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Nationality of Poland's Exports

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Abstract

In this paper, we analyse the material structure of Poland's exports of goods to the European Union and to the United States. In a general presentation of Polish exports, we aggregate all other trade partners than the EU and the U.S. to the 'Rest of the World' (RoW). We use descriptive statistics to check what goods are subject to export from Poland. We analyse data on various levels of aggregation. We prove that Polish exports aggregated to the CN sections and HS2 product groups to both destinations seem to be of higher technological advancement than export disaggregated to the HS6 product classification. On the higher level of aggregation, the material structure of Poland's exports to the EU and the U.S. look more similar than those analysed on the more disaggregated level. We look at the material structures of exports to both partners from the point of view of the producers as well. We study Poland's exports of goods to the EU and the U.S. based on the HS6 classification and analyse the leading producers of the most important goods in sales to both partners. We show that most of them are affiliates of the foreign companies.

Keywords: international trade, economic integration, FDI

Introduction

In this paper[1], we analyse the material structure of Poland's exports of goods to the European Union and to the United States. Both the EU and the U.S. have similar and much higher economic potential than Poland; they have richer inhabitants (for more,

[1] This project is funded by National Science Centre of Poland on the basis of the decision Nr DEC-2013/11/B/HS4/02126.The preliminary version of this analysis was presented on the yearly conference of European Trade Study Group in Helsinki in September 2016. Broad analysis of this problem is to be found in Czarny, Śledziewska (2016a, 2206b and 2017).

see, e.g.: Czarny, Folfas 2016: 31–46) and they are more innovative. On the same time they differ a lot as Poland's trade partners. After EU accession in 2004 (or even earlier in the framework of pre–accession concessions), Poland gained free access to the Single European Market and has become more integrated with the other EU member states, while in trade with the U.S.it is still confronted with trade barriers. Poland's neighbours are mostly EU members, whereas the U.S. is very distant geographically.

In a general presentation of Polish exports[2], we aggregate all other trade partners than the EU and the U.S. to the 'Rest of the World' (RoW). RoW consists of very differentiated states (with Poland's neighbours Russia, Belorussia and Ukraine as well as with many developing countries, among which there are some enjoying trade preferences granted by the EU and others without such concessions).

We use descriptive statistics to check what goods are subject to export from Poland. We analyze data on various levels of aggregation. We prove that Polish exports aggregated to the CN sections and HS2 product groups to both destinations seem to be of higher technological advancement than export disaggregated to the HS6 product classification. On the higher level of aggregation, the material structure of Poland's exports to the EU and the U.S. look more similar than those analysed on the more disaggregated level.

We look at the material structures of exports to both partners from the point of view of the producers as well. We study Poland's exports of goods to the EU and the U.S. based on the HS6 classification and analyse the leading producers of the most important goods in sales to both partners. We supplement the information about the producers with the analysis of selected trade barriers in Polish exports of single products to the U.S. We write about difficulties in gathering the information about the producers.

Because of a large amount of data, we constrain our analysis of the material structure of Polish export divided into single products (HS6) for the years 2004 and 2014, while the general analysis covers all years from the period 2004–2014. We use data from COMTRADE database (WITS 2016).

[2] We are aware of the fact that in foreign trade statistics the term 'Polish export' also refers to the export of goods produced by subsidiaries of transnational corporations (TNCs) or other foreign companies located in Poland. With this in mind, we substitute the term 'goods from Poland' or 'Poland's exports' with the term 'Polish goods' in the empirical analysis, knowing that these terms are in fact imperfect substitutes.

1. Exports of Goods from Poland to the European Union, the U.S. and other partners

We start with an examination of total Polish exports of goods (Table 1). This is preliminary information about the foreign sales of products manufactured in Poland. We divide the recipients of Poland's export into three categories: the European Union, the United States and the rest of the world (RoW).

Table 1. Total exports of goods from Poland in 2004–2014, bn USD

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total	73.8	89.4	109.6	138.8	171.9	136.6	157.1	188.1	179.6	203.8	214.5
EU27*	58.7	67.4	84.0	106.4	129.4	105.6	122.3	143.4	131.5	148.6	160.3
U.S.	1.8	1.8	2.0	2.1	2.4	2.5	2.8	3.4	3.4	4.3	4.5
RoW	13.3	20.1	23.6	30.3	40.0	28.5	31.9	41.3	44.6	51.0	49.7

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS 2016.

In the period 2004–2014, the total value of Polish exports of goods increased almost three times (Table 1). The fastest growth (almost 3.74 times)was observed in export to non-U.S. third countries. Exports to the EU increased 2.73 times, and to the U.S. 2.5 times. Goods from Poland are doing well, not only on the EU market where they enjoy free access, but also in third countries, where they are often confronted with various barriers to trade. The relatively slow growth and low value of Polish exports to the United States result from, i.e., the geographic and economic distance as well as the trade barriers between the partners.

