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Product variety and the export pattern of Poland 1999-2006

Tomasz Brodzicki*

Abstract:

The goal of this article is to investigate the role of product variety and changes in the product variety in the patter of exports of Poland a middle-sized open economy in the second phase of economic transition to a benchmark group of countries – EU15. The analysis covers the period 1999-2006 and is carried out on highly disaggregated trade data. In the analysis we utilize both simple index of variety of products as well as an index of relative variety of products. Attention is given to the scope and structure of intra-industry trade. The overall product variety in exports to EU15 as measured by simple product counts is found to have decreased while relative product variety in comparison to EU15 Member States remained at roughly unchanged level.

Furthermore we investigate the link between the changes in export variety and the growth of TFP in Polish manufacturing industry sectors. The conclusions are drawn from dynamic panel data model controlling for several features suggested by the literature of the subject. The results are rather intriguing and need further robustness tests.

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Keywords: product variety, productivity, horizontal differentiation, system GMM estimator

JEL codes: F11, F12, F14, C23

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1 Introduction

Trade liberalization between Poland and European Union was a gradual process which commenced in 1992 and led to the establishment of FTA in manufacturing goods on 1 January 2002. Mutual integration progressed further leading to the subsequent accession of Poland to the EU on 1 May 2004 and the inclusion in the common market.

Trade liberalization resulted in significant tread creation which was also fueled by significant inflow of FDI to Poland. This led to a complete geographical reorientation of Polish trade relations from East to West. In 2006 EU15 Member States had a significant 63,6 per cent share in Polish exports and where responsible for 62,9 per cent of Polish imports. Roughly speaking EU15 MS are responsible for two thirds of Polish trade. This is in line with the trade gravity approach (Brodzicki 2008).

Treating the group of EU15 states as a benchmark it is interesting to analyze the changes in the pattern of Polish manufacturing industry exports to this specific group of countries. Particular attention should be given to the role of product variety and thus product differentiation which is a key issue both to the so-called new trade theory focusing on explaining the volume and structure of intra-industry trade as well as to some of the models of the new growth theory. Inspired by Feenstra et al. (1999) and having measured the changes in relative product variety we will try to empirically detect the impact of product variety in exports on the productivity of Polish manufacturing industry sectors.

The reminder of the paper is organized as follows. The second section discusses theoretical and empirical background to the present study. Section 3 presents the data and their necessary adjustments. Section 4 describes the pattern and changes in the pattern of Polish exports to EU12 within the analyzed period. Section 5 evaluates the impact of changes in relative product variety on the productivity of Polish manufacturing industry sectors. The final section concludes.

2 Theoretical and empirical background

The trade – productivity linkage is well established both in the theoretical and empirical literature of the subject. Trade can be considered as the most important channel of international technology transfer and diffusion of knowledge (Ben-David and Loewy 1998). Specifically Grossman and Helpman (1991) argue that trade in intermediate goods is of key importance. The linkage was empirically proven by Coe and Helpman (1995) in a seminal study for a group of 21 OECD countries and Israel in 1970-1990. Domestic TFP growth was proven to depend both on domestic R&D effort as well as the R&D effort of country's main trading partners with imports of goods providing the channel of technology diffusion. Eaton and Kortum (2001) show that access to foreign intermediate inputs and capital goods through imports is associated with higher productivity growth. Keller (2001) analyzes productivity determinants at the level of 13 industrial sectors of 6 most advanced countries. He states that on average half of the medium-run increase in productivity of a given sector can be attributed to the intensity of domestic R&D effort within the sector, 30 per cent to R&D effort of other domestic sectors and a significant 20 per cent to the foreign R&D effort (with trade as a main channel of diffusion). In less developed economies the significance of the foreign R&D effort is likely to play much more significant role.

We have to note that beneficial knowledge spillovers are spatially localized (Eaton and Kortum 2001, Keller 2000). In line with the trade gravity approach it naturally favours less developed states bordering or proximate to large, technologically sophisticated economies.

Participation in export markets should thus allow quicker technology absorption, accelerated learning and knowledge acquisition and thus foster productivity growth as measured by total factor productivity. The benefits of participation in the foreign markets spillover to domestic companies operating only on regional and national level. This is further augmented by the inflow of FDI and direct cooperation in the case of vertical FDI or/and competition with foreign rivals in the case of horizontal FDI[1].

When discussing the role of product variety in exports we have to note the difference between vertically and horizontally differentiated products. According to Lancaster

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[1] NBP-based Kolasa (2006) exploiting micro-level data for Polish enterprises was able to differentiate between the impact of horizontal versus vertical FDI on productivity of domestic firms. According to Kolasa productivity of local manufacturing firms clearly benefits from foreign presence in downstream industries. Higher absorptive capacity of domestic firms clearly increases the size of beneficial spillovers. Kolasa finds no empirical evidence for horizontal spillovers from FDI in Polish manufacturing.

(1966) two products are horizontally differentiated when both products have positive demand, whenever they are offered at the same price. Furthermore, the different variants in the product group have the same characteristics, but in different proportions, and no variant dominates the others in relation to the content of its characteristics. Vertical product differentiation exists when products differ by the set of inherent characteristics and potential consumers rank products by these characteristics. Thus at a given price consumers will purchase the product of superior quality. The distinction is not only important from the point of view of analysis of trade relations (horizontal versus vertical IIT) it also is a key future of 2nd generation of endogenous growth theory models (Grossman and Helpman 1991, Barro and Sala-i-Martin 2003, Aghion and Howitt 1997). Generally speaking endogenous technological change can take form of horizontal differentiation and thus be shown as expansion of the number of varieties of intermediate goods related to R&D effort or it can take form of the so-called quality ladders – improvement in the quality of an array of existing kinds of intermediate goods related to typical firm-level incremental innovations. An interesting feature of quality-ladders type of technological change is the built-in process of creative destruction in which discovery of a higher grade good drives out the lower grades completely out of the market thus destroying earlier monopoly rentals (a concept attributed originally to Schumpeter).

The investigation of the crucial link between increased product variety and productivity is the idea behind the paper of Feenstra et al. (1999) which they consider a micro-level test of endogenous growth theory. The study conducted at sectoral level for Taiwan and Korea investigates whether changes in relative export variety in their export relations with the USA are correlated with the relative growth of sectoral productivity as measured by TFP. Feenstra et al. (1999) develop an exact measure of product variety for inputs and outputs as well as measure of relative product variety (which we will utilize and thus describe in detail further on). The obtained results provide some support for the crucial linkage. Changes in relative export variety have a positive and significant effect on TFP in nine of the sixteen sectors seven of whom are classified by authors as secondary industries utilizing and producing differentiated manufacturing products[2]. The analysis is conducted,

[2] The exact derivation of indices is laid down in Feenstra (2004).

however, at an aggregated level of 2 digit sectors which could potentially bias the results.

