a dummy variable) increases the odds of being an exporter, which proves the positive influence of SEZs' programme on export extensive margin. However if the share of FOEs is included on the list of the independent variables, the odds ratio reduces to the level below unity, which means that localisation in SEZs negatively influences the chances of being an exporter. The positive effect of foreign ownership is visible in all the model estimations, in which this variable occurs. However participation of foreign capital in the company only slightly increases the odds of being an exporter. It is in line with the predictions, foreign ownership, (often being a part of the MNE) improves access to foreign markets, to the stock of knowledge, financial resources and international networks, including distribution network. It also reduces risks associated with foreign expansion. The SEZs influence turns insignificant, if regional fixed effects are included in estimations. Regional dimension matters – SEZs in Poland's regions are different. Only in some of them there are entities that can be regarded as serious exporters. Also cooperation in the sphere of R&D exerts positive effect on the odds ratio. It is also in line with expectations.

Firms in SEZs are bigger than the ones that operate outside SEZs. For them Poland's domestic market is too small and they are engaged on foreign markets. Due to foreign expansion, they can increase the scale of production and make use of the available production capacity.

Respondents from SEZs have reported lower level of barriers to start exporting, which proves their higher competitiveness and – indirectly – their ability to bear the costs associated with exports. However in the econometric logit model, operation in SEZs turned not to increase the odds ratio of exporting, controlled for other factors, such as foreign ownership as well as sectoral and regional fixed effects. Inclusion of regional fixed effects together with foreign ownership makes the SEZs either insignificant or negatively influence the odds ratio of being an exporter. It bears an important policy implication that not SEZs per se, but other factors increase changes of being an exporter. SEZs in Poland differ in terms of export capacity, not all of them have revealed significant export potential. Many subzones have been established and not all of them have generated the critical mass to significantly contribute to exports. Higher foreign ownership positive influence on the odds ratio of being exporter was expected. The odds ratio for this variable is only slightly above unity, ceteris paribus. More detailed inquiry into the distribution of foreign owned exporters shows their concentration in a small number of sub-zones. Because R&D cooperation has been identified as the factor that with higher magnitude increases the odd ratio of being an exporter, it shall be promoted and aided from public funds. It requires however very fine tuned actions aimed at selected, targeted enterprises. Institutions as regional exports promotion agencies, regional exports brokers etc. – shall be involved.

4.4. The impact of special economic zones on firms' operation

SEZs represent the form of public aid aimed at improving the firms' performance in terms of employment, export capacity, innovativeness, etc. As already mentioned, their functioning is subject to debate because of the preferences given. Firm-level consequences of SEZs' operations are rarely assessed, primary reason being poor access to individual data. From the international economics perspective, assistance provided to a firm shall translate into the increased competitiveness and the improved export potential because the improved financial position positively influences the firm's ability to bear the costs associated with foreign expansion.

The survey embraced questions related to how functioning within SEZs in Poland influences the respondents' performance. 58.51 percent of firms answered that SEZs have neither positive nor negative impact on the growth of firm's exports. For 36.45 per cent of firms this influence was positive and only for 5.04% was very positive. The synthetic indices are presented in the table 4.5.

Table 4.5. The scale of benefits of operation in SEZs

Selected benefits of operating in special economic zones	Index
Greater price competitiveness of products / services due to tax exemptions in SEZs	0,34
High concentration of firms from related industries	0,14
Easier flow of knowledge and technology between firms in SEZs	0,12
High concentration of enterprises from other industries	0,06
Possibility of obtaining additional local tax exemptions	0,02
The proximity to other exporters	0,01

Source: own elaboration based on the survey data.
Explanation: Scale of answers from -2 (definitely not) to 2 (definitely yes) assessing the influence of SEZs on firm's activity. Index is a synthetic measure of weighted sum of answers multiplied by the rank of the each answer and divided by the product of the highest rank and the no. of all the answers (Karaszewski & Sudoł, 1997). The index generates values from the interval of -1 to 1. The closer to unity the more important the benefit. Factors with values close to zero present negligible impact of SEZs in this regard.

The most important benefit indicated by the respondents is greater price competitiveness of products/services offered, possible due to tax exemptions. This aspect relates to price competition. The second factor indicated by the respondents is high concentration of firms from related industries. It corresponds to benefits from agglomeration externalities of the MAR (Marshall-Arrow-Romer) type.

Agglomeration effects are also revealed in high rank of easier flow of knowledge and technology between firms in SEZ. The obtained results prove that the surveyed companies see the general benefits, associated with price competitiveness and agglomeration. Direct export-related benefits are not on top of the identified consequences of functioning within SEZs, thus it is not significant form the point of view of business activity.

Respondents were asked about more detailed opinions related to experience of operating within the zones (cf. table 4.6). What shall be underlined is that the answers were given by both SEZ and non-SEZs firms. Thus in case of non-SEZs firms, their answers relate not to own experience, but to opinions about the zonal firms' performance. A comparison of answers given by the two groups of respondents shows that the zonal firms perceive cooperation with local suppliers from outside the zones as an important aspect of overall company relationships, which is rather a surprising observation, as it was expected that the cooperation with other firms from the zones will be the dominant positive experience. Secondly ranked positive aspect relates to export-related experience leading to the significant increases in knowledge and competence. It corresponds to learning by exporting effect, known from the literature. This effect is not always proved. However, the smallest difference in the structure of answers for both groups is reported in case of opinion that export activity contributes to productivity growth. This aspect has been relatively highly ranked by both the respondents' groups. Again, such opinion may prove the learning by exporting positive effects.

Table 4.6. Firms' experiences with SEZs (synthetic index of importance)

Selected experiences with SEZs operation	Total	non-SEZ	SEZ	Difference*
Export activity contributes to productivity growth	0,31	0,32	0,30	-0,01
The export activity of the company contributes to the improvement of its competitiveness	0,30	0,31	0,24	-0,07
Experience with export activity leads to a significant increase in knowledge and competence	0,23	0,31	0,14	-0,17
Cooperation with local suppliers outside the SEZs is significant from the point of view of the company's overall relationships	-0,02	-0,13	0,08	0,21

Source: own elaboration based on the survey data.
Explanation: *difference (SEZ – non-SEZ). ** firms in SEZs only, *** firms outside SEZs only. Scale of answers from -2 (definitely not) to 2 (definitely yes). Index is a synthetic measure of weighted sum of answers multiplied by the rank of the each answer and divided by the product of the highest rank and the no. of answers. The index generates values from the interval of -1 to 1. The closer to unity the more important the benefit.

From the point of view of effectiveness of SEZs operations, it is important to get to know the opinions about policy recommendations that would result in the increase of exports. Developing existing zones around which clusters of exporting companies are formed, ranks top in the structure of respondents' opinions (table 4.7). This reflects their positive opinions about export spillovers stemming from agglomerations of exporters. It should be also noticed that putting new sub-zones has been given lower percentage of answers, which may reflect an opinion that public support provided in the form of SEZ will be spatially concentrated. Respondents see the necessity to support the linkages of the SEZ with the local economy, through development of infrastructure, education, transport facilities, etc. This is expected to positively contribute to their competitive position.

Table 4.7. Suggested actions to increase the export activity in SEZs and areas surrounding them

Actions	% of answers
Develop existing zones around which the clusters of export companies are formed	35,2
Support the linkages of companies in the SEZ with the local economy through the development of infrastructure of education, transport, research facilities, etc.	34,3
Put new sub-zones in the vicinity of existing agglomerations of certain industries	19,0
Differentiate the amount of public aid depending on the scale of the company's exports	8,6
Other actions	2,9

Source: own elaboration based on the survey data.

Respondents perceive greater price competitiveness, possible due to tax exemptions, as the most important benefit stemming from operations in SEZs. Export-related aspects (proximity to other exporters) have not been given higher ranks. On the other hand, the concentration of exporters in Poland is a fact. It might mean that the communication between exporters is yet not well developed. Especially if they are small and medium size firms, they could benefit much from cooperation for instance through learning, risk sharing and resource matching (which are the basic benefits from agglomeration). This kind of benefits will be communicated and promoted, which will positively increase the extensive exports margin.

4.5. Business activity in SEZ and sensitivity to economic shocks

As it has been already showed, firms operating in SEZs reveal more intensive engagement in foreign trade. According to this fact, the hypothesis H6 has been formulated, with reference to the consequences of the financial and economic crisis.

H6: Firms operating in SEZs have been more affected, than non-SEZ entities, by the negative consequences of the financial and economic crisis through the foreign trade channel.

The prerequisites for formulating the above hypothesis are as follows:

- higher openness results in higher sensitivity and/or vulnerability to the shocks;
- firms operating in SEZs are relatively less flexible in adjustments to the changeable economic situation, i.e. in terms of fluctuations of the workforce; it results from the requirements they have to follow, once have been given the permits to operate within the zones and granted the tax privileges;
- often being subsidiaries of MNC and part of the global value chains, firms in the zones are dependent on the global changes and challenges that influence the performance of the multinational business of which they are a part of.