In the analysed period, the dominant recipient of goods from Poland was the European Union (Table 2). In 2004, the EU bought almost 80% of the goods Poland sold abroad. In 2014, the EU bought nearly 75% of Poland's export products. In 2004, the EU's share of Poland's exports was almost four times higher than the share of all non–EU partners and more than 33 times higher than the U.S. share.

Table 2. Share of goods exported from Poland to the EU, the U.S. and RoW, 2004–2014, in %

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
EU*	79.5	75.4	76.6	76.7	75.3	77.3	77.9	76.2	73.2	72.9	74.8
U.S.	2.4	2.0	1.9	1.5	1.4	1.8	1.8	1.8	1.9	2.1	2.1
RoW	18.1	22.5	21.5	21.9	23.3	20.9	20.3	22.0	24.9	25.0	23.2

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS 2016.

Although during the whole analysed period the EU was the dominant recipient of goods from Poland, its share in Poland's exports has not passed the peak from 2004. In fact, it decreased considerably after the last global economic crisis (after 2011). Both at the beginning and the end of the analysed period, goods sent from Poland to the United States accounted for as little as ca. 2% of total Polish exports. In the years 2004–2014,the share of Polish goods exported to the markets of both most-developed partners fell. The remainder was taken by RoW, which recorded its share increase by 5.1 p.p. This increase took place despite a large decrease (not analysed in this study) in Poland's export to Russia and Ukraine, which until recently were the leading RoW importers of Polish products (in 2013, Russia was the largest and Ukraine the second–largest non–EU recipient of Polish products; for more, see: Czarny, Śledziewska 2015: 231).

2. Material Structure of Poland's Exports of Goods to the EU, the U.S. and RoW

In this part, we disaggregate Poland's exports and check which sectors, product groups and products dominate Poland's trade with the European Union and the United States. We use the nomenclature 'CN', starting with the division into 21 sections. Then, we choose the most important ones among 99 product groups (HS2). Finally, we select the product leaders from the collection, including ca. 4,000 goods (HS6). The middle level of the disaggregation (HS4; ca. 1000 items) is used only in the analysis of Poland's RCA in export to the EU and the U.S.

2.1. Poland's Exports to the EU and the U.S. by CN Sections

We start with an analysis of Poland's exports to the European Union and the United States as divided into 21 sections under the CN classification (I–XXI). We present only 10 top sections (Tables 3–6). The detailed analysis (including comparative study) is limited to the top 5 sections. We use two criteria to determine the top products. The first are the shares of the sections in Polish exports to the EU (Table 3). The second are changes in those shares (Table 4). The same criteria are applied to the analysis of exports to the U.S. (Tables 5 and 6).

Table 3. Shares of CN sections in Poland's exports to the EU* in 2004 and 2014, by size of shares in 2014, in %

Number	Section	2004	2014
XVI	Machinery and mechanical appliances; electrical equipment; parts thereof	23	24
XVII	Vehicles, aircraft, vessels and associated transport equipment	17	13
XV	Base metals and articles of base metal	13	11
VII	Plastics and articles thereof; rubber and articles thereof	5	7
VI	Products of the chemical or allied industries	4	7
XX	Miscellaneous manufactured articles	8	7
IV	Prepared foodstuff; beverages; Tobacco	3	5
V	Mineral products	6	5
I	Live animals; animal products	3	4
XI	Textiles and textile articles	5	4

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS [2016].

The two highest shares of Poland's exports to the EU note technologically advanced goods: machinery (section XVI) and vehicles (XVII). Positions 4 and 5 occupy relatively technologically advanced goods as well (plastics, section VII, and chemical products, VI). Among the top 5 sections in Poland's exports to the EU, the only less technologically advanced section are base metals (section XV at position 3).

Furthermore, both chemical sections (VII and VI) are among the fastest growing items in Poland's exports to the EU. They follow the leader: prepared foodstuff (section IV) and occupy positions 2 and 3. Relatively fast growth is observed in the case of machinery (XVI) as well (position 5 in the classification in Table 4).The

situation of vehicles and base metals, belonging to the leading sections as well, is very different. Both sections lost shares of Poland's total exports to the EU (WITS 2016). Vehicles, although still second among the most important sections in Polish exports to the EU, are going to lose that position, recording the biggest fall in their shares of the export.

A general observation of the changes in the shares of the top 5 sections in the Polish exports to the EU leads to the conclusion that there are two opposite trends. The first one is a dynamic growth in export of plastics and chemical products as well as machinery. The second is a fall in vehicles and base metals. The decrease in the export of base metals is not surprising. Poland has been moving toward an industrialised economy and is exporting more and more technologically advanced goods. This means not only a change in its production and export structure, but also the necessity to use more raw materials for its own production as well. However, the fall in the share of vehicles is worrying. It used to be a Polish specialisation after the FDI inflow into the car industry and it was one of the most important sections of technologically advanced goods in Poland's exports.