The present paper adopts the idea from the original paper of Feenstra et al. (1999) and applies it to trade between Poland and the benchmark group of the EU15 Member States. In measuring product variety we will first utilize a simple product counts method (utilized for instance by Funke and Ruhwedel 2003). We will than calculate relative product variety RUV_{st} indices which we define as ratios of number of product groups present in Polish exports to the EU15 in year t in sector s ($n_{st,PL}$) and the number of product groups present in EU15 total exports (both intra and extra-community exports) in the same year t and in the same sector s ($n_{st,EU}$). This is shown by the following formula:

[1] $$RUV_{st} = \frac{n_{st,PL}}{n_{st,EU}}$$

The change in relative product variety is given by:

[2] $$\Delta RUV_{st} = \ln\left(\frac{n_{st,PL}}{n_{st,EU}}\right) - \ln\left(\frac{n_{st-1,PL}}{n_{st-1,EU}}\right).$$

Furthermore, we will measure changes in relative product variety of Poland vis-à-vis EU15 by an index proposed in the aforementioned paper by Feenstra et al. (1999). Following the reasoning of authors we specify a set of goods I as an intersection of products supplied both by Poland and the European Union. We denote the years by t, while PL and EU represent the countries. Then $I_t = I_{PLt} \cap I_{EU\,t}$ denotes the set of goods supplied by Poland and EU in year t, while $I = I_{t-1} \cap I_t$ denotes the set of goods supplied by Poland and EU both in year t and t-1. The change in product variety in Poland relative to EU15 can be therefore expressed as:

[3] $$\Delta VAR_{st} = \left[\ln\left(\frac{\sum_{i\in I_{PLt}} p_{iPLt} x_{iPLt} / \sum_{i\in I} p_{iPLt} x_{iPLt}}{\sum_{i\in I_{EUt}} p_{iEUt} x_{iEUt} / \sum_{i\in I} p_{iEUt} x_{iEUt}} \right) - \ln\left(\frac{\sum_{i\in I_{PLt-1}} p_{iPLt-1} x_{iPLt-1} / \sum_{i\in I} p_{iPLt-1} x_{iPLt-1}}{\sum_{i\in I_{EUt-1}} p_{iEUt-1} x_{iEU-1t} / \sum_{i\in I} p_{iEUt-1} x_{iEUt-1}} \right) \right]$$

The index stated above will be calculated separately for all analyzed groups of manufacturing industry and the manufacturing industry as a whole.

The intensity of intra-industry trade at sectoral level will be measured by a modified version of the Grubel-Lloyed index (Grubel, Lloyd 1971) as proposed by Greenaway and Milner (1983) which adjusts the index for potential categorical aggregation bias. The adjusted GL index free of the potential distortion for sector s takes the following form:

[4] $$GL_s = 1 - \frac{\sum_j \left| x_{sj} - m_{sj} \right|}{\sum_j \left(x_{sj} + m_{sj} \right)}$$

, where x_{sj} and m_{sj} represent exports and imports of sector s and time t at a disaggregated level of individual product groups j. Higher values of Grubel-Lloyd index indicate higher intensity of intra-industry trade. The residual (1-GL) is thus indicative of intensity of inter-industry trade.

A suggested by the literature of the subject we further break the intra-industry trade index into its two principal components of horizontal IIT and vertical IIT thus taking into account quality differences. We will further break the vertical IIT index into indices of VIIT in low quality products and VIIT in high quality product taking into account quality differences in trade in vertically differentiated products.

In constructing the indices we follow the methodology utilized by Greenaway, D. et al (1995) in their empirical study of intra-industry trade in the UK which is based on relative unit values – a ratio of unit values in exports (UV_{sj}^{x}**)** to UV in imports (UV_{sj}^{m}) for a given product group j in sector s. Horizontally differentiated products are those that satisfy the following condition

[5] $$1 - \alpha \le \frac{UV_{sj}^{x}}{UV_{sj}^{m}} \le 1 + \alpha$$

, where α is some dispersion factor. If relative unit value lies outside of this range we are dealing with vertically differentiated products. Taking into account quality differences we further differentiate between trade in low quality vertically differentiated product if relative UV is below of $1-\alpha$ and trade in high quality vertically differentiated product if relative UV is above of $\alpha+1$.

Following Oulton (1991) we calculate unit values per tonne. The unit values for individual product groups (8-digit CN) show considerable level of variation in time. We thus take the data from 2006 as representative for the whole analyzed period and base our decision on that. In line with the standards adopted in the empirical literature we choose a dispersion factor of 0.15.

Lets assume that within sector s we have N disaggregated product groups j and that of them N_H are horizontally differentiated, N_{LQV} are low quality vertically differentiated products and N_{HQV} are high quality vertically differentiated products. We can then obtain the following indices of horizontal IIT (HGL) as well as vertical IIT (VGL(LQ) and VGL(HQ) respectively):

[6] $$HGL_s = \frac{\sum_{j=1}^{N_H}(x_{sj} - m_{sj}) - \sum_{j=1}^{N_H}|x_{sj} - m_{sj}|}{\sum_{j=1}^{N}(x_{sj} + m_{sj})}$$

[7] $$VGL_s(LQ) = \frac{\sum_{j=1}^{N_{LQV}}(x_{sj} - m_{sj}) - \sum_{j=1}^{N_{LQV}}|x_{sj} - m_{sj}|}{\sum_{j=1}^{N}(x_{sj} + m_{sj})}$$

[8] $$VGL_s(LQ) = \frac{\sum_{j=1}^{N_{HQV}}(x_{sj} - m_{sj}) - \sum_{j=1}^{N_{HQV}}|x_{sj} - m_{sj}|}{\sum_{j=1}^{N}(x_{sj} + m_{sj})}$$

From basic calculus we should note that for a given sector s we should observe:

[9] $GL_s = HGL_s + VGL_s(LQ) + VGL_s(HQ)$

Following the remarks of Grubel and Lloyd (1971) the indices for the manufacturing sector taken as a whole are calculated as weighted averages of sectoral indices with weights given by the relative size of trade of a given sector in total trade of Poland with the EU15.

3 Data

In order to observe the pattern of changes in Polish exports to EU15 we are going to use disaggregate trade statistics of the European Community for 1999-2006 (COMEXT) provided by EUROSTAT. As the detailed data for Poland are available from 2004 onwards we will utilize aggregated trade data of individual Member States of the European Union. The trade data in COMEXT are given in 1000 of EUR and tons.

We utilize as well industrial data. The data on total factor productivity are taken from Zielińska et al. (2008), who calculate TFP as a Divisia index for a panel of Polish manufacturing industry sectors (3-digit NACE rev. 1 groups). The TFP data are available for 1999-2005 only. The other variables utilized in empirical analysis have been calculated by author from raw data of GUS (Central Statistical Office of the Republic of Poland) within the framework of research project no 0916/H03/2006/30 financed by the Ministry of Science and Higher Education.