According to the answers given by the respondents, firms in SEZs have been more affected by the changeable economic situation, than the ones outside the zones. There is 20 percentage points difference in the structure of answers provided by the two groups of respondents, regarding the situation perceived as slightly worsened or not changed. Thus, hypothesis H6 has been proved (table 4.8).

Table 4.8. Changes in the economic situation among SEZs and non-SEZs firms (% firms)

Economic situation	Total	non-SEZ	SEZs	Difference*
deteriorated significantly	1,9	2,6	1,2	-1,4
slightly worsened	23,9	13,6	34,1	20,5
not changed	71,2	81,2	61,3	-20,0
slightly improved	1,8	1,3	2,3	1,0
improved significantly	1,2	1,3	1,2	-0,1

Source: own elaboration based on the survey data.
Explanation: *difference (SEZ – non-SEZ) in pp. The scale of answers was set between -2 (deteriorated significantly) and 2 (improved significantly). Two-sample t-test has found significant differences among non-SEZs firms (mean -0,15) and SEZs firms (-0,32) in terms of their reaction to crisis at $p < 0.01$. SEZs firms have anticipated worse changes in the economic situation.

The most severe consequences of the crisis, as reported by the respondents, are: difficulties with collecting receivables (which relates to the difficulties witnessed by the other firms, not the respondents by their own), decline of the domestic demand and uncertainty about the crisis duration and its long-term effects (table 4.9). Rigorous legal conditions of functioning in the SEZs have not been ranked high by the respondents. This is not a key factor that would deteriorate the respondents' situation during the financial and economic crisis.

Table 4.9. The influence of factors on the deterioration of the situation during the financial crisis (index)

Factors	Index
Difficulties with collecting receivables from business partners	0,68
Decline in domestic demand	0,66
Uncertainty about the actual effects / duration of the crisis	0,65
Decline in foreign market demand	0,58
Unfavourable exchange rate change	0,56
Deterioration of access to external financing	0,53
The decline in the value of a company's assets	0,52
Rigorous legal conditions of functioning in the SEZs (e.g. the need to maintain the declared employment size)	0,51
Need for financial support for parent companies outside the country	0,41
Other	0,29

Source: own elaboration based on the survey data.
Explanation: Total population of firms with economic downturn. The index is constructed in the same way as in the table 5.5.

Respondents, that are a part of multinational corporations, do not regard the need for financial support for parent companies to be an important factor either.

Most of the respondents have not taken any actions aimed at reduction of sensitivity to the crisis (table 4.10). However, there is 25 percentage points difference, in favor of SEZs firms, that have taken some actions. It has been showed that there is a higher export intensity for the SEZs firms. Once they are more sensitive to economic situation on foreign markets, they more clearly see the necessity to take the proper actions countervailing the effects of the crisis. As being part of the international processes and chains of the value added, they are more aware of the necessity to respond to the crisis.

Table 4.10. Actions taken to reduce the firms' sensitivity to the crisis (% firms)

Responsiveness to crisis	Total	non-SEZ	SEZ	Difference*
No action taken	69,3	82,0	56,7	-25,3
Some actions taken	30,7	18,0	43,3	25,3

Source: own elaboration based on the survey data.

There is an interesting difference seen in actions taken to reduce sensitivity to the global financial and economic crisis (table 4.11). SEZs' firms introduce goods/services to the new markets, which proves their active attitude to be present on the new markets, which enlarges their sales base. Another difference

Table 4.11. Actions taken to reduce the sensitivity of firms to the global financial crisis (% firms)

Actions	Total	non-SEZ	SEZ	Difference*
Innovative products / services introduced (new to the company)	20,4	24,6	18,9	-5,7
New intermediaries were sought	16,1	17,2	15,6	-1,6
Introduced goods / services into new markets	14,8	2,4	19,1	16,8
Innovative products / services introduced (new to the market)	12,4	9,9	13,2	3,3
Increased reserve capital in the enterprise	9,9	10,3	9,7	-0,6
Decreased employment in the company	8,6	10,3	8,0	-2,2
Increased marketing and advertising spending	4,9	5,2	4,9	-0,3
Limited number of destination markets	3,1	7,5	1,6	-5,9
Security against exchange rate changes introduced (e.g. currency options)	3,1	2,6	3,3	0,7
Increased expenditure on developing new products / services, technologies, materials, etc.	2,5	0,0	3,3	3,3
Other	2,5	5,0	1,6	-3,5
Increased the share of temporary workers in total employment	1,9	2,4	1,7	-0,7
Exports to foreign markets were restricted	1,9	4,9	0,8	-4,2

Source: own elaboration based on the survey data. Explanation: *difference (SEZ – non-SEZ) in pp.

is seen as regards innovative products/services introduced. Superiority of firms in SEZs is revealed by their inclination to introduce innovations rather new to the market, not to the company, as compared to non-SEZs entities. This can be explained by higher export intensity, and it shall be recalled that there is a positive nexus between innovations and exporting. As it has been mentioned before, firms in SEZs are relatively bigger, and the size also translates into higher innovation capacity.

Table 4.12. The firms' sensitivity to future global crisis (% firms)

Level of sensitivity to future crisis	Total	non-SEZ	SEZ	Difference*
Completely resilient	2,2	3,2	1,2	-2,1
Rather resilient	26,9	21,3	32,4	11,1
Have no idea	58,1	61,9	54,3	-7,6
Rather sensitive	8,3	9,1	7,5	-1,6
Very sensitive	4,6	4,5	4,6	0,1

Source: own elaboration based on the survey data.
Explanation: *difference (SEZ – non-SEZ) in pp.

Respondents were asked to give their own opinions about sensitivity to the next, possible global crisis. Firms in SEZs perceive themselves as slightly less sensitive, once it happens (table 4.12). However, the differences are not very high and mostly concern the answer "rather resilient".

Summary and implications for economic policy

Many aspects of SEZs' functioning have been already assessed, with the clear focus on consequences of their functioning on labour market. Foreign trade is rather the neglected aspect of functioning of SEZs, mainly due to lack of comprehensive data. Due to the research done and data collected, it is possible to contribute to the existing stock of knowledge on the consequences of functioning of SEZs, with focus on exporting and importing.

Foreign trade activity is the one on which competitiveness is assessed. The so-called ability to sell is a primarily component of competitiveness. New, new trade theory, that rests on the concept of heterogeneity, assumes that only the most productive and competitive enterprises can become exporters. Productivity that exceeds a certain threshold, enables to cover sunk costs associated with exporting. Assistance given to the zonal firms in the form of the investment incentives, is expected to improve their financial standing, which shall translate into export performance. Moreover, firms operating in SEZs often are foreign owned, which also is expected to positively influence export capacity, however much depends on foreign investors' motivations.

The book depicts many aspects related to foreign trade activity performed by the SEZs firms, compared to the non-SEZs, which in fact represents the most comprehensive study of exports and imports so far performed for Poland's SEZs. The research done is based on several data sources, the most important being information from the Ministry of Entrepreneurship and Technology, which was supplemented by the financial information from InfoCredit and from Customs Chamber. Also the questionnaire survey was done, that enabled to shed light on the qualitative aspects of the zonal firms' operations. As a result, a comprehensive set of data was established, that made the assessment of SEZs firms possible.

Introductory chapter presents theoretical background of privileged areas operations as well as the examples of their functioning in selected countries. As regards foreign trade activity, the research done so far for firms in SEZs is very contextual. Drawing any universal conclusions can hardly be done. SEZs take many forms in particular countries, which makes any cross-country comparisons difficult. Poland's experience corresponds to the context of the European countries in which SEZs are relatively well embodied in the economy and are not the separate, economic enclaves, as for instance in African of Asian economies.

Chapter one depicts the role of SEZs in Poland's foreign trade. The contribution of SEZs to Poland's exports and imports is relatively higher that to country's employment, investments, and the number of exporters and importers. For instance in 2015 SEZs share in Poland's exports was 22 per cent, compared to the share in employment that equalled 2,2 per cent. This is due to foreign direct investment in the SEZs, selection effects and the fact that SEZs attract

the most mobile firms (often with foreign capital). Export capacity of the zonal firms is however highly concentrated in terms of value. A few firms, from automobile industry and to a lesser extent, manufacturers of rubber and plastic products, as well as remaining non-metallic products determines a relatively high share of foreign trade flows. Firms in SEZs in a positive way contribute to Poland's trade balance. This stems from their high competitiveness, in a large extent determined by foreign investors activity, for whom imports is an input into exports. The supremacy of the SEZs firms as regards trade balance also stems from the fact that big importers of petroleum products as well as the bulk of Chinese products are located outside SEZs. This is imports structure broken by the geographical directions in which SEZs differ the most vs. non-SEZs ones, as assessed by the Clarks's diversification index. Geographical and commodity concentration of exports from SEZs is higher than in case of non-SEZs firms.