Table 4. Change in the shares of CN sections in Poland's exports to the EU*, 2004–2014, in percentage points (p.p.)

Number	Section	2014/2004
IV	Prepared foodstuff; beverages; Tobacco	3
VI	Products of the chemical or allied industries	3
VII	Plastics and articles thereof; rubber and articles thereof	2
I	Live animals; animal products	2
XVI	Machinery and mechanical appliances; electrical equipment; parts thereof	1
XIII	Articles of stone, plaster, cement, asbestos, mica or similar materials	1
II	Vegetable products	0
III	Animal or vegetable fats and oils and their cleavage	0
XIV	Natural or cultured pearls, precious or semi-precious stones, precious metals	0
XVIII	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus	0

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS [2016].

The data from Tables 5 and 6 show that the two leading sections in Poland's exports to the U.S. contain technologically advanced products (sections XVI and XVII). Both sections have the biggest growth in their shares of total export as well. Moreover, these two sections are also on the top of export classification for goods sent to the EU (in exactly the same order).

In export to the U.S., in the top 5 sections, there are miscellaneous manufactured products (section XX at position 3), mineral products (V at position 4) and base metals (XV at position 5). A decline in the importance of the sections from the top 5 ranking is observed only for technologically less-advanced mineral products (section V) and base metals (XV). The analysis of the material structure of Poland's exports to the U.S. shows that technologically less-advanced products are substituted with technologically more advanced ones.

Table 5. Shares of CN sections in Poland's exports to the U.S., 2004 and 2014, by size of the shares in 2014, in %

Number	Section	2004	2014
XVI	Machinery and mechanical appliances; electrical equipment; parts thereof	21.5	35.5
XVII	Vehicles, aircraft, vessels and associated transport equipment	6.8	14.5
XX	Miscellaneous manufactured articles	8.4	9.5
V	Mineral products	9.1	8.4
XV	Base metals and articles of base metal	12.2	4.9
XVIII	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus	6.8	4.7
VII	Plasticsand articles thereof; rubber and articles thereof	3.3	4.6
IV	Prepared foodstuff; beverages; tobacco	7.6	4.4
VI	Products of the chemical or allied industries	6.8	3.6
I	Live animals; animal products	1.6	2.2

Source: own calculation based on WITS [2016].

Summarising we can say that machinery (section XVI) is in the top spot in exports to both analysed partners. Moreover, the next spot, position 2 in Poland's exports to both partners, is vehicles. The lost shares of vehicles in export to the EU is the opposite of their dynamic growth in export to the U.S., where they are the second fastest–growing section. This analysis confirms also the relatively good, though worsening position of base metals (XV) in total exports to both partners.

Table 6. Changes in the shares of CN sections in Poland's exports to the U.S., 2004–2014, in p.p.

Number	Section	2014/2004
XVI	Machinery and mechanical appliances; electrical equipment; parts thereof	14.1
XVII	Vehicles, aircraft, vessels and associated transport equipment	7.7
VII	Plastics and articles thereof; rubber and articles thereof	1.3
XX	Miscellaneous manufactured articles	1.1
I	Live animals; animal products	0.6
XIX	Arms and ammunitions; parts and accessories thereof	0.1
VIII	Raw hides and skins, leather, furskins and articles thereof	0.1
XII	Footwear, headgear, umbrellas	0.0
III	Animal or vegetable fats and oils and their cleavage	0.0
X	Pulp of wood or other fibrous cellulosic material; paper and paperboard	–0.3

Source: own calculation based on WITS [2016].

2.2. Polish Exports to the EU and the U.S. by CN Product Groups 1–99

In this part, we analyse the more disaggregated structures of Polish exports to the European Union and to the United States. We remain using the CN classification. This time, however, we examine which of the 99 product groups (HS2) has the largest share in the sales of in Poland produced goods on the Single European Market as well as on the U.S. market. We supplement this analysis with a presentation of the fastest-growing shares in exports to both partners, as we did in the previous part concerning CN sections. This time, because of a large amount of data, we limit the analysis to the year 2014 and cover the whole analysed period (2004–2014) by presenting only changes in the shares. We constrain our analysis to the 5 groups occupying leading positions in both rankings.

Table 7. Shares of the most important CN product groups in Poland's exports to the EU*, by size of the shares in 2014, in %

Section	CN group	Product group	Share
XVI	85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers	12.3
XVI	84	Nuclear reactors, boilers, machinery, and mechanical appliances; parts thereof	12.1
XVII	87	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	11.8
XX	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings	6.2
VII	39	Plastics and articles thereof	4.8

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS [2016].