In order to assign product categories from COMEXT (CN) to groups of manufacturing industry (NACE rev. 1) we have utilized concordance tables between 8 – digit categories of products in Combined Nomenclature and 4-digit classes of Statistical Classification of Products by Activity in the European Economic Community (CPA). CPA is linked to NACE Rev.1 through agreement at four-digit level (classes). The results have been further aggregated to NACE rev. 1 groups.

In the division of sectors into categories of intermediate goods, capital goods, consumer durables and non-durables we have utilized an annex to Commission Regulation (EC) No 656/2007 of 14 June 2007 concerning short-term statistics as regards the definition of main industrial groupings (MIGS). The Regulation is binding and all European statistical offices apply it in practice. We have adjust it to suit NACE rev. 1 as they are provided in NACE rex. 2 only (the resulting correlation table A.1 is given in the Annex to the paper).

4 Polish manufacturing industry exports to EU15

European Union and more specifically the EU15 group is the most principal partner of Poland responsible for roughly two-thirds of Polish exports and imports. Economic transition led to geographical reorientation in trade relations in which partners of the former Council for Mutual Economic Assistance (COMECON) played a dominant role[3].

Within the analyzed period the value of mutual trade went up form 45.6 billion EUR in 1999 to 93.7 billion EUR in 2006. The value of Polish manufacturing industry exports to EU15 increased steadily from 16.2 to 39.2 billion EUR with an average annual rate of growth of 12.6 per cent.

The structural trade deficit in relations with EU15 Member States shrank significantly between 1999 to 2003 and opened up once again after Polish accession to the EU. In 2006 it amounted to approx. 16.4 billion EUR. The total trade deficit with all trade partners amounted only to approx. 12.5 billion EUR the same year.

In 2006 42 per cent of Polish exports came from 5 most important sectors: manufacture of motor vehicles (NACE 341, 15.1 per cent share), manufacture of parts and accessories for motor vehicles and their engines (NACE 343, 8.3 per cent share), manufacture of furniture (NACE 361, 7.7 per cent share), manufacture of television and radio receivers (NACE323) as well as manufacture of basic precious and non-ferrous metals (NACE 274). These are the sectors at the same time with the highest absolute increase in value of exports within the analyzed period. At the same time we have to note that the level of concentration in Polish exports to EU15 as measured by CR5 increased significantly from 35,2 per cent to the aforementioned 42 per cent in 2006. In 1999 production of other wearing apparel and accessories (NACE 182) had the highest share in Polish exports of 10,3 per cent but its value contracted most both in absolute (by 859 million EUR) and relative terms (by 8,3 per cent).

In 2006 capital goods sectors (please refer to Tables 2 and 3) accounted for 34,6 per cent of Polish exports to EU15 and were followed by consumer and intermediate goods sectors with the same share of 31,6 per cent. Within the consumer goods durable goods sectors accounted for 17,2 per cent while non-durable goods for 14,4 per cent. Energy had a residual share of 2,5 per cent. In absolute terms Polish exports increased the most in capital goods (+9,5 billion EUR) and was followed by intermediate goods (+6,1 billion EUR). Within the analyzed period we observe a fall

[3] At the outset of economic transition total trade volume of Poland with EU15 Member States amounted to 6 billion EUR on yearly basis.

in share of intermediate goods and consumer non-durables and clearly upward trend in capital goods as well as consumer durables.

It is interesting to observe the changes in the pattern of revealed comparative advantage in Polish trade with the EU15 as measured by the classic RCA index[4]. In 2006 out of 95 analyzed sectors Poland had comparative advantage in 43 sectors. The comparative advantage is most evident in the case of production of coke oven products, manufacture of wooden containers, manufacture of other products of wood as well as furniture and manufacture of television and radio receivers. In majority of the sectors comparative advantage is stable throughout the analyzed subperiods. We have to note, however, that Poland lost RCA vis-à-vis EU15 after accession to the European Union in May 2004 in production of electric motors, generators and transformers, production of vegetable and animal oils and fats, production of accumulators, primary cells and primary batteries, production of motorcycles and bicycles, production of knitted and crocheted fabrics as well as production of leather clothes. On the other hand Poland gained comparative advantage in manufacture of machinery for the production and use of mechanical power, manufacture of cutlery, tools and general hardware as well as manufacture of dairy products.

From the point of view of types of goods produced Poland in 2006 had a clear revealed comparative advantage only in consumer durables. In 2006 it lost its advantage in intermediate goods but the index is still relatively close to parity. The index takes the lowest value for energy and consumers non-durables.

Product variety in Polish exports to the benchmark group of the EU15, a central theme of this rather descriptive paper, as measured by simple product counts decreased between 1999 and 2006 (please refer to Table 6). We have to note however that it increased from 1999 till 2003 (6554) and than decreased to 5921 varieties. We have to further note that with some exceptions product variety in Polish imports is generally higher than product variety in Polish exports. We observe strong heterogeneity between sectors of the manufacturing industry.

Product variety is the largest in the case of intermediate goods sectors (2629 product varieties present in Polish exports in 2006). They are followed by consumer non-durables (1925) and capital goods (1075). The number of product varieties in Polish

[4] We have adopted EU15 total exports as a benchmark.

exports to EU15 increased between 1999-2006 in the case of consumer non-durables (by 263 product varieties, 15,8 per cent increase over the base year) and in energy producing sectors (by 16 product varieties). There was on the other hand a significant decrease in the number of product varieties in the case of capital goods (by 319 PV, - 22,0 per cent) and intermediate goods (-173 PV, -6,2 per cent).

In order to correctly asses the changes in product varieties in Polish exports we have to do it in light of changes in the benchmark group (intra and extra Community exports of EU15). We have to utilize relative product variety indices (RPV). Interesting enough the overall RPV index based on simple product counts shows a minute increase of product variety in Polish exports relative to exports of the EU15 (please refer to Table 8). It went up from 0,804 in 1999 to 0,823 in 2006 with a maximum value of 0,837 in 2004. In relative terms position of Poland did not deteriorate after all. In 2006 it was equal to 1 in 12 out of 95 sectors. For comparison it was only 9 in 1999.

Relative product variety measured by the index proposed by Feenstra et al. (1999) for the whole manufacturing industry shows a relatively small decline in the analyzed subperiod (please refer to Table 9).

Overall, the relative product variety of Poland against the EU15 remained roughly at the same level within the analyzed period of rapid structural adjustments (second phase of economic transition).

Last but not least we should look at the intensity of intra-industry trade between Poland and EU15 where vertical and horizontal product differentiation is a central theme. Out of 95 analyzed manufacturing industry groups the Grubel-Lloyed index diminished in only 21 sectors and increased in 75 in trade between Poland and EU15 (please refer to Table 10 and 11). The overall GLI for manufacturing industry went up from the level of 29,9 per cent in 1999 to 39,5 per cent in 2006. It thus increased by one-third. We have to note, however, that it still remains significantly below the levels in advanced industrialized economies of Western Europe. The intra-industry trade between Poland and EU15 which can be explained by traditional trade theories clearly dominates.