Chapter two focuses on the regional aspects of SEZs functioning in Poland. One of the main reasons for which SEZs were established in Poland was to support the less developed areas, witnessing socio-economic problems such as unemployment and industrial monoculture.

However, in practise, as the regulations applicable to the establishment of the zones were changing, zones and sub-zones were created in the most developed areas in Poland, with relatively high wages, low unemployment rate and in the most urban ones. Because the SEZs finally concentrated in the prosperous regions of Poland, situated in the proximity to foreign markets and well equipped with infrastructure, SEZs only to the very limited extent contributed to elimination of the regional disparities. Over time, original purpose was forgotten and SEZs or their sub-zones were also established in relatively well-developed areas or even in the most developed ones. The location of sub-zones was also a result of pressure exerted by larger investors (most often with foreign capital) using their strong bargaining position, especially because of local governments competing over investment capital.

The voivodeships, in the economies of which SEZs are most significant, are Dolnośląskie, Podkarpacke, Lubuskie and Warmińsko-Mazurskie. The Dolnośląskie voivodeship is one of the most developed regions of Poland (in terms of GDP per capita, second after the first Mazowieckie voivodeship) which for many years has been developing at a high rate, though it is characterised by its internal diversity (when compared the city of Wrocław to other, peripheral areas of the voivodeship). The Dolnośląskie voivodeship is a region with high potential accessibility (proximity of foreign markets and easy access to them thanks to well-developed transport infrastructure) and a large presence of entities with foreign capital.

As regards only the export activity, the importance of entities operating in SEZs is particularly high for the export activity of the Podkarpackie, Warmińsko-Mazurskie, Dolnośląskie, Lubuskie, and Śląskie voivodeships.

SEZs are not established directly within metropolises; however, the distribution of active businesses operating in the SEZs proves positive correlation between the location of entities in SEZs and the metropolisation processes. The question is how effective counteracting the natural tendency of economic activity to agglomerate can be. The challenge is to attract investors to areas perceived as those, where conducting an economic activity is not profitable.

In chapter three, evaluation of SEZs entities' export competitiveness is presented. SEZs affect competitiveness in several ways, for instance through activation of the less developed regions, inflow of FDI that brings technology and capital resources as well as through agglomeration processes.

The issue of technological advancement and the position of countries on the so-called technological advancement ladder is one of the most important subjects of economic analyses, especially those related to international trade. Technology, and more precisely technological advancement, is a dimension in which competitiveness is analysed. SEZs are an instrument of economic policy and the subject of debates regarding whether and for how long they should be established and if they are effective. In fact, SEZs are a sign of moving away from a purely market-based economy and represent a form of public aid. Therefore, for reasons of political economics, but also because of the applicable laws and regulations on public aid, a comprehensive analysis of various aspects of technological advancement of SEZ businesses is very beneficial in terms of knowledge.

As already proved, contrary to expectations, after 2005 entities operating in SEZs in Poland have been characterised by a lower share of high-tech product export when compared to non-SEZ businesses. What is more, the share of SEZs in nationwide high-tech product imports (since 2008) has been larger, when compared to nationwide high-tech product exports. The resulting image of the activity of SEZ entities may be an effect of the fact that production components imported as high-tech products are inputs to exports, although the exported products are not high-tech. The automotive industry is an example, where advanced electronics or specialist parts are imported, while the exported final products (vehicles) are not classified as high-tech products. This is a reflection of the role of Poland in the international division of labour, which is particularly important, when it comes to the activity of international/supranational corporations. For many of them, the main reason for starting and conducting an economic activity in Poland are low labour costs. This may explain why the export activity is less technologically advanced than the import activity. High technology is embedded in imported high-tech products, which, when exported, "contain" labour and that makes the export activity less technologically advanced.

In terms of economic policy, it would be advisable to issue permits to conduct an economic activity in SEZs in a more selective manner, mostly to high-tech-oriented investors. However, as it is known, it is difficult to enforce since it is often the case that investment plans are too optimistic and certain investors, trying

to get more public aid, overestimate their investments and their technological advancements. What is more, trade-related investment measures (commercial investment policy instruments) cannot be employed.

The analysis of the revealed comparative advantages of exports generated by SEZ businesses shows that such advantages relate mainly to products of the automotive industry (usually parts) and household appliances as well as laundry machinery, lighting equipment, heating and paper. One should note that those products are exported primarily by entities with foreign capital which are part of supranational corporations. The fact that exports generated by SEZ entities are characterised by a greater value per kilogramme, when compared to non-SEZ entities, should also be assessed positively. The analysis of intra-industry trade, contrary to what was expected, indicates it is more intense for non-SEZ entities. In addition, as far as SEZs are concerned, inter-industry trade prevails.

This indirectly proves that entities operating in SEZs are oriented towards large domestic markets. Even before the Poland's EU accession firms tended to localise in proximity to south-western border, were frequently interested in selling their products to Germany. These tendency lasts till now, but owing to the agglomeration process it is observable in the trade data (geographic and sectoral product concentration). However, it requires more research on individual economic operators in order to analyse the import and export concentrations. It is very likely that when it comes to exports generated by SEZs, exports are substantially concentrated. One should also remember that the results achieved may be affected by the quality of the available statistical data, including the fact that certain information on the export activity of individual SEZ businesses is unavailable.

Microeconomic aspects of functioning SEZs in Poland are rarely assessed (Nazarczuk & Umiński, 2018). No access to data for individual business units is a primary obstacle. A survey done on the sample of the zonal firms and the non-SEZ's ones (as a control), enabled to contribute to the stock of existing literature in several ways: (i) differences have been identified between SEZs and non-SEZs firms, (ii) reasons for starting or increasing the scale of exports have been depicted as well as the barriers to start exporting, (iii) the logit model estimated has identified the factors that in a statistically significant way effect the odds ratios of exporting and (iv) impact of the zones' functioning and of the financial and economic crisis on the zonal firms performance has been inquired. The survey results have been merged with data from InfoCredit and from the Ministry of Entrepreneurship and Technology, which makes the data used in the study – unique.

Functioning of the SEZs programme itself is a subject of debate, or even critique, on the grounds of political economy arguments. SEZs represent the form of public aid, which is restricted and monitored on the grounds of the EU competition law. If tax exemptions are offered or any other form of incentives to the business units starting and conducting activity in the zones are provided,

the question is asked about their costs. Therefore any kind of inquiry related to the functioning of the zones deserves research efforts.

There are many reasons why firms in SEZs vs. non-SEZs are expected to differ. These are the size, presence of foreign capital, influence of public aid on financial standing and on the ability to cover the sunk costs attributed to exports, etc. However, many depends on the circumstances attributed to the particular business entities. For instance foreign ownership, export activity and functioning within the SEZs – are good examples of the complexity of the relations inquired. Many depends on the position that a particular entity has in the overall structure of the MNE. Also regional fixed effects, as well as the sectoral ones, are important. SEZs in Poland differ in many terms. Not all of them have attracted serious (big) investors with significant innovative and export potential. Not all attracted foreign direct investors at all. Zones and their subzones are situated in various regions, having different characteristics, incl., transport infrastructure, proximity to large European market(s), access to skilled and unskilled labour etc.

The SEZs firms are more intensively engaged in foreign trade which manifests in higher exports and imports ratios to revenue from total sales. However the estimations done within the logit model showed that the localisation in the SEZ does not increase the odds of being exporter, if regional fixed effects are included as well as the sectoral ones according to the Pavitt's Classification. As it was mentioned – each zone is specific, many subzones were established, the rationale of their establishment is often unclear, the critical mass of innovative and export potential has not always been reached. This fact shall be take into account in any discussion related to the future of SEZs' programme in Poland, including the its implementation on all the Poland's territory.

Cooperation in the sphere of research and development is the factor that seriously increases the probability of exporting, which corresponds to the extensive export margin, which is recommended in the literature as the desired way to increase exports. This kind of cooperation shall be promoted, allocated public funds and best practise shall be disseminated. It seems however a serious challenge in Poland, because the culture of sharing knowledge and experience is poor. However in the global, competitive economy it is a necessity. It is heterogeneity theory that predicts the nexus between innovation capacity (incl. R&D efforts) and exporting – that has been proved in the logit model estimated. Overall conclusion from the modelling is that not necessarily SEZs per se, but rather other factors as the company size, to some extent foreign ownership and already mentioned ability to cooperate in the sphere of R&D – increase the probability of exporting.

Another important factor that deserves attention are the consequences of the financial and economic crisis, that can be treated as a "stress test" for the economic condition, sensitivity, vulnerability and adaptive capacity. Resilience to the crisis sheds interesting light on the nature of the SEZs and the firms

operating within. Firms operating in the SEZs have been more effected by the crisis, compared to the non-SEZs ones, which can be explained by the higher export intensity. The obtained results however are incomprehensive and need further analysis, as for instance decline in domestic demand has been ranked higher that the decline of foreign market demand.

Firms in SEZs are those that take more active attitude as far as reducing of sensitivity to the crisis is concerned. This is due to their awareness about the nature of the crisis and to the fact of being more exposed to the risks attributed to foreign markets.