The analysis of the shares of the CN product groups reveals that most important from the point of view of Polish exports to the EU, are product groups 85 (electrical machinery and equipment) and 84 (nuclear reactors etc.). Both groups stem from section XVI, the top section in Poland's exports to the EU (Table 7). Position 3 is taken by product group 87 (vehicles other than railway), representing section XVII (the second section in the classification of Poland's exports to the EU). With shares of 11.8–12.3%, these three named product groups have an established position in Poland's exports to the EU, but only group 85 is among the top growing groups of exports to this partner (Table 8). The high positions in both classifications make group 85 the most important industry in Polish exports to the EU, which is decisive for the choice of product subgroup for the further RCA analysis.

Table 8. CN product groups with the largest increases of shares in Poland's exports to the EU*, 2004–2014, in p.p.

Section	CN group	Product group	Change
VII	39	Plastics and articles thereof	1.8
I	02	Meat and edible meat offal	1.3
IV	24	Tobacco and manufactured tobacco substitutes	1.3
XVI	85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers	1.3
VI	30	Pharmaceutical products	1.2

* EU27 consists of all Member States in 2014 minus Poland.
Source: own calculation based on WITS [2016].

In Table 9, we present 5 product groups with the largest shares in Poland's exports to the U.S. At the head of the classification, there are two groups from section XVI: 84 (nuclear reactors) and 85 (electrical machinery and equipment). The top group 84 recorded a 24.4% share in exports to the U.S., while the runner-up has less than half as much (11.1%). In the third place, with a share equal to 9%, is group 94 from section XX (furniture, bedding, and mattresses). These three product groups clearly dominate in Poland's export to the U.S.: for every dollar earned in the American market by a company located in Poland, 45 cents comes from the export of these three product groups. Almost 25 cents are earned by group 84 alone.

Table 9. Shares of the most important CN product groups in Poland's exports to the U.S., by size of the shares in 2014, in %

Section	CN group	Product group	Share
XVI	84	Nuclear reactors, boilers, machinery, and mechanical appliances; parts thereof	24.4
XVI	85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers	11.1
XX	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings	9.0
V	27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	8.4
XVII	89	Ships, boats, and floating structures	6.7

Source: own calculation based on WITS [2016].

The most important product group is also the group with the largest increase in the share of Poland's export of goods to the United States (Table 10). Group 84 is the undisputed leader in Poland's trade with the U.S. As it is on top in both classifications (it has the largest share of Poland's exports to the U.S. and the largest share increase), it should also be considered the product group with potentially the best prospects for further export expansion as well. This is the group we will divide into products and analyse further.

The previous findings determine the status of product groups 84 and 85 as undisputed leaders in Poland's exports to both of its most-developed partners. Group 85 leads Poland's exports to the EU and is second in exportsto the U.S., while group 84 is the opposite–second in export to the EU and first to the U.S.

Table 10. CN product groups with the largest share increases in Poland's exports to the U.S., 2004–2014, in p.p.

Section	CN group	Product group	Change
XVI	84	Nuclear reactors, boilers, machinery, and mechanical appliances; parts thereof	10.8
XVII	89	Ships, boats, and floating structures	4.2
XVI	85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers	3.3
XVII	88	Aircraft, spacecraft, and parts thereof	3.1
XX	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings	2.5

Source: own calculation based on WITS [2016].

To better assess the opportunities for these product groups, as well as other product groups important for Polish exports, we compare their shares in trade with the EU and the U.S. (Tables 7 and 9), keeping in mind that exports to the EU represent about three-quarters of total Polish exports, while exports to the U.S. comprise only about 2% of the sales of goods from Poland abroad. Such a comparison (we also will apply this procedure to exports disaggregated to the level of goods, see Section 2.3) allows us to assess the position of individual product groups in the Polish exports to both markets.

Though both groups (84 and 85) occupy the top positions in Poland's exports to the EU as well as to the U.S., there is a significant difference between their shares of the total exports to each trade partner. Both groups have almost identical shares in total exports to the EU and, if added together, amount to the share of group 84 in exports to the U.S. At the same time, in exports to the U.S. the shares of the top group, 84, and the number two group, 85, differ considerably, so the dominance of the first one is incontestable. Group 84 is in a much stronger position than the relatively weaker group 85 in Poland's exports to the U.S. compared to exports to the EU, where both product groups have similar shares.