The intensity of intra-industry trade in 2006 was the highest in the case of production of tanks, reservoirs and containers of metal, heating radiators and boilers (NACE

282) – 80 per cent. The intensity exceeded 70 per cent in the case of production of knitted and crocheted articles, manufacture of parts and accessories for motor vehicles and their engines as well as manufacture of electricity distribution and control apparatus. At the same time it did not exceed a 5 per cent threshold in the case of manufacture of paints, varnishes and similar coatings, printing ink and mastics, manufacture of vegetable and animal oils and fats, building and repairing of ships and boats as well as manufacture of coke oven products.

Decomposing the intra-industry trade for the whole manufacturing industry trade into its principal components (please refer to Table 11) we observe that in 2006 vertical IIT clearly dominated horizontal IIT. The intensity of IIT was 27,8 per cent for vertical and 11,7 per cent for horizontal IIT respectively. When one decomposes the vertical IIT into trade in low and high quality differentiated products we observe the trade in low quality products is responsible for two-thirds of the vertical IIT.

Intensity of all intra-industry trade components is increasing. We have to note, however, that intensity of vertical IIT in high-quality products doubled between 1999-2006 while it increased by a factor of 1.1 in the case of horizontal IIT and only by a moderate factor of 1.1 in the case of low-quality vertical IIT.

Intensity of horizontal IIT was the highest (exceeding 50 per cent) in 2006 in the case of manufacture of tanks, reservoirs and containers of metal as well as central heating radiators and boilers (72,8 per cent) and production of other transport equipment (68,4 per cent)[5]. In the case of vertical IIT in high quality differentiated products the intensity of trade exceeds 50 per cent only in production of leather clothes (60,3 per cent). In vertical IIT in low quality products it is the case in manufacture of structural metal products, printing and service activities related to printing, manufacture of watches and clocks, manufacture of parts and accessories for motor vehicles and their engines as well as manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines.

[5] Detailed results of decomposed IIT intensity are available from author upon request.

5 Impact of relative product variety on the level of productivity

In order to identify the impact of product variety and changes in product variety on total factor productivity growth we construct a simple dynamic panel data model. The dependent variable (**lntfp**) is the level of total factor productivity in sector s and time t.

The estimated empirical model takes the following functional form:

[8] $$\ln tfp_{it} = \alpha + \beta \ln(tfp_{i,t-1}) + \delta X_{it} + \chi PV_{it} + \eta_i + u_{it}$$

α - constant term

$\ln tfp_{it}$ - level of TFP in logs

X_{it} - matrix of other explanatory variables

PV_{it} - matrix of variables approximating the impact of product variety

η_i - disturbance term - fixed effect for sectors i

u_{it} - disturbance term representing idiosyncratic shocks

The model will be estimated with a recommended two-stage system GMM estimator of Arellano-Bover (1995)/Blundell-Bond (1998) which best suits dynamic panel estimators with low T and high N. The estimation is carried out in STATA 8 with the use of xtabond2 command. The results are presented in Table 12.

On the right-hand side of the estimated equation we have the lagged value of the explained variable which is thus treated as predetermined in further analysis. The presence of the lag of dependent variable proves the dynamic character of the panel.

The matrix of other explanatory variables will change between different specifications. Taking into account the potential impact of scale of a given sector on the TFP growth we include in a set of explanatory variables **lnps** which is the log of real total sales of sector s at time t. Larger domestic market provides incentives for accelerated productivity growth. The variable must be clearly treated as endogenous.

In order to take into account a potentially positive impact of FDI on sectoral TFP growth we introduce a proxy **fown** which gives the share of firms with foreign capital as a dominant shareholder in total sectoral employment. We expect it to have a positive impact of FDI on TFP growth in Polish manufacturing industry sectors.

The level of technological sophistication could have an adverse impact on the growth rate of productivity. We thus introduce a proxy **tl** which stands for technology level and increases with the rising technological sophistication. We utilize here the well-known classification of OECD (1995) which classifies industrial sectors into four groups of low, medium-low, medium-high and high technology sectors on the basis of their R&D intensity.

In order to account for potential trade – productivity linkage we include export rate (**expr**) which is a ratio of export sales to total sales in a given industrial manufacturing sector. It could be also interpreted as a measure of outward orientation of a given sector. Preferably we would like to utilize import penetration indices or the share of imports in purchases of intermediate goods in sectors – the data are however unavailable at this level of disaggregation. We expect the impact of the variable to be statistically significant and positive. Last but not least we take into account investment ratios as given by variable **inv**.

In the matrix of variables approximating the impact of product variety on the level of productivity in sectors we include several variables described and discussed at length in the preceding section – relative product varieties vis-à-vis EU15 as measured by simple product counts (**rpv**) and the method suggested by Feenstra et al. (1999) – (**varf**), which could also enter the regression in logs.

In the first model the impacts of all explanatory variables are statistically significant and have the expected signs apart from the investment rate. The result which is robust to alternations in the specification could be related to the construction of TFP as a residual. Larger market, more intense trade relations, higher FDI stock as well as higher level of technological sophistication have positive impacts on the level of TFP. The positive value of the coefficient on the lagged TFP level is in accordance with our expectations implying a relatively fast rate of conditional convergence (sectors further away from their steady-state values of productivity should experience higher growth rates of productivity).

In the second model we augment the specification with relative product variety index. The impact on the level of productivity is statistically significant though surprisingly it is negative. The result is robust to possible alternations in the specification of the model including the introduction of individual effects for years (model 4) or changes in the way it enters regression (rpv introduced in logs, not shown). Greater product variety relative to advanced EU15 group of countries seems to have a negative impact on the level of productivity in the sector.

In the third model we substitute the RPV variable with another proxy for relative product variety – a more complex index of relative product variety of Feenstra et al. (1999). The impact on the productivity is of smaller magnitude but still is negative while retaining its statistical significance. The result is once again robust to alternation of the specification. In the last two analyzed models we introduce extra time effects thus taking out the impact of distortions common to all analyzed manufacturing industry sectors.

6 Conclusions

The overall product variety in exports to EU15 as measured by simple product counts decreased. Relative product variety in comparison to EU15 Member States remained at roughly unchanged level. This is rather surprising taking into account the magnitude of changes in Polish exports within the analyzed period both in quantitative and qualitative changes.

To our knowledge, this paper is a first attempt to directly test the connection between export variety and productivity at a disaggregate level for transition economy in CEE. We have constructed a relatively simple dynamic panel data model with the log of total factor productivity as the dependant variable. The empirical model is estimated with the use of robust two-stage system GMM estimator. The impact of relative product variety on TFP level in Polish manufacturing industry sectors is statistically significant but negative. The results are robust to model alternations and they hold both for undemanding relative product variety index based on simple product counts as well as more complex measure of relative product variety. For the time being we should treat the results with caution as further analysis seems to be necessary.