Several policy implications can be formulated as regards the functioning of the SEZ programme in Poland and its future:

1. The study of foreign trade activity of firms in SEZs' in Poland showed many interesting aspects of the zones operations. It shall however be continued in the forthcoming years, because the number of the zonal firms is increasing, new foreign owned investors are attracted to the zones and Brexit will probably make Poland relatively more attractive for those investors that were initially going to invest in the UK.

2. While discussing the pros and cons of continuing and extending the SEZs programme in Poland, also trade aspects shall be taken into account. SEZs' influence on Poland's exports performance is mixed. Firms operating in the SEZs positively contribute to Poland's overall trade balance. However the technological advancement of the zonal firms exports is lower than the non-SEZs ones. Also their intra-industry trade intensity is lower. Logit model showed that the localisation in SEZs does not increase the probability that a firm is an exporter (exports extensive margin), however it increases exports intensity (share of exports in turnover). High exports intensity makes however zonal firms sensitive/vulnerable to the consequences of the economic shocks. Overall conclusion from the modelling is that not necessarily SEZs per se, but rather other factors as the company size, to some extent foreign ownership and already mentioned ability to cooperate in the sphere of R&D – increase the probability of exporting.

3. Less – than expected – positive consequences of functioning of the SEZs depicted, probably stem from the fact that sub-zones of the existing zones have proliferated, which does not guarantee a critical mass, required in order to significantly affect the economy of Poland. Thus economic policy in the future shall make the SEZs programme more concentrated on the really less developed regions, that have fewer chances to attract investors otherwise. The high share of SEZs in the economies of such competitive/ highly developed voivodeships as the Dolnośląskie voivodeship, but also the Śląskie, Wielkopolskie, and Małopolskie voivodeships rather supports the thesis that the function of an SEZ is no longer to eliminate differences in regional development.

4. Cooperation in the sphere of research and development shall be promoted – as it is the factor that seriously increases the probability of exporting, which corresponds to the extensive export margin, which is recommended in the literature (Mayer & Ottaviano, 2007) as the desired way to increase exports. This kind of cooperation shall be promoted, allocated public funds and best practise shall be disseminated.

5. The results of RCA-based study revealed higher product concentration of exports within SEZs, which were to a large extent a consequence of high product and investment specialisation, owing to legal restrictions concerning selected types of activity only allowed in SEZs. The SEZs support is granted to selected branches of economic activity only. By a more preferential treatment of firms willing to be more competitive or innovative, the export-oriented the positive effects of the overall SEZs programme may increase.

6. New regulations coming into effect at the time of publication of this book, imply support to firms located throughout the country without territorial restrictions as it was earlier. Thus, firms do not have to move into designated SEZs plots in order to take advantage of tax exemptions, what should result in a reduction of time to obtain such a privilege and start company's operation. Tax exemptions will be granted to a specified time (10, 12 or 15 years), depending on the level of EU regional aid granted to regions. Tax preferences will be dependent of the location of investment, character and quality of created workplaces. Additional points will be assigned to projects having significant impact on regional competitiveness and innovativeness (e.g. knowledge/technology transfer, emergence of clusters, R&D activity) as well as cooperation with vocational schools. The level of minimum required capital formation will be adjusted to the size of a company, that is why also small companies may take advantage of tax exemptions in SEZs. The new act reorganizes the territorial scope of land managed by 14 companies supervising SEZs operation. From now on, Poland will be divided into 14 areas, according to the location of SEZs managing companies, which will stop the inter-SEZs competition for better investment plots and prevent the situation where in one region operating 5 different SEZs managing companies were offering investment plots[15]. Finally, the new SEZs bill does not change the situation of firms that have obtained SEZs permits before the new act takes effect.

[15] The division of Poland into 14 areas managed by different SEZs companies can be found under the webpage: http://prawo.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20180001698

List of figures

List of tables

Appendix

Table A.1. Commodities with the highest share in SEZ exports (2-digit HS)

No.	HS	CN Chapter	%	HS	CN Chapter	%
		2005			**2013**	
1	87	Vehicles other than Railway or Tramway Rolling Stock, and Parts …	37,0	87	Vehicles other than Railway or Tramway Rolling Stock, and Parts …	25,1
2	84	Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts thereof	23,4	84	Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts thereof	20,8
3	85	Electrical Machinery and Equipment and Parts thereof; Sound Recorders and Reproducers, Television Image ...	13,3	85	Electrical Machinery and Equipment and Parts thereof; Sound Recorders and Reproducers, Television Image ...	12,7
4	94	Furniture; Bedding, Mattresses, Mattress Supports, Cushions and Similar …	4,9	94	Furniture; Bedding, Mattresses, Mattress Supports, Cushions and Similar …	7,6
5	40	Rubber and Articles thereof	3,8	40	Rubber and Articles thereof	5,0
6	48	Paper and Paperboard; Articles of Paper Pulp…	3,6	48	Paper and Paperboard; Articles of Paper Pulp…	4,7
7	49	Printed Books, Newspapers, Pictures …	1,7	39	Plastics and Articles thereof	3,8
8	73	Articles of Iron or Steel	1,7	70	Glass and Glassware	2,5
9	39	Plastics and Articles thereof	1,5	73	Articles of Iron or Steel	2,1
10	70	Glass and Glassware	1,2	88	Aircraft, Spacecraft, And Parts Thereof	1,7
11	69	Ceramic Products	0,8	96	Miscellaneous Manufactured Articles	1,1
12	90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus...	0,7	69	Ceramic Products	1,1
13	44	Wood and Articles of Wood; Wood Charcoal	0,7	90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus...	1,1
14	63	Other Made-Up Textile Articles…	0,6	49	Printed Books, Newspapers, Pictures …	1,0
15	59	Impregnated, Coated, Covered Or Laminated Textile Fabrics…	0,5	76	Aluminium and Articles thereof	1,0

Source: own compilation based on Customs Chamber and the Ministry of Entrepreneurship and Technology data.

Explanation: Only first 15 most significant chapters at 2-digit CN level are presented.

Table A.2. Commodities with the highest share in SEZ imports (2-digit HS)

No.	CN	CN Chapter	%	CN	CN Chapter	%
		2005			**2013**	
1	84	Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts thereof	28,7	84	Nuclear Reactors, Boilers, Machinery and Mechanical Appliances; Parts thereof	25,3
2	85	Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Reproducers, Television Image ...	20,0	85	Electrical Machinery and Equipment and Parts Thereof; Sound Recorders and Reproducers, Television Image ...	19,1
3	87	Vehicles other than Railway or Tramway Rolling Stock, and Parts and Accessories thereof	14,1	87	Vehicles other than Railway or Tramway Rolling Stock, and Parts and Accessories thereof	10,6
4	39	Plastics and Articles thereof	5,9	39	Plastics and Articles thereof	7,1
5	73	Articles of Iron or Steel	4,5	40	Rubber and Articles thereof	4,3
6	40	Rubber and Articles thereof	3,8	73	Articles of Iron or Steel	3,7
7	48	Paper and Paperboard; Articles of Paper Pulp…	2,4	48	Paper and Paperboard; Articles of Paper Pulp…	3,5
8	94	Furniture; Bedding, Mattresses, Mattress Supports, Cushions and Similar...	2,4	72	Iron and Steel	2,9
9	90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus…	2,0	90	Optical, Photographic, Cinematographic, Measuring, Checking, Precision, Medical or Surgical Instruments and Apparatus…	2,6
10	72	Iron and Steel	1,9	76	Aluminium and articles thereof	2,5
11	76	Aluminium and articles thereof	1,4	38	Miscellaneous Chemical Products	1,1
12	29	Organic Chemicals	1,4	29	Organic Chemicals	1,1
13	54	Man-Made Filaments; Strip and The Like of Man-Made Textile Materials	1,1	47	Pulp Of Wood Or Of Other Fibrous Cellulosic Material; Recovered (Waste And Scrap) Paper Or Paperboard	1,1
14	70	Glass and Glassware	1,0	32	Tanning or Dyeing Extracts; Tannins and Their Derivatives; Dyes, Pigments…	1,0
15	32	Tanning or Dyeing Extracts; Tannins and Their Derivatives; Dyes, Pigments…	1,0	70	Glass and Glassware	1,0

Source: own compilation based on Customs Chamber and the Ministry of Entrepreneurship and Technology data.

Explanation: Only first 15 most significant chapters at 2-digit CN level are presented.