2.3. Leaders of Poland's Export

In this part, we proceed to the most disaggregated classification of the products of greatest importance in Poland's exports to the EU and the U.S. We use an analysis of the products from the HS6 classification–ca. 4,000 items. Individual products are

described with six-digit codes, in which the first two digits indicate the product group under which the analysed products are classified, and the four remaining digits are ascribed to the products themselves. We present 5 most important products exported by Poland. The results of the study of Poland's exports to the EU are presented in Table 11 and the analysis of exports to the U.S. is shown in Table 12.

Table 11. The most important goods in Poland's exports to the EU*, by export values and by share of Poland's exports to the EU in 2014, in millions USD and %, respectively

Product	Code	Value	Share
Television receivers, colour	**852812**	4189.7	2.6
Petroleum oils	271000	3391.0	2.1
Other vehicles, with spark–ignition	**870322**	3063.4	1.9
Transmission apparatus incorporating reception apparatus	**852520**	2490.6	1.5
Other digital automatic data processing machines	**847149**	2379.5	1.5

* EU27 consists of all Member States in 2014 minus Poland.
Source: own calculation based on WITS [2016].

This time, the top product group position (85), is not as indisputable as in the analysis at the higher level of aggregation, although it is still observable. In exports to the EU, the top spot are TV receivers (code: 852812). Among the top 5 items, we can find one more product from group 85 (transmission apparatus; 852520; on the position 4). These two products together comprise the largest share from one group in the top 5 ranking (4.1%). At the same time, there is just one product from group 84 in this ranking (other digital automatic data processing machines; 847149) with a 1.5% share. Group 87 (vehicles other than railway) has one product as well (with the share of 1.9%) (Table 7). Also interesting is the high ranking (2nd) of petroleum oils (271000) from group 27 (mineral fuels, 6th among the top product groups in Polish exports to the EU) and its 2.1% share (by itself comprising almost half of the total share of group 27).

In Polish exports to the U.S., the leading products are parts of turbojets or turboprops (group 84; code: 841191; the share: 10.7%). Among the top 5goods, there are representatives of other groups: 27, 88 and 89. The group 89 (ships; 5th in Poland's total exports to the U.S., see Table 9) is represented by two goods with a combined share of 6.6%.

In the top 5 exports sold in both markets, only one product is present in both rankings (Tables 11 and 12) and that is petroleum oils (product code 271000; rank 2

in both classifications). The position of this product is proof of the strength of Polish crude oil processing. However, it is difficult to consider this product with hope for increasing Poland's exports because of the great dependence on imported raw materials. Poland buys a dominant portion of its petroleum from Russia, and this dependence can be dangerous for this Polish sector.

Table 12. The most important goods in Poland's exports to the U.S., by export value and by share of Poland's exports to the U.S., 2014, in millions USD and %, respectively

Product	Code	Value	Share
Parts of turbojets or turbo-propellers	841,191	515.8	10.7
Petroleum oils	271,000	403.6	8.3
Other vessels for the transport of persons and/or goods	890,190	174.5	3.6
Other parts of aeroplanes or helicopters	880,330	148.9	3.1
Tankers	890,120	145.1	3.0

Source: own calculation based on WITS [2016].

In both rankings, there are goods from the leading product groups (in export to the EU it is the group 85, whereas in export to the U.S. 84). In export to the EU in top 5 there are 'television receivers' (852812) and 'transmission apparatus incorporating reception apparatus' (852520). In exports to the U.S., the leader stems from group 84 and this item is different from this present in the exports to the EU (parts of turbojet or turbo-propellers, code: 841191).

This analysis shows that on the high level of disaggregation, it is much harder to see the similarities in the material structure of Poland's exports to the EU and the U.S. This explains, why the conclusions of analyses carried out at different levels of aggregation differ considerably.

2.4. Revealed Comparative Advantages of the Most Important Product Subgroups in Poland's Exports to the EU and the U.S.

The next part of the study is an analysis of the revealed comparative advantages of Poland's exports (RCA). We limit this analysis to goods from the leading product subgroup among Poland's most important items exported to both analysed partners. In exports to the EU, that subgroup is 8528 (monitors and projectors etc.) and

in exports to the US, it is 8411 (turbojets, turboprops, and other gas turbines). Confirmation of these groups as the leaders in their respective export rankings can be seen from the first four digits in the codes of goods presented in the classifications in Tables 11 and 12. We calculate RCA based on data from COMTRADE database (WITS 2016).