As a directions for further research, it would be important to explore whether these results continue to hold over a wider sample of transition economies as well as in relative terms as was the case in original study of Feenstra et al. (1999) for instance comparing Poland to the Czech Republic. We further acknowledge that the results obtained could be biased by a short time-span under analysis. We envisage to elongated in the future to the period 1995 – 2007.

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Table 1 Value of Polish manufacturing industry exports to EU15 (EUR million)

NACE rev. 1 group	1999	2000	2001	2002	2003	2004	2005	2006
151	161.4	190.1	216.5	220.0	334.0	348.4	489.0	489.9
152	159.6	167.0	181.4	164.5	192.0	186.3	283.6	414.5
153	400.1	463.9	520.7	529.6	607.3	526.3	543.0	660.6
154	30.4	23.2	34.4	26.3	21.5	37.2	101.5	148.4
155	43.3	35.4	81.7	73.7	79.5	267.4	455.9	463.6
156	2.8	2.1	3.5	8.1	8.5	13.8	30.7	27.2
157	11.3	10.9	35.4	43.5	47.2	63.9	66.2	66.1
158	92.8	136.4	157.8	193.6	235.2	407.8	521.5	592.6
159	14.8	23.8	18.0	22.5	30.3	39.4	54.0	89.6
160	0.8	3.4	0.7	0.7	3.1	59.9	66.8	118.5
171	61.2	85.5	106.8	115.1	107.5	123.5	96.9	111.0
172	39.7	49.4	50.6	50.2	48.7	52.8	40.4	55.0
174	252.8	319.3	368.4	375.0	378.0	398.4	359.6	367.2
175	67.3	93.3	106.7	120.4	139.3	140.4	146.0	140.1
176	10.5	14.8	13.7	9.8	12.4	16.1	14.7	20.5
177	119.9	132.2	155.9	150.3	128.3	94.7	74.6	75.4
181	10.6	13.1	19.5	17.5	14.8	9.9	7.8	6.0
182	1676.1	1701.8	1775.1	1565.0	1352.7	1061.6	878.7	817.1
183	21.6	32.7	48.7	39.4	46.9	39.4	35.3	32.4
191	47.3	67.1	88.5	93.7	79.6	65.1	83.6	82.3
192	22.7	23.5	25.4	25.4	40.9	37.0	30.5	16.1
193	159.4	156.2	162.8	143.8	128.6	112.0	113.9	113.9
201	185.2	208.4	169.6	182.3	214.9	194.6	204.1	237.2
202	170.9	186.4	176.3	166.0	167.7	175.0	212.7	215.1
203	174.8	195.3	201.2	222.7	280.1	227.1	238.5	297.2
204	114.5	130.0	126.5	126.3	162.6	144.2	143.6	155.3
205	288.9	346.1	352.5	374.6	392.3	317.3	292.2	292.7
211	241.9	371.6	399.8	533.8	542.5	329.2	315.5	370.0
212	107.9	133.1	271.6	266.1	292.5	183.1	215.2	251.9
221	33.0	49.1	55.2	74.2	90.8	76.0	78.6	106.7
222	32.1	44.9	47.0	55.6	65.3	55.3	56.2	61.2
231	160.4	240.7	322.4	318.4	403.1	470.0	529.3	420.2
232	68.5	189.6	273.6	221.4	163.3	195.4	433.0	564.3
233	0.4	0.6	0.7	0.6	0.7	0.8	0.5	0.5
241	592.9	896.0	839.6	812.1	920.4	920.0	1118.3	1409.4
242	4.6	4.3	1.9	3.6	5.7	8.8	10.5	16.7
243	3.8	6.6	7.9	14.3	16.2	21.1	19.0	24.3
244	20.6	23.7	27.4	29.9	37.2	44.9	69.7	170.6
245	52.0	95.3	116.2	170.5	227.1	274.4	329.9	408.5
246	33.5	31.4	33.4	43.0	44.8	52.1	72.7	85.1
247	81.8	108.8	110.4	112.0	100.0	99.5	115.2	121.6
251	247.1	349.4	452.9	556.0	697.2	777.4	956.4	872.4
252	254.3	328.4	394.7	499.6	594.3	573.3	666.0	639.5
261	196.3	242.6	281.8	314.4	358.8	342.0	346.1	303.0
262	109.2	135.3	157.0	144.8	150.9	116.9	160.8	133.6
263	0.7	0.9	0.8	1.6	3.4	2.7	2.3	7.4
264	13.5	12.1	11.0	9.7	10.9	9.8	8.1	17.3
265	70.6	43.7	44.5	26.3	20.7	15.8	14.2	37.3
266	29.1	36.4	40.1	46.7	56.1	64.0	66.9	60.1
267	26.1	26.2	25.2	21.4	24.2	12.7	9.9	7.7
268	37.8	45.2	60.3	68.0	67.1	76.5	97.3	113.2
271	400.6	651.2	620.0	528.4	633.6	669.7	645.2	824.3
272	85.5	111.0	138.8	110.8	132.8	151.8	186.5	196.6
273	84.3	96.2	100.6	85.5	106.3	48.2	52.9	65.3