Table A.3. Destinations of exports in SEZs in Poland (the table lasts for a few pages)

Country	2004	2008	2010	2014	delta=2014-2004 [pp.]
1	2	3	4	5	6
DE	39,73%	26,31%	28,91%	28,79%	-10,94
GB	6,69%	8,65%	8,18%	7,91%	1,22
FR	8,71%	8,65%	8,78%	6,74%	-1,97
CZ	2,37%	4,57%	5,21%	5,90%	3,52
IT	3,98%	5,26%	5,96%	4,66%	0,68
ES	1,82%	4,57%	5,07%	4,30%	2,48
NL	1,65%	3,81%	3,79%	3,37%	1,73
RU	1,59%	4,81%	3,60%	3,09%	1,50
HU	4,62%	3,61%	2,37%	2,98%	-1,65
US	0,90%	1,27%	1,90%	2,87%	1,97
SE	5,91%	4,60%	3,89%	2,67%	-3,24
TR	1,51%	1,66%	2,13%	2,66%	1,15
BE	4,78%	2,71%	2,53%	2,51%	-2,26
SK	1,05%	1,76%	2,04%	2,25%	1,19
AT	1,09%	2,12%	2,03%	1,69%	0,61
RO	0,50%	1,04%	1,05%	1,38%	0,88
UA	1,58%	1,58%	1,27%	1,15%	-0,43
CH	0,23%	0,75%	0,91%	0,98%	0,75
EE	0,13%	0,29%	0,23%	0,90%	0,77
DK	0,69%	0,97%	0,97%	0,89%	0,20
CN	0,29%	0,55%	0,61%	0,87%	0,58
NO	0,20%	0,85%	0,67%	0,72%	0,52
LT	0,52%	0,78%	0,40%	0,67%	0,15
CA	0,05%	0,20%	0,23%	0,54%	0,49
PT	3,07%	0,75%	0,78%	0,54%	-2,54
FI	0,22%	0,84%	0,56%	0,48%	0,27
JP	0,31%	0,17%	0,25%	0,47%	0,15
KR	0,08%	0,20%	0,22%	0,44%	0,36
MX	0,54%	0,13%	0,09%	0,43%	-0,11
LV	0,27%	0,58%	0,40%	0,43%	0,16
XS	0,00%	0,06%	0,16%	0,42%	0,42
ZA	0,04%	0,27%	0,36%	0,40%	0,36
BR	0,18%	0,21%	0,17%	0,39%	0,22
IL	0,05%	0,22%	0,28%	0,36%	0,30
BY	0,21%	0,24%	0,26%	0,35%	0,13

cont. Table A.3

1	2	3	4	5	6
GR	0,31%	0,81%	0,72%	0,34%	0,03
SI	0,13%	0,38%	0,40%	0,31%	0,18
SA	0,00%	0,13%	0,08%	0,27%	0,27
DZ	0,02%	0,13%	0,05%	0,26%	0,24
IE	0,08%	0,26%	0,19%	0,24%	0,16
AU	2,14%	0,39%	0,35%	0,23%	-1,91
IN	0,01%	0,04%	0,07%	0,23%	0,22
BG	0,28%	0,35%	0,17%	0,22%	-0,06
KZ	0,06%	0,07%	0,15%	0,19%	0,14
MA	0,09%	0,04%	0,05%	0,18%	0,09
AE	0,02%	0,78%	0,08%	0,18%	0,16
MY	0,02%	0,02%	0,02%	0,18%	0,16
TW	0,03%	0,09%	0,18%	0,17%	0,15
EG	0,00%	0,04%	0,09%	0,16%	0,16
HR	0,17%	0,18%	0,11%	0,12%	-0,04
SG	0,04%	0,07%	0,04%	0,11%	0,07
TH	0,02%	0,02%	0,06%	0,08%	0,06
MD	0,04%	0,03%	0,04%	0,07%	0,03
ID	0,34%	0,00%	0,03%	0,07%	-0,28
LU	0,01%	0,09%	0,05%	0,06%	0,06
BA	0,00%	0,06%	0,05%	0,06%	0,06
SM	0,00%	0,05%	0,05%	0,05%	0,05
UZ	0,01%	0,01%	0,02%	0,05%	0,04
QA	0,00%	0,21%	0,01%	0,04%	0,04
VN	0,00%	0,01%	0,01%	0,04%	0,04
TN	0,17%	0,03%	0,03%	0,04%	-0,12
CL	0,00%	0,01%	0,02%	0,04%	0,04
HK	0,03%	0,02%	0,03%	0,04%	0,01
AZ	0,02%	0,01%	0,01%	0,04%	0,02
AR	0,00%	0,04%	0,06%	0,04%	0,03
JO	0,01%	0,02%	0,03%	0,04%	0,03
KW	0,01%	0,02%	0,02%	0,03%	0,03
NZ	0,12%	0,01%	0,01%	0,03%	-0,09
IQ	0,00%	0,00%	0,01%	0,03%	0,03
PE	0,00%	0,00%	0,01%	0,03%	0,03
PK	0,00%	0,03%	0,01%	0,03%	0,03

cont. Table A.3

1	2	3	4	5	6
GE	0,00%	0,01%	0,01%	0,03%	0,02
PH	0,00%	0,00%	0,01%	0,03%	0,02
MK	0,00%	0,01%	0,01%	0,03%	0,02
CO	0,00%	0,01%	0,01%	0,03%	0,02
OM	0,00%	0,16%	0,01%	0,03%	0,03
AM	0,00%	0,00%	0,00%	0,02%	0,02
BD	0,00%	0,01%	0,01%	0,02%	0,02
AL	0,00%	0,01%	0,02%	0,02%	0,02
LB	0,01%	0,00%	0,03%	0,02%	0,01
IR	0,01%	0,01%	0,06%	0,02%	0,00
PA	0,00%	0,00%	0,00%	0,01%	0,01
CI	0,00%	0,01%	0,01%	0,01%	0,01
XK	0,00%	0,00%	0,01%	0,01%	0,01
ET	0,00%	0,00%	0,00%	0,01%	0,01
TM	0,00%	0,00%	0,00%	0,01%	0,01
NG	0,02%	0,05%	0,02%	0,01%	-0,01
LK	0,00%	0,03%	0,02%	0,01%	0,01
MT	0,00%	0,01%	0,01%	0,01%	0,01
UY	0,00%	0,01%	0,00%	0,01%	0,01
CM	0,00%	0,00%	0,00%	0,01%	0,01
GH	0,00%	0,02%	0,04%	0,01%	0,01
ME	0,00%	0,00%	0,01%	0,01%	0,01
BH	0,00%	0,00%	0,00%	0,01%	0,01
IS	0,02%	0,01%	0,01%	0,01%	-0,02
QR	0,00%	0,00%	0,00%	0,01%	0,01
QS	0,00%	0,00%	0,00%	0,01%	0,01
AO	0,00%	0,00%	0,00%	0,01%	0,01
VE	0,01%	0,01%	0,00%	0,01%	0,00
EC	0,00%	0,00%	0,01%	0,01%	0,01
SY	0,00%	0,01%	0,03%	0,00%	0,00
CY	0,00%	0,03%	0,02%	0,00%	0,00
KE	0,00%	0,00%	0,01%	0,00%	0,00

Source: own compilation. First column presents two-letter abbreviations of country names.

Table A.4. Destinations of imports in SEZs in Poland (the table lasts for a few pages)

Country	2004	2008	2010	2014	delta=2014-2004 [pp.]
1	2	3	4	5	6
DE	46,46%	39,94%	32,17%	31,41%	-15,05
CN	0,45%	6,83%	9,27%	11,20%	10,76
IT	8,70%	6,73%	5,02%	6,39%	-2,31
KR	0,17%	6,11%	11,68%	5,53%	5,36
FR	4,44%	3,87%	3,10%	4,22%	-0,22
NL	2,28%	2,72%	2,46%	3,37%	1,09
CZ	2,45%	2,90%	3,18%	3,35%	0,91
US	1,06%	1,31%	2,81%	3,23%	2,17
HU	3,63%	2,39%	1,90%	2,71%	-0,91
ES	2,62%	2,08%	2,24%	2,47%	-0,15
AT	4,12%	4,24%	3,47%	2,28%	-1,84
JP	4,78%	3,08%	2,43%	2,16%	-2,62
SE	2,73%	1,82%	2,11%	2,07%	-0,66
SK	1,12%	1,56%	1,36%	1,80%	0,68
GB	2,71%	1,68%	1,58%	1,72%	-0,99
BE	2,54%	2,08%	1,66%	1,60%	-0,94
CH	0,67%	0,41%	0,32%	1,18%	0,51
MY	0,04%	0,17%	0,61%	1,17%	1,13
RO	1,28%	0,64%	0,99%	1,14%	-0,14
TR	0,47%	0,47%	0,76%	0,90%	0,43
RU	0,03%	0,65%	0,67%	0,84%	0,81
FI	0,57%	1,24%	0,84%	0,80%	0,23
TW	0,30%	0,36%	2,13%	0,70%	0,40
TH	0,01%	0,45%	1,09%	0,64%	0,62
SI	0,42%	0,67%	0,52%	0,54%	0,12
NO	0,09%	0,20%	0,21%	0,54%	0,45
DK	0,32%	0,56%	0,52%	0,48%	0,16
HK	0,45%	0,35%	0,49%	0,47%	0,02
PT	0,23%	0,44%	0,57%	0,37%	0,14
IN	0,04%	0,08%	0,12%	0,36%	0,32
ID	0,09%	0,31%	0,41%	0,34%	0,25
SG	2,54%	0,37%	0,55%	0,31%	-2,24
UA	0,10%	0,20%	0,20%	0,29%	0,19
AE	0,01%	0,01%	0,01%	0,23%	0,23
LU	0,03%	0,17%	0,20%	0,22%	0,19