We calculate RCA indices – first – comparing the positions of individual goods (HS6) from all of group 85 in Polish exports to the EU with the positions of world exports to the EU related to group 85 [formula (1); results in Table 13]:

$$(1) \quad RCA^{PL/EU}_{productHS6\ from\ group85} = \frac{X^{PltoEU}_{productHS6} \Big/ X^{PltoEU}_{group85}}{X^{WRLtoEU}_{productHS6} \Big/ X^{WRLtoEU}_{group85}}$$

Second, we compare the positions of individual goods (HS6) of all of group 85 in Polish exports to the EU with the position of these products in intra–EU exports in comparison with intra–EU exports of all of group 85 [formula (2); results in Table 13]:

$$(2) \quad RCA^{PL/EU}_{productHS6\ from\ group85} = \frac{X^{PltoEU}_{productHS6} \Big/ X^{PltoEU}_{group85}}{X^{EUtoEU}_{productHS6} \Big/ X^{EUtoEU}_{group85}}$$

We apply the same procedure for Polish exports to the U.S., except now it is for group 84:

$$(3) \quad RCA^{PL/EU}_{productHS6\ from\ group85} = \frac{X^{PltoEU}_{productHS6} \Big/ X^{PltoEU}_{group85}}{X^{EUtoEU}_{productHS6} \Big/ X^{EUtoEU}_{group85}}$$

$$(4) \quad RCA^{PL/EU}_{productHS6\ from\ group85} = \frac{X^{PltoEU}_{productHS6} \Big/ X^{PltoEU}_{group85}}{X^{EUtoEU}_{productHS6} \Big/ X^{EUtoEU}_{group85}}$$

The advantage is revealed when the RCA index is greater than 1. In our case, the RCA data show the products where Poland has an advantage in exports to the EU

(or the U.S.) in comparison with exports from the whole world (WRL in formulas (1) and (3)) or from the other EU countries [(2) and (4)].

Table 13. Poland's comparative advantages in the export of goods from subgroup 8528 to the EU

Code	Product	In comparison with world export–formula (1)			In comparison with EU27* export– formula (2)		
		2004	2014	Change	2004	2014	Change
852812	Television receivers, colour	4.34	4.99	0.65	4.27	3.80	–0.48
852813	Television receivers, black and white or other monochrome	0.04	0.00	–0.04	0.05	0.00	–0.05
852821	Video monitors, colour	0.16	1.48	1.32	0.21	2.49	2.28
852830	Video projectors	0.02	0.10	0.08	0.02	0.12	0.09

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS [2016].

Data in Table 13 show that the subgroup that includes TV receivers (852812), the leader among the Polish hits in export to the EU, have very high RCA what justifies their leader position (2014: in comparison with the world, 4.99; in comparison with the EU27, 3.8). The advantage is seen in comparison with both world exports to the EU and intra-EU exports in both the first and last year of our analysis. However, the advantage in relation to world exports increased during the analysed period, while against intra–EU exports it went down.

Also interesting is the video monitors subgroup (852821), which recorded an increase in RCA in comparison with both reference variables. The non–colour products (black and white TV receivers and video projectors) are outdated products that are being forced out of the market by newer products – this is the reason, why Poland has an apparent disadvantage in their production.

When we look at the commodity dominant in Poland's exports to the U.S. (code: 841191), we can confirm, first, its very good position on the market in 2014. A positive RCA for this item appeared in relation to both exports from the whole world as well as from the rest of the EU (Table 14). Second, it is visible that Poland achieved this advantage in comparison with the world export after 2004. In the case of parts of turbojets in comparison with world exports RCA increased during the analysed period.

Table 14. Poland's comparative advantages in the export of goods from subgroup 8411 into the U.S.

Code	Product	In comparison with world exports			In comparison with EU27* exports		
		2004	2014	change	2004	2014	change
841191	Parts of turbojets or turbo-props, n.e.s.	1.84	4.12	2.28	0.91	2.96	2.04
841181	Gas turbines of a power not exceeding 5,000 Kw	0.05	18.03	17.98	0.02	37.99	37.97
841199	Parts of gas turbines, n.e.s.	0.26	1.18	0.92	0.17	0.99	0.82
841112	Turbojets of thrust > 25 kN	2.82	0.04	–2.78	1.24	0.02	–1.22
841121	Turboprops of a power not exceeding 1,100 Kw	0.00	0.24	0.24	0.00	1.33	1.33
841122	Turboprops of a power exceeding 1,100 Kw	0.00	0.10	0.10	0.00	0.12	0.12
841111	Turbojets of thrust <= 25 kN	1.20	0.00	–1.20	1.37	0.00	–1.37
841182	Gas turbines of a power exceeding 5,000 Kw	0.00	0.00	0.00	0.00	0.00	0.00

* EU27 consists of all member states in 2014 minus Poland.
Source: own calculation based on WITS [2016].

The scale of increase in RCA index in the exports of 'other gas turbines' (841181) is stunning. Yet, in 2004, Poland's disadvantage in exports of these products to the U.S. was large (the RCA indicators in comparison with the world showed 0.05; with the EU27, 0.02). Then in 2014, these indicators jumped, respectively, by 360 times and nearly 1,900 times.