274	748.6	984.0	894.9	940.8	956.3	1096.8	1168.9	2138.8
281	287.0	392.0	469.3	499.1	514.1	417.0	469.1	524.8
282	56.4	82.1	98.6	149.1	171.4	171.8	199.0	256.3
283	31.2	77.5	31.9	23.5	72.7	47.7	43.9	47.8
286	87.7	124.3	168.6	188.5	186.4	208.3	344.8	494.9
287	533.3	668.6	738.2	767.9	847.8	722.3	744.6	741.4
291	254.2	405.1	508.1	539.3	556.1	563.3	700.7	631.5
292	207.9	265.5	320.6	347.9	360.1	348.4	441.5	322.8
293	85.5	96.8	103.6	119.1	149.4	136.7	146.6	161.9
294	81.4	116.6	145.0	136.7	139.8	120.5	139.2	152.8
295	256.9	300.2	365.8	381.3	445.6	495.9	614.3	524.5
296	0.4	0.2	0.6	0.7	0.2	0.4	0.4	1.1
297	156.7	203.3	301.4	391.3	559.0	729.2	1014.3	1207.4
300	39.3	49.1	45.1	72.4	50.8	91.3	110.9	147.4
311	216.6	249.2	293.9	290.2	307.4	312.7	378.0	191.5
312	180.8	244.0	297.5	379.5	444.0	541.1	549.3	628.0
313	178.6	244.3	301.2	297.6	326.2	395.1	439.9	604.4
314	84.1	111.7	119.3	107.3	138.0	123.2	130.8	17.4
315	221.6	238.9	259.3	265.1	259.8	305.7	381.3	309.5
316	318.1	392.3	499.0	629.9	740.6	779.5	828.7	234.0
321	196.9	182.9	145.0	127.1	118.6	156.5	204.8	237.2
322	53.6	89.4	78.8	110.3	85.8	163.9	206.5	217.6
323	558.6	684.4	939.0	1119.6	1243.1	1373.1	1516.3	2422.0
331	45.5	61.0	74.7	103.9	115.4	118.9	132.4	164.0
332	59.9	71.0	90.2	102.6	119.7	160.8	175.7	65.0
334	4.0	5.0	5.8	5.9	12.3	51.9	64.8	34.1
335	10.7	6.3	9.5	8.4	8.9	13.9	13.3	14.1
341	1211.8	2826.9	3069.7	3107.2	3864.8	4906.4	4214.9	5921.7
342	130.2	151.5	166.4	168.7	179.4	193.8	229.9	268.3
343	566.0	844.7	1209.3	1546.0	1969.5	2380.8	2770.4	3255.9
351	264.8	276.6	276.5	413.9	186.2	231.0	261.2	326.9
352	46.1	97.9	164.8	200.5	271.8	237.9	139.5	130.3
353	18.5	32.5	48.9	57.5	45.1	55.7	47.5	0.0
354	56.4	65.1	73.7	86.8	96.5	98.0	120.7	103.3
355	11.4	14.5	17.7	17.9	20.1	19.0	20.4	19.8
361	1483.1	1864.2	2172.5	2413.8	2763.8	2770.2	2959.3	3013.4
362	11.1	12.2	13.1	15.9	17.8	16.3	25.6	39.9
363	4.3	4.2	4.3	5.2	6.4	4.7	4.0	3.3
364	13.4	15.8	16.5	18.7	26.6	24.3	25.9	31.6
365	30.4	33.8	39.9	55.7	43.9	38.2	33.1	33.2
366	93.7	117.9	133.9	149.2	164.8	153.7	152.6	168.3
Total	**16225.6**	**21789.0**	**24745.2**	**26491.1**	**29606.1**	**31527.1**	**34326.6**	**39202.0**

Source: Own elaboration. Data base COMEXT.

Table 2 Polish exports to EU15 (EUR million)

	1999	2000	2001	2002	2003	2004	2005	2006
Capital goods	3960.3	6490.9	7496.2	8302.2	9522.0	11110.8	11382.4	13475.1
Consumer durables	2229.3	2787.8	3453.8	3969.5	4622.5	4964.5	5604.7	6739.9
Consumer non-durables	3566.7	3977.7	4412.0	4325.1	4480.1	4514.4	5006.0	5628.8
Energy	229.3	431.0	596.7	540.5	567.1	666.2	962.9	985.0
Intermediate goods	6240.0	8101.6	8786.5	9353.8	10414.4	10271.3	11370.6	12373.3
Total	**16225.6**	**21789.0**	**24745.2**	**26491.1**	**29606.1**	**31527.1**	**34326.6**	**39202.0**

Source: Own elaboration. Data base COMEXT.

Table 3 The structure of Polish exports to EU15

	1999	2000	2001	2002	2003	2004	2005	2006
Capital goods	24.4	29.8	30.3	31.3	32.2	35.2	33.2	34.4
Consumer durables	13.7	12.8	14.0	15.0	15.6	15.7	16.3	17.2
Consumer non-durables	22.0	18.3	17.8	16.3	15.1	14.3	14.6	14.4
Energy	1.4	2.0	2.4	2.0	1.9	2.1	2.8	2.5
Intermediate goods	38.5	37.2	35.5	35.3	35.2	32.6	33.1	31.6
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Own elaboration. Data base COMEXT.

Table 4 The pattern of reaveled comparative advantage in Polish exports to EU15

NACE rev. 1 group	1999	2000	2001	2002	2003	2004	2005	2006
151	1.354	1.210	1.207	1.162	1.605	1.552	2.108	1.700
152	2.586	2.151	1.932	1.628	1.726	1.647	2.287	2.600
153	3.932	3.838	3.749	3.338	3.321	2.914	2.909	2.655
154	0.444	0.302	0.375	0.232	0.171	0.280	0.708	0.786
155	0.271	0.180	0.357	0.323	0.285	0.907	1.479	1.231
156	0.059	0.036	0.054	0.112	0.102	0.157	0.339	0.232
157	0.293	0.238	0.661	0.720	0.850	1.059	1.047	0.801
158	0.358	0.428	0.430	0.469	0.495	0.809	0.954	0.838
159	0.066	0.088	0.057	0.063	0.075	0.095	0.122	0.152
160	0.013	0.045	0.008	0.007	0.030	0.583	0.578	0.864
171	1.164	1.252	1.474	1.584	1.394	1.620	1.631	1.545
172	0.232	0.238	0.217	0.215	0.201	0.241	0.199	0.232
174	6.158	6.236	6.365	6.042	5.353	5.431	5.408	4.377
175	0.552	0.612	0.630	0.651	0.689	0.679	0.709	0.537
176	0.324	0.371	0.331	0.231	0.264	0.354	0.374	0.416
177	1.684	1.521	1.553	1.456	1.148	0.840	0.652	0.528
181	2.029	1.603	1.631	1.423	1.226	0.888	0.678	0.398
182	5.191	4.318	3.910	3.145	2.404	1.795	1.437	1.043
183	3.048	3.433	4.224	3.170	3.560	3.228	2.727	1.716
191	1.092	1.064	1.177	1.234	1.036	0.877	1.178	0.932
192	0.601	0.442	0.393	0.377	0.528	0.422	0.311	0.120
193	1.114	0.875	0.761	0.640	0.536	0.461	0.447	0.351
201	2.924	2.588	2.056	1.946	2.049	1.746	1.730	1.475
202	3.605	3.021	2.508	2.004	1.788	1.638	1.880	1.454
203	6.008	5.382	5.044	5.328	5.736	5.119	5.052	4.432
204	14.153	12.552	10.442	9.999	12.098	10.767	10.866	8.999
205	14.648	13.310	12.359	12.296	11.544	9.316	8.722	7.207
211	0.716	0.786	0.806	0.975	0.887	0.737	0.706	0.629
212	0.866	0.809	1.472	1.436	1.393	1.280	1.433	1.339
221	0.338	0.378	0.366	0.473	0.541	0.455	0.445	0.523
222	0.791	0.868	0.839	0.909	0.948	0.789	0.763	0.675
231	44.166	53.996	52.590	52.786	63.690	51.319	63.386	33.404
232	0.255	0.335	0.489	0.399	0.244	0.233	0.358	0.315
233	0.032	0.057	0.047	0.038	0.039	0.039	0.023	0.018
241	0.663	0.709	0.603	0.559	0.557	0.503	0.531	0.503
242	0.087	0.066	0.026	0.047	0.066	0.095	0.112	0.146
243	0.046	0.061	0.064	0.104	0.102	0.123	0.102	0.100
244	0.034	0.029	0.025	0.020	0.022	0.024	0.033	0.061
245	0.277	0.390	0.402	0.513	0.586	0.677	0.755	0.718
246	0.102	0.076	0.070	0.081	0.073	0.081	0.104	0.097
247	2.414	2.501	2.388	2.225	1.978	1.697	1.766	1.466
251	1.488	1.714	2.004	2.252	2.398	2.410	2.791	2.425
252	0.694	0.698	0.741	0.846	0.874	0.773	0.831	0.758