cont. Table A.4

1	2	3	4	5	6
CI	0,00%	0,07%	0,06%	0,21%	0,21
LT	0,01%	0,11%	0,09%	0,19%	0,18
BR	0,06%	0,42%	0,30%	0,19%	0,13
PH	0,03%	0,15%	0,16%	0,18%	0,16
BG	0,06%	0,04%	0,04%	0,18%	0,11
CA	0,50%	0,12%	0,19%	0,17%	-0,33
MX	0,02%	0,13%	0,11%	0,17%	0,15
BY	0,10%	0,29%	0,31%	0,16%	0,05
EC	0,02%	0,01%	0,01%	0,13%	0,11
EE	0,26%	0,06%	0,09%	0,12%	-0,14
IE	0,26%	0,12%	0,10%	0,11%	-0,15
IL	0,05%	0,07%	0,05%	0,11%	0,06
ZA	0,02%	0,61%	0,22%	0,10%	0,08
XS	0,00%	0,08%	0,04%	0,10%	0,10
PK	0,00%	0,01%	0,00%	0,08%	0,08
VN	0,00%	0,01%	0,06%	0,08%	0,08
HR	0,06%	0,06%	0,07%	0,06%	-0,01
GR	0,11%	0,09%	0,05%	0,05%	-0,06
LV	0,04%	0,13%	0,05%	0,05%	0,01
GH	0,00%	0,01%	0,01%	0,04%	0,04
MA	0,00%	0,00%	0,00%	0,03%	0,03
TN	0,00%	0,01%	0,02%	0,03%	0,03
QW	0,00%	0,14%	0,06%	0,03%	0,03
LI	0,00%	0,00%	0,00%	0,03%	0,03
MD	0,00%	0,00%	0,03%	0,03%	0,03
SA	0,00%	0,00%	0,01%	0,03%	0,02
UY	0,00%	0,00%	0,00%	0,03%	0,03
DZ	0,00%	0,00%	0,00%	0,02%	0,02
NG	0,00%	0,00%	0,02%	0,02%	0,02
KZ	0,00%	0,00%	0,01%	0,02%	0,02
OM	0,02%	0,01%	0,00%	0,02%	0,00
ET	0,00%	0,00%	0,00%	0,02%	0,02
EG	0,02%	0,01%	0,01%	0,02%	-0,01
MT	0,01%	0,00%	0,00%	0,01%	0,00
AU	0,03%	0,01%	0,00%	0,01%	-0,01
BD	0,03%	0,00%	0,00%	0,01%	-0,01

cont. Table A.4

1	2	3	4	5	6
GA	0,00%	0,00%	0,00%	0,01%	0,01
CO	0,01%	0,00%	0,00%	0,01%	0,01
BA	0,00%	0,01%	0,00%	0,01%	0,01
PE	0,00%	0,00%	0,00%	0,01%	0,01
CL	0,00%	0,00%	0,00%	0,01%	0,01
CM	0,00%	0,02%	0,04%	0,01%	0,01
MK	0,00%	0,00%	0,00%	0,01%	0,01
QA	0,00%	0,00%	0,00%	0,01%	0,01
GN	0,00%	0,01%	0,02%	0,01%	0,01
CR	0,00%	0,00%	0,00%	0,01%	0,01
LK	0,00%	0,00%	0,00%	0,01%	0,00
IR	0,00%	0,01%	0,00%	0,01%	0,00
CC	0,00%	0,00%	0,00%	0,01%	0,01
AR	0,01%	0,02%	0,00%	0,00%	-0,01

Source: own elaboration. First column presents two-letter abbreviations of country names.

Table A.5. Classification of technological advancement of industrial activity

Sector	Manufacturing	NACE Rev. 2
High-technology	Manufacture of basic pharmaceutical products and pharmaceutical preparations	21
	Manufacture of computer, electronic and optical products	26
	Manufacture of air and spacecraft and related machinery	30.3
Medium high-technology	Manufacture of chemicals and chemical products	20
	Manufacture of weapons and ammunition	25.4
	Manufacture of electrical equipment	27
	Manufacture of machinery and equipment n.e.c.	28
	Manufacture of motor vehicles, trailers and semi-trailers	29
	Manufacture of railway locomotives and rolling stock	30.2
	Manufacture of military fighting vehicles	30.4
	Manufacture of transport equipment n.e.c.	30.9
	Manufacture of medical and dental instruments and supplies	32.5
Medium low-technology	Reproduction of recorded media	18.2
	Manufacture of coke and refined petroleum products	19
	Manufacture of rubber and plastic products	22
	Manufacture of other non-metallic mineral products	23
	Manufacture of basic metals	24
	Manufacture of fabricated metal products, except machinery and equipment excluding manufacturing of weapons and ammunition	25 without 25.4
	Building of ships and boats	30.1
	Repair and installation of machinery and equipment	33
Low-technology	Manufacture of food products	10
	Manufacture of beverages	11
	Manufacture of tobacco products	12
	Manufacture of textiles	13
	Manufacture of wearing apparel	14
	Manufacture of leather and related products	15
	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	16
	Manufacture of paper and paper products	17
	Printing and service activities related to printing	18.1
	Manufacture of furniture	31
	Other manufacturing excluding manufacturing of medical and dental instruments and supplies	32 without 32.5

Source: Own compilation based on (GUS, 2015, pp. 197–198).

Table A.6. Technological advancement of service activities

	Sector	Services	NACE Rev. 2
Knowledge-intensive services (KIS)	High-tech services	Motion picture, video and television programme production, sound recording and music publishing activities	59
		Programming and broadcasting activities	60
		Telecommunications	61
		Computer programming, consultancy and related activities	62
		Information service activities	63
		Scientific research and development	72
	Market services (excluding financial and high-tech services)	Water transport	50
		Air transport	51
		Legal and accounting activities	69
		Activities of head offices; management consultancy activities	70
		Architectural and engineering activities; technical testing and analysis	71
		Advertising and market research	73
		Other professional, scientific and technical activities	74
		Employment activities	78
		Security and investigation activities	80
	Financial services	Financial and insurance activities	64-66
	Other	Publishing activities	58
		Veterinary activities	75
		Public administration and defence; compulsory social security	84
		Education	85
		Human health and social work activities	86-88
		Arts, entertainment and recreation	90-93
Less knowledge-intensive services (LKIS)	Market services	Wholesale and retail trade; repair of motor vehicles and motorcycles	45-47
		Land transport and transport via pipelines	49
		Warehousing and support activities for transportation	52
		Accommodation and food service activities	55-56
		Real estate activities	68
		Rental and leasing activities	77
		Travel agency, tour operator and other reservation service and related activities	79
		Services to buildings and landscape activities	81
		Office administrative, office support and other business support activities	82
		Repair of computers and personal and household goods	95
	Other	Postal and courier activities	53
		Activities of membership organisations	94
		Other personal service activities	96
		Activity of households as employers of domestic personnel and undifferentiated goods- and services-producing activities of private households for own use	97-98
		Activities of extraterritorial organisations and bodies	99

Source: Eurostat, Working Group Meeting on Statistics on Science, Technology and Innovation, Luxembourg 27-28 November 2008.

Table A.7. Classification of high-tech foreign trade by subgroups of products

Group	Code	Title
1	2	3
Aerospace	(714-714.89-714.99)+	Aeroplane motors, excluding 714.89 and 714.99
	792.1+	Helicopters
	792.2+792.3+792.4+	Aeroplanes and other aircraft, mechanically-propelled (other than helicopters)
	792.5+	Spacecraft (including satellites) and spacecraft launch vehicles
	792.91+	Propellers and rotors and parts thereof
	792.93+	Undercarriages and parts thereof
	874.11	Direction finding compasses; other navigational instruments and appliances
Computers, office machines	751.94+	Multifunction office machines, capable of connecting to a computer or a network
	751.95+	Other office machines, capable of connecting to computer or a network
	752+	Computers
	759.97	Parts and accessories of group 752
Electronics telecommunications	763.31+	Sound recording or reproducing apparatus operated by coins, bank cards, etc
	763.8+	Video apparatus
	(764-764.93-764.99)+	Telecommunications equipment, excluding 764.93 and 764.99
	772.2+	Printed circuits
	772.61+	Electrical boards and consoles < 1000V
	773.18+	Optical fibre cables
	776.25+	Microwave tubes
	776.27+	Other valves and tubes
	776.3+	Semiconductor devices
	776.4+	Electronic integrated circuits
	776.8+	Piezoelectric crystals
	898.44+	Optical media
	898.46	Semiconductor media
Pharmacy	541.3+	Antibiotics
	541.5+	Hormones and their derivatives
	541.6+	Glycosides, glands, antisera, vaccines
	542.1+	Medicaments containing antibiotics or derivatives thereof
	542.2	Medicaments containing hormones or other products of subgroup 541.5