The success of this category of turbines was associated with a deterioration in the position of Poland's exports of turbojets (841112). In exports of the latter, Poland had a comparative advantage in 2004, but in 2014, it lost this advantage (in comparison with the world in 2004, 2.82, and in 2014, 0.04; in comparison with the EU27 in 2004, 1.24, and in 2014, 0.02). During the same period, exports of parts of gas turbines (841199) revealed an advantage in comparison with the world, and left Poland at a slight disadvantage in comparison with the EU27. This means that Poland has lost its advantage in the production of a final product in favour of intermediaries. It can be regarded as regression. However, this change may also prove Poland's integration into international supply chains, which nowadays is a common practice of doing business.

3. The Suppliers of the top Products Exported from Poland to the EU and the U.S.

We identified TV receivers (code: 852812) and parts of turbojets (841191) as the most important HS6 products in Poland's exports to, respectively, the EU and the U.S. Now we will find out who the producers of these goods are. We are especially interested in the national source of the capital of these companies. It is necessary to make a statement about the real nationality of exports from Poland.

The easiest way to do it would be an analysis of the respective statistical data, but the information on foreign capital employed in the production of single goods is not available. We wanted to fill the gap with information concerning companies exporting these goods, but this appeared impossible as well.

The statistics, based on the companies' reports about their activities, include, namely, only values of production but not of exports. That means that we have some general information about enterprises producing these exported goods, but we do not know, which ones really are the exporters and what part of their production is going abroad.

This is the reason, why we analyse producers located in Poland and not the exporters. We identify the producers using the database of companies located in Poland for exports to the U.S. and various electronic sources for exports to the EU. We will not give a complete list of these manufacturers, but in our opinion even an incomplete presentation is sufficient to get a general idea about their provenance.

Detailed characteristics of manufacturers is difficult to discern, not only because of the lack of disaggregated data concerning the production of individual products and the national source of the capital employed, but also because of the combined nature of various activities, including the production of goods classified into different product groups. In the case of Polish exports to the U.S., an additional constraint in data availability are trade secrets related to the production of goods from group 84. The Americans often use security classifications because some of their products have military uses. This can also be an important barrier to the potential development of exports of these goods to markets other than the U.S.

We are especially interested in details about the production of Poland's top exports because both (TV receivers and parts of turbojets) represent the high–tech

industry[3]. We add information about the location of these producers in Poland. In our opinion, this helps to identify the sources of their export success.

We start with an analysis of the producers of Poland's specialty in exports to the EU: TV receivers (code: 842812). Brzozowski (2016) wrote that thanks to foreign investments, Poland became a major supplier of TV receivers and their parts to the European market. In the past Poland wasn't an internationally acknowledged supplier of TV receivers. It has attracted TNCs and other foreign companies. Kobierzyce and Łysomice are Polish centres for the production of TV sets and their parts. They are located in Special Economic Zones (SEZ). Producers located in an SEZ enjoy special treatment and pay lower taxes or even are fully released from them. For example, the company LG–a producer of LCD screens–has a production complex in Kobierzyce. In this location, Toshiba built a factory to produce LCD TV sets [later, Toshiba sold this factory to a Taiwanese company Compal Electronics – more see: Evertiq (2016)].

After LG came to Poland, other manufacturers arrived as well. In Łysomice, an LCD TV factory was opened by a Japanese company Orion Electric. In the same location, Sharp Manufacturing Poland installed a factory producing LCD modules (one of the owners of this enterprise is the Slovak company UMC).

Another investor in liquid crystal production in Poland is a Taiwanese company TPV Displays Poland located in the SEZ in Gorzów Wielkopolski. In November 2006, the Polish government signed an agreement with Funai, the company investing in the construction of a factory producing consumer electronics, including LCD TVs, in Nowa Sól, a city located in the same SEZ as Gorzow Wielkopolski. Along with the manufacturers of TV sets and monitors, their cooperates started production in Poland: Korean Neotech (a producer of printed circuit boards for LCD TVs).

This short presentation proves that Poland's production of TV receivers as well as their parts is, in fact, the work of affiliates of foreign companies (mainly TNCs) located in Poland. Many of these companies enjoy privileges, such as tax waivers because of their location in the SEZs. This means that at least part of Poland's revealed comparative advantage (RCA) is of political nature and results from special treatment granted by Polish public authorities. However, the companies located in Poland do not receive only tax waivers and benefit from labour costs that are cheaper than in the 'old' EU member states, but get also well–qualified workers as well as access to well-trained, local human capital (e.g., engineers).

[3] Dunning (1996: 4) defined high–tech as industries that record an average R&D expenditure of at least 4% of sales or where scientists and engineers employed in R&D make up 2% or more of total employment. He directly named industries producing both goods as belonging to this category.