261	1.748	1.707	1.734	1.752	1.801	1.613	1.630	1.190
262	2.027	2.042	2.170	1.930	1.855	1.414	1.924	1.240
263	0.015	0.015	0.012	0.022	0.045	0.033	0.027	0.069
264	2.697	2.090	1.818	1.448	1.349	1.069	0.829	1.332
265	5.369	2.757	2.641	1.475	1.044	0.740	0.572	1.126
266	1.576	1.677	1.705	1.825	1.953	1.995	1.845	1.228
267	1.067	0.837	0.730	0.619	0.664	0.340	0.254	0.153
268	0.928	0.895	1.067	1.144	1.011	1.057	1.233	1.146
271	1.286	1.427	1.322	1.032	0.998	1.348	1.167	0.988
272	0.993	0.974	0.991	0.711	0.789	0.856	0.823	0.908
273	1.057	0.875	0.844	0.704	0.750	0.454	0.372	0.363
274	2.296	2.005	1.686	1.811	1.691	1.620	1.469	1.545
281	3.921	4.604	4.669	4.509	4.148	3.329	3.308	2.639
282	1.555	1.908	2.122	2.952	2.757	2.536	2.674	2.457
283	1.349	3.708	1.177	0.704	2.298	1.446	1.112	2.381
286	0.605	0.675	0.799	0.816	0.713	0.736	1.153	1.523
287	2.302	2.259	2.208	2.122	2.061	1.781	1.661	1.338
291	0.552	0.684	0.741	0.719	0.647	0.583	0.676	1.118
292	0.432	0.435	0.451	0.460	0.422	0.360	0.420	0.351
293	0.916	0.869	0.807	0.779	0.876	0.730	0.698	0.581
294	0.421	0.468	0.507	0.487	0.455	0.358	0.372	0.303
295	0.442	0.402	0.428	0.428	0.447	0.456	0.520	0.386
296	0.048	0.021	0.048	0.053	0.012	0.026	0.024	0.052
297	0.939	0.974	1.275	1.483	1.890	2.400	3.238	3.611
300	0.047	0.043	0.037	0.062	0.040	0.068	0.075	0.121
311	1.246	1.086	1.092	1.083	1.012	0.943	1.018	0.800
312	0.877	0.900	0.960	1.189	1.205	1.306	1.239	1.043
313	2.520	2.501	2.774	2.974	3.040	3.164	3.200	2.749
314	2.509	2.367	2.418	2.071	2.539	2.176	2.199	0.767
315	3.329	2.869	2.838	2.770	2.390	2.585	3.046	2.551
316	1.898	1.747	2.066	2.422	2.553	2.375	2.446	0.992
321	0.512	0.274	0.211	0.190	0.194	0.230	0.293	0.281
322	0.115	0.118	0.101	0.150	0.128	0.240	0.217	0.668
323	2.464	2.185	2.808	3.229	3.102	2.968	2.997	4.656
331	0.247	0.250	0.241	0.291	0.264	0.242	0.238	0.231
332	0.243	0.214	0.232	0.247	0.256	0.306	0.308	0.203
334	0.046	0.038	0.041	0.040	0.080	0.289	0.341	0.146
335	0.591	0.279	0.380	0.302	0.295	0.431	0.381	0.321
341	0.744	1.365	1.262	1.136	1.236	1.452	1.183	1.294
342	2.368	2.232	2.178	1.956	1.775	1.608	1.798	1.537
343	1.035	1.176	1.513	1.693	1.847	2.012	2.173	1.952
351	3.056	2.279	1.773	2.311	1.010	1.225	1.359	1.320
352	1.582	2.605	3.560	3.452	3.461	2.803	1.771	1.263
353	0.028	0.035	0.043	0.055	0.041	0.050	0.048	0.000
354	1.268	1.138	1.105	1.125	1.078	1.020	1.158	0.763
355	5.169	4.320	5.419	5.621	4.659	3.573	3.406	2.521
361	6.927	6.828	7.081	7.454	7.696	7.335	7.664	6.832
362	0.164	0.130	0.122	0.147	0.170	0.146	0.212	0.236
363	0.640	0.462	0.434	0.485	0.488	0.349	0.290	0.184
364	0.547	0.495	0.455	0.474	0.559	0.491	0.489	0.470
365	0.712	0.606	0.536	0.646	0.474	0.451	0.338	0.218
366	1.410	1.433	1.440	1.490	1.452	1.306	1.226	1.079

Source: Own elaboration. Data base COMEXT.

Table 5 The pattern of reaveled comparative advantage in Polish exports to EU15

	1999	2000	2001	2002	2003	2004	2005	2006
Capital goods	0.554	0.673	0.682	0.721	0.754	0.810	0.772	0.940
Consumer durables	2.888	2.701	3.027	3.299	3.469	3.414	3.647	3.908
Consumer non-durables	1.210	1.065	0.976	0.829	0.758	0.726	0.751	0.654
Energy	0.808	0.742	1.028	0.936	0.815	0.767	0.775	0.538
Intermediate goods	1.229	1.192	1.169	1.171	1.152	1.108	1.122	0.975

Source: Own elaboration. Data base COMEXT.

Table 6 Product variety in Polish exports to EU15 (simple product count)