cont. Table A.7

1	2	3
Scientific instruments	774+	Electrodiagnostic apparatus for medicine or surgery and radiological apparatus
	871+	Optical instruments and apparatus
	872.11+	Dental drill engines
	(874-874.11-874.2)+	Measuring instruments and apparatus, excluding 874.11, 874.2
	881.11+	Photographic cameras
	881.21+	Cinematographic cameras
	884.11+	Contact lenses
	884.19+	Optical fibres other than those of heading 773.1
	(899.6-899.65-899.69)	Orthopaedic appliances, excluding 899.65, 899.69
Electrical machinery	778.6-778.61-778.66-	Electrical capacitors, fixed, variable or adjustable, excluding 778.61, 778.66, 778.69
	778.69)+	Electrical machines, having individual functions
	778.7+	Electrical machines and apparatus, having individual functions, n.e.s.; parts thereof
	778.84	Electric sound or visual signalling apparatus
Chemistry	522.22+	Selenium, tellurium, phosphorus, arsenic and boron
	522.23+	Silicon
	522.29+	Calcium, strontium and barium
	522.69+	Other inorganic bases
	525+	Radioactive materials
	531+	Synthetic organic colouring matter and colour lakes
	574.33+	Polyethylene terephthalate
	591	Insecticides, disinfectants
Non-electrical machinery	714.89+	Other gas turbines
	714.99+	Part of gas turbines
	718.7+	Nuclear reactors and parts thereof, fuel elements, etc
	728.47+	Machinery and apparatus for isotopic separation
	731.1+	Machine-tools working by laser or other light or photon beam, etc
	731.31+	Horizontal lathes, numerically controlled
	731.35+	Other lathes, numerically controlled
	731.42+	Other drilling machines, numerically controlled
	731.44+	Other boring-milling machines, numerically controlled
	731.51+	Milling machines, knee-type, numerically controlled
	731.53+	Other milling machines, numerically controlled
	731.61+	Flat-surface grinding machines, numerically controlled
	731.63+	Other grinding machines, numerically controlled

cont. Table A.7

1	2	3
	731.65+	Sharpening machines, numerically controlled
	733.12+	Bending, folding, straightening or flattening machines, numerically controlled
	733.14+	Shearing machines, numerically controlled
	733.16+	Punching machines, numerically controlled
	735.9+	Parts and accessories of 731 and 733
	737.33+	Machines and apparatus for resistance welding of metal, fully or partly automatic
	737.35	Machines and apparatus for arc welding of metal, fully or partly automatic
Armament	891	Arms and ammunition

Source: Eurostat, Eurostat indicators on High-tech industry and Knowledge – intensive services. Annex 5 – High-tech aggregation by SITC Rev. 4, available at: http://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an5.pdf

Table A.8. Structure of high-tech exports in SEZs, non-SEZ and Poland (in %)

Scope	Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
SEZ	Aerospace	5,4	5,6	8,3	11,8	12,7	17,9	30,8	38,8	46,2	54,1
	Computers & office machinery	0,4	6,5	4,7	0,7	3,9	0,3	0,0	0,0	0,1	0,2
	Electronics & telecommunications	87,6	75,0	73,1	70,3	65,9	61,1	49,3	40,5	35,9	27,7
	Pharmacy	2,6	2,9	2,9	3,2	2,7	4,2	4,6	5,9	5,3	6,0
	Scientific instruments	3,2	6,7	7,1	9,2	9,9	11,2	10,3	8,3	6,9	8,5
	Electrical machinery	0,1	0,2	1,3	1,2	1,5	1,5	2,2	3,2	1,8	1,1
	Non-electrical machinery	0,7	0,5	0,7	1,5	1,0	1,3	0,8	1,0	1,3	0,6
	Chemistry	0,0	2,5	2,0	2,0	2,4	2,5	1,9	2,2	2,5	1,8
	Armament	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Poland	Aerospace	7,6	6,7	7,7	6,7	6,8	8,7	10,1	11,0	12,5	14,9
	Computers & office machinery	4,0	4,4	4,2	3,1	14,4	24,4	23,3	19,8	18,6	14,5
	Electronics & telecommunications	58,6	57,5	58,5	63,0	51,8	39,5	41,7	41,6	42,1	42,6
	Pharmacy	6,6	8,3	8,5	9,0	10,2	11,8	12,3	12,4	12,4	13,4
	Scientific instruments	11,8	10,7	9,3	8,0	7,3	7,2	7,1	8,4	7,7	8,1
	Electrical machinery	3,4	3,2	3,2	2,9	3,2	2,5	1,9	2,3	1,9	1,8
	Non-electrical machinery	3,8	3,5	3,5	3,5	2,7	3,0	1,5	2,2	2,1	2,2
	Chemistry	3,7	3,5	3,2	2,3	2,4	1,6	1,4	2,2	2,4	2,3
	Armament	0,5	2,2	2,0	1,4	1,3	1,3	0,7	0,2	0,2	0,3
non-SEZ	Aerospace	8,0	6,8	7,6	6,0	6,0	7,8	7,9	7,8	8,2	8,7
	Computers & office machinery	4,6	4,0	4,1	3,5	15,7	26,8	25,7	22,1	21,0	16,7
	Electronics & telecommunications	53,5	54,7	56,2	61,9	50,0	37,3	40,9	41,7	42,9	45,0
	Pharmacy	7,3	9,2	9,4	9,9	11,2	12,6	13,0	13,2	13,3	14,5
	Scientific instruments	13,4	11,4	9,6	7,8	7,0	6,8	6,7	8,4	7,8	8,0
	Electrical machinery	4,0	3,6	3,5	3,1	3,4	2,5	1,9	2,2	1,9	1,9
	Non-electrical machinery	4,3	4,0	3,9	3,8	2,9	3,2	1,6	2,3	2,2	2,5
	Chemistry	4,4	3,7	3,3	2,3	2,3	1,5	1,4	2,1	2,4	2,4
	Armament	0,6	2,5	2,3	1,6	1,5	1,5	0,8	0,2	0,2	0,3

Source: own compilation.
Explanations: in 2005 the methodology of data on foreign trade obtainment have changed. Calculations done at 4-digit SITC rev. 4 level.

Table A.9. Cluster robustness tests – identification of the number of groups according to the clustering method

Criterion	Ward	single linkage	mean weighted linkage	centroid	median linkage	complete linkage
Duda-Hart	4	5	5	4	4	4

Source: own compilation.

Table A.10. Comparison of clustering results of voivodships by different methods – for selected a priori 4 clusters

Voivodship	Ward	single linkage	mean weighted linkage	centroid	median linkage	complete linkage
Dolnośląskie	1	1	1	1	1	1
Kujawsko-pomorskie	3	4	3	3	3	3
Lubelskie	3	4	3	3	3	3
Lubuskie	4	4	3	3	3	3
Łódzkie	2	4	4	3	3	4
Małopolskie	4	4	3	3	3	3
Mazowieckie	4	4	3	3	3	4
Opolskie	3	4	3	3	3	3
Podkarpackie	2	4	4	3	3	4
Podlaskie	3	4	3	3	3	3
Pomorskie	4	4	3	3	3	3
Śląskie	1	2	2	2	2	2
Świętokrzyskie	3	4	3	3	3	3
Warmińsko-mazurskie	4	4	3	3	3	3
Wielkopolskie	2	3	4	4	4	4
Zachodniopomorskie	3	4	3	3	3	3

Source: own compilation.

Share of SEZs in regional economies against their contribution to GDP in Poland in 2014.