Next, we turn to the analysis of suppliers of products from subgroup 8411, tops in Poland's exports to the U.S. Poland often imports from U.S. intermediaries for the use in the aerospace industry, and then after refining, re–exports the final products or passes them along to more advanced intermediaries. Poland, therefore, can be regarded as part of the global supply chain for major aviation companies in the world (Stefaniak 2016).

As much as 90% of Poland's aerospace industry is located in 'Aviation Valley' (Dolina Lotnicza, or just 'DL') in the south-eastern Poland. DL is a National Key Clusterand a SEZ. The remaining 10% of aerospace industry in Poland operates in the Wielkopolski Aviation Cluster and in Warsaw, where mainly the headquarters of the companies are located.

The production of parts for turbojets or turboprop engines (841191) has been developed by ATI ZKM Forging Sp. z o.o., Erko Sp. j., Fin Sp. z o.o., Hamilton Sundstrand Poland Sp. z o.o., KLX Aerospace Solutions, MTU Aero Engines Polska Sp. z o.o., Pratt &Whitney (Kalisz and Rzeszów), and TMC Poland. All of these companies, except for Pratt & Whitney Kalisz, are located in Aviation Valley. Pratt & Whitney Kalisz is based in the Wielkopolski Aviation Cluster.

This means that almost all of the manufacturers from the aerospace industry are foreign (or partly foreign), and benefit from preferential treatment resulting from the government economic policy toward foreign direct investments (including tax preferences or tax waivers).

It is worth looking at the runner–up in Poland's leading exports to both partners. In both cases, number 2 is petroleum oils. This product is interesting because its production is partly owned by Poland's Treasury Ministry (Skarb Państwa). The Treasury possesses shares of the leading fuel industry companies in Poland: PKN Orlen[4] and Lotos[5]. As we have already pointed out, petroleum oils are hardly a hope for Poland's future prospects in terms of long-term export specialization because of a high degree of dependence on imported crude oil. The case of petroleum oils shows

[4] PKN Orlen is 27.52% in public hands (the Polish Treasury in 1999 had as much as 84.44% of the shares, but in November that year it sold 30% of the shares, and then in July 2000, another 26%; after that until 2009, only a small number of publicly owned shares have been sold). Other important shareholders of this firm are Nationale Nederlanden OFE (9.3%) and OFE Aviva BZ WBK. For more, see: Bankier (2016).

[5] Grupa Lotos SA is ca. 5 times smaller than PKN Orlen. Its dominant owner is the Polish Treasury, which has 53.18% of the shares (another big investor here, similar to PKN Orlen, is Nationale Nederlanden OFE (5.73%). For more, see: Bankier (2016).

that Poland is able to keep in public hands a considerable part of an internationally concentrated industry.

Conclusion

Our analysis shows that exports from Poland to the EU are more than 30 times bigger than exports to the U.S. It proves the importance of economic integration, geographic proximity and traditional ties connecting the trade partners as factors intensifying the mutual exchange of goods.

In Poland's exports to both most-developed partners, the most important are the technologically advanced product groups 84 and 85. However, when data are disaggregated, Poland appears to be a supplier not of final products but of intermediaries.

Poland's exports to both partners look similar at a high level of aggregation, but when disaggregated, the picture becomes more differentiated. Nevertheless, the top exports in both directions come from the same product groups. The only product among the top 5 of Poland's exports to the EU as well as to the U.S., namely petroleum oils (271000), is second for the both directions. The position of this product is proof of the strength of Polish crude oil processing, which–like only a few other industries–is still, to a large degree, the property of Poland's Treasury. However, it is difficult to consider this product for long-term export specialization because of its high level of dependence on imported raw materials.

Poland's specialisation in exports to the EU are TV receivers (code: 842812). Thanks to foreign investments, Poland has become the major supplier of TV receivers and their parts to the European market.

In Poland's exports to the U.S., parts for turbojets or turboprops (841191) and gas turbines (841181) dominate. After 2004, a significant increase in exports of these products to the U.S. was observed. In 2014, these products recorded a revealed comparative advantage (RCA) for Poland in relation to other world's exporters as well as to the EU ones. Poland has gained these advantages only recently. The success of these goods was associated with a deterioration in the position of Polish exports of turbojet engines (841112). Thus, Poland has lost an advantage in manufacture of a final product in favour of intermediary in its production chain.

The leading producers of Poland's top exports to both of its most-developed partners are foreign companies. The majority of them are located in Special Economic Zones, where they enjoy special treatment and pay lower taxes or even are fully exempted from them. This means that at least part of Poland's comparative advantages (RCA) are political in nature and result from special treatment granted by Polish public authorities.

This analysis shows that Poland's exports to the EU and the U.S. are smaller than revealed in the statistical data because a large portion of these sales are produced by subsidiaries of foreign companies located in Poland.

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