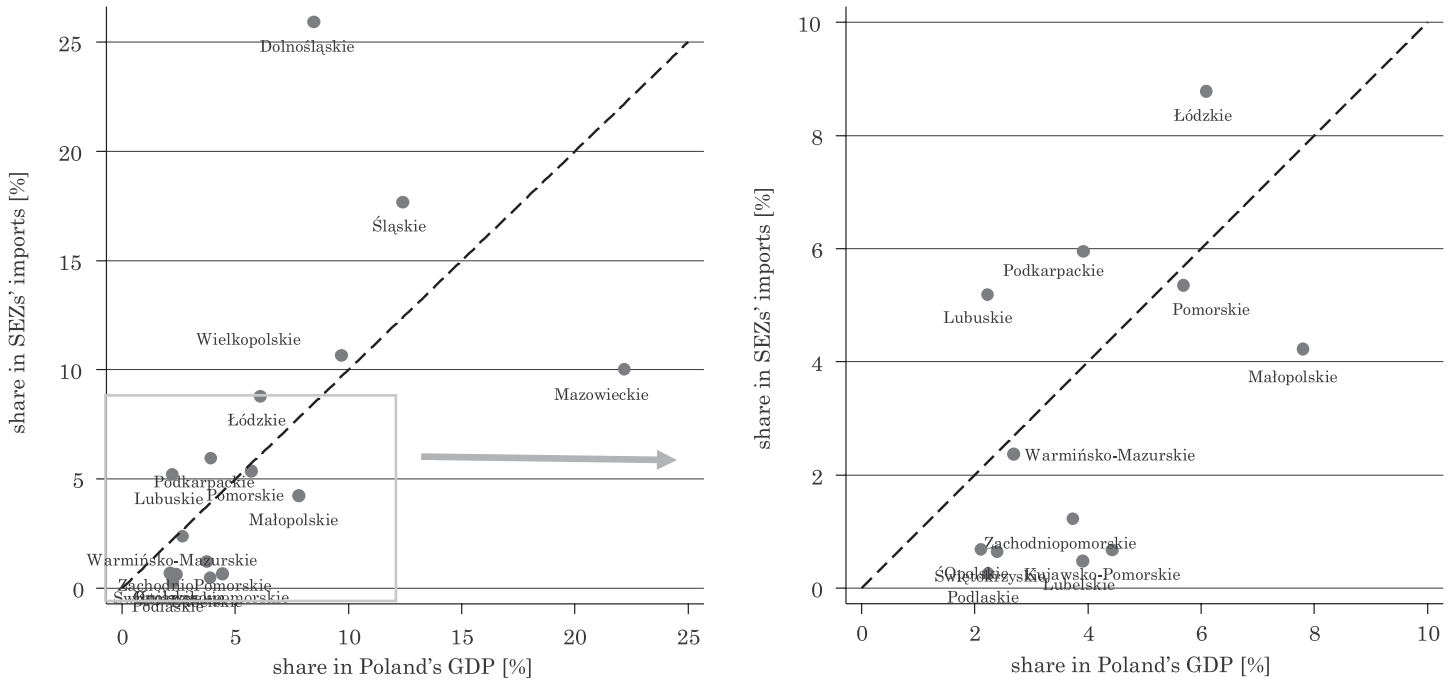

Fig. A.1. Share of imports generated in SEZ by voivodship compared to voivodeship share in GDP in Poland in 2014 (left) and enlargement of the beginning of the coordinate system (right)

Source: own compilation.

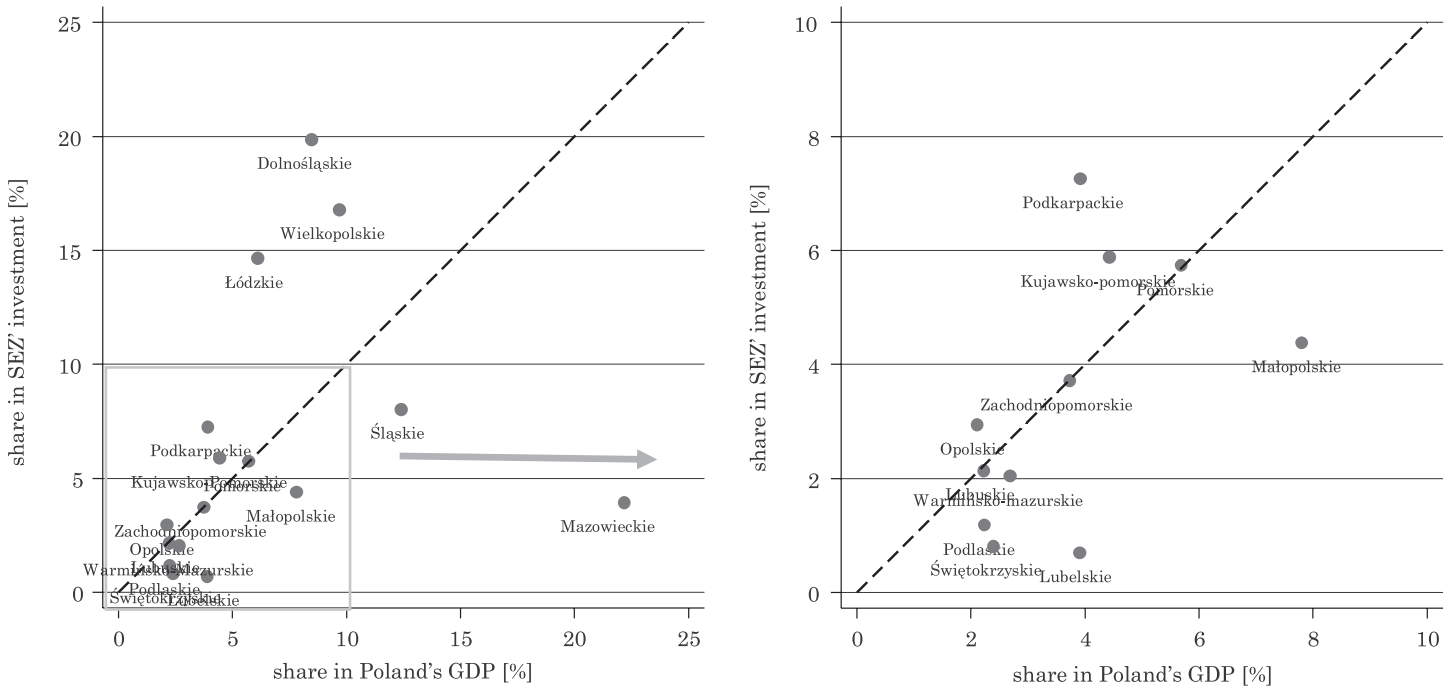

Fig. A.2. Share of investment outlays generated in SEZ by voivodship compared to voivodeship share in GDP in Poland in 2014 (left) and enlargement of the beginning of the coordinate system (right)

Source: own compilation.

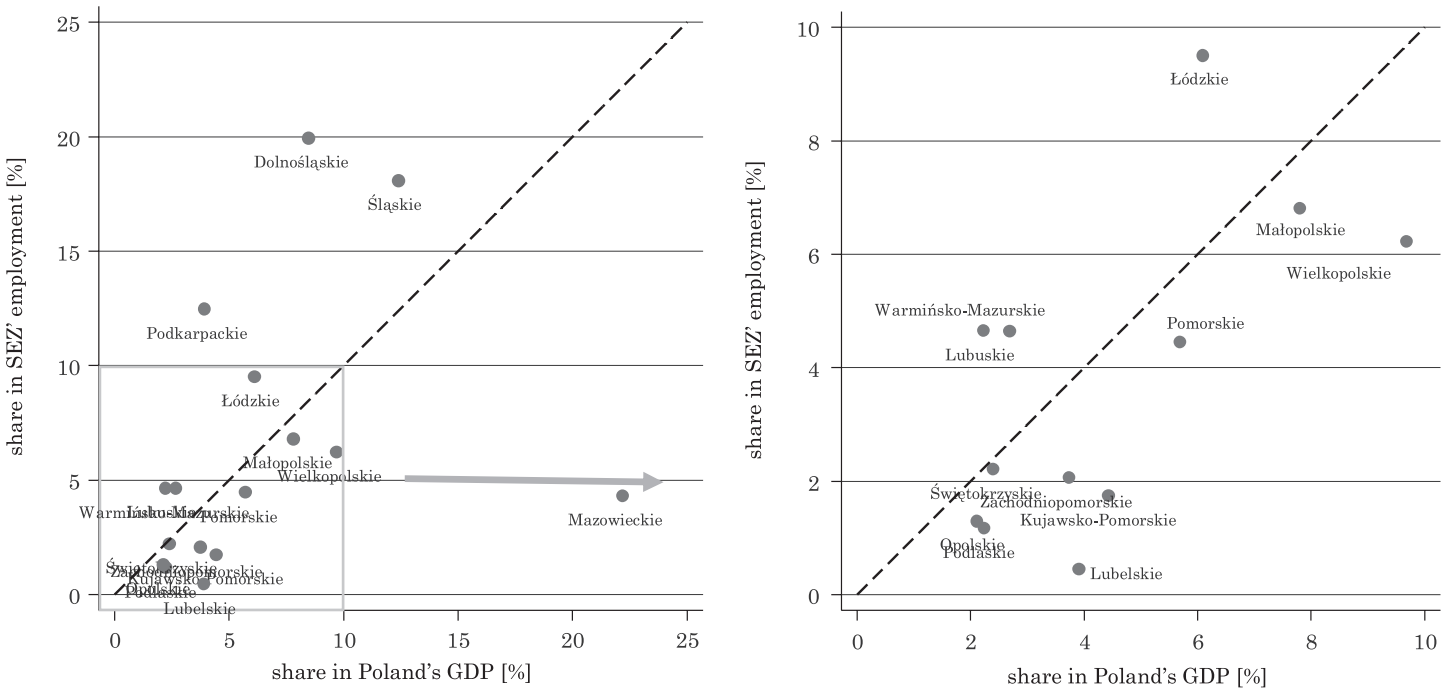

Fig. A.3. The share of employment generated in the SEZ by voivodship compared to the share of voivodships in Poland's GDP in 2014 (left) and the enlargement of the origin of the coordinate system (right)

Source: own compilation.

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