NACE rev. 1 group	1999	2000	2001	2002	2003	2004	2005	2006	Absolute change in the no of PV	Relative change in the no of PV (1999=100)
151	95	92	108	130	135	159	172	176	81	185,3
152	69	72	74	69	65	90	108	110	41	159,4
153	126	137	151	158	150	180	188	208	82	165,1
154	24	19	23	20	25	32	34	48	24	200,0
155	26	25	26	25	30	71	88	100	74	384,6
156	32	25	41	43	38	53	68	75	43	234,4
157	12	12	12	11	11	15	17	18	6	150,0
158	127	127	131	140	145	149	159	169	42	133,1
159	48	52	58	42	54	59	61	53	5	110,4
160	6	6	6	6	7	7	8	8	2	133,3
171	98	103	90	102	99	112	81	91	-7	92,9
172	259	272	274	268	257	253	219	221	-38	85,3
174	87	87	84	84	85	84	71	70	-17	80,5
175	143	152	153	151	145	152	136	136	-7	95,1
176	48	49	50	52	56	56	43	42	-6	87,5
177	28	28	28	27	28	28	27	28	0	100,0
181	1	1	1	1	1	1	1	1	0	100,0
182	354	358	354	355	356	351	302	297	-57	83,9
183	23	22	25	22	22	20	19	18	-5	78,3
191	33	29	30	49	47	46	37	40	7	121,2
192	30	33	31	32	32	30	30	30	0	100,0
193	80	77	77	76	78	74	66	73	-7	91,3
201	45	36	35	34	37	37	32	37	-8	82,2
202	42	44	45	47	44	51	47	47	5	111,9
203	14	14	14	14	14	13	13	13	-1	92,9
204	5	5	5	5	5	5	5	5	0	100,0
205	29	26	28	28	33	30	32	29	0	100,0
211	119	116	119	126	132	89	85	83	-36	69,7
212	57	60	60	56	55	46	47	47	-10	82,5
221	24	25	24	26	26	23	22	23	-1	95,8
222	20	20	20	20	19	20	19	18	-2	90,0
231	5	5	4	4	4	5	4	3	-2	60,0
232	24	32	29	30	28	37	42	41	17	170,8
233	3	3	3	3	3	4	4	4	1	133,3
241	394	434	422	429	443	453	451	463	69	117,5
242	16	16	15	15	18	19	19	21	5	131,3
243	29	29	31	31	33	29	28	30	1	103,4
244	61	66	71	74	74	74	69	70	9	114,8
245	42	44	42	44	44	44	45	45	3	107,1
246	88	98	110	107	107	108	112	117	29	133,0
247	41	47	40	41	41	41	41	39	-2	95,1

251	74	74	74	86	84	84	86	68	-6	91,9
252	140	144	142	142	138	145	144	130	-10	92,9
261	120	126	124	122	121	120	114	113	-7	94,2
262	38	38	39	40	38	35	33	36	-2	94,7
263	12	12	15	12	11	12	11	13	1	108,3
264	5	5	5	5	5	5	5	5	0	100,0
265	11	11	11	12	11	9	9	10	-1	90,9
266	18	19	19	19	20	19	18	20	2	111,1
267	13	14	15	14	15	15	15	15	2	115,4
268	35	38	39	37	36	38	36	34	-1	97,1
271	155	184	189	165	166	106	112	117	-38	75,5
272	64	68	66	73	76	72	69	47	-17	73,4
273	105	119	129	111	120	58	61	55	-50	52,4
274	150	157	164	164	163	155	164	165	15	110,0
281	15	15	15	15	15	13	13	13	-2	86,7
282	16	16	16	16	16	16	16	16	0	100,0
283	7	9	10	8	7	7	7	7	0	100,0
286	119	119	120	119	118	117	118	111	-8	93,3
287	190	187	194	197	191	192	190	169	-21	88,9
291	165	170	166	167	172	160	161	69	-96	41,8
292	172	165	172	173	171	168	161	113	-59	65,7
293	63	62	61	62	63	61	58	59	-4	93,7
294	146	150	143	153	151	147	139	146	0	100,0
295	210	206	205	214	224	210	194	186	-24	88,6
296	14	12	10	10	9	11	8	7	-7	50,0
297	72	74	75	70	77	74	69	61	-11	84,7
300	62	52	45	54	53	54	47	31	-31	50,0
311	69	70	67	74	71	66	62	22	-47	31,9
312	42	43	44	44	44	44	43	44	2	104,8
313	17	16	16	17	17	16	17	17	0	100,0
314	33	34	36	33	30	31	28	18	-15	54,5
315	48	50	50	48	48	48	48	40	-8	83,3
316	64	62	65	62	67	64	61	44	-20	68,8
321	66	78	74	74	74	76	74	75	9	113,6
322	19	21	21	22	20	20	17	16	-3	84,2
323	90	78	94	92	89	92	92	59	-31	65,6
331	51	49	53	55	53	52	49	49	-2	96,1
332	128	131	132	136	132	128	110	60	-68	46,9
334	53	63	61	59	65	60	54	55	2	103,8
335	32	34	28	29	33	27	23	22	-10	68,8
341	61	64	62	59	68	62	53	59	-2	96,7
342	18	18	16	21	20	22	21	20	2	111,1
343	35	39	40	40	40	40	40	40	5	114,3
351	27	28	29	27	28	27	21	23	-4	85,2
352	27	33	32	32	33	32	25	29	2	107,4
353	26	24	25	26	27	23	19	1	-25	3,8
354	34	34	31	33	36	35	34	34	0	100,0
355	1	1	1	1	1	1	1	1	0	100,0
361	44	43	44	43	42	45	45	38	-6	86,4
362	16	19	19	19	20	19	15	15	-1	93,8
363	26	26	25	26	26	20	17	15	-11	57,7
364	25	24	29	29	29	28	25	26	1	104,0
365	40	39	39	41	40	40	39	40	0	100,0
366	102	99	105	104	104	102	91	96	-6	94,1
Total	**6192**	**6364**	**6445**	**6503**	**6554**	**6473**	**6234**	**5921**	**-271**	**95,6**

Source: Own elaboration. Data base COMEXT.

Table 7 Product variety in Polish exports to EU15 (simple product count)

Group	1999	2000	2001	2002	2003	2004	2005	2006	Absolute change in the no of PV	Relative change in the no of PV (1999=100)
Capital goods	1394	1410	1386	1426	1445	1391	1290	1075	-319	77,1
Consumer durables	302	304	319	310	320	311	293	244	-58	80,8
Con. non-durables	1662	1683	1740	1777	1797	1920	1860	1925	263	115,8
Energy	32	40	36	37	35	46	50	48	16	150,0
Intermediate goods	2802	2927	2964	2953	2957	2805	2741	2629	-173	93,8
Total	**6192**	**6364**	**6445**	**6503**	**6554**	**6473**	**6234**	**5921**	**-271**	**95,6**

Source: Own elaboration. Data base COMEXT.

Table 8 Relative product variety in Polish exports to EU15*

NACE rev. 1 group	1999	2000	2001	2002	2003	2004	2005	2006	Absolute change in the no of PV	Relative change in the no of PV (1999=100)
151	0.420	0.407	0.480	0.568	0.590	0.707	0.764	0.782	0.362	186.1
152	0.337	0.360	0.370	0.343	0.327	0.459	0.551	0.561	0.225	166.7
153	0.373	0.405	0.445	0.446	0.423	0.536	0.582	0.652	0.279	174.9
154	0.235	0.186	0.230	0.190	0.238	0.314	0.333	0.471	0.235	200.0
155	0.193	0.185	0.193	0.185	0.222	0.526	0.652	0.758	0.565	393.4
156	0.262	0.205	0.336	0.341	0.302	0.421	0.540	0.605	0.343	230.6
157	0.429	0.429	0.429	0.393	0.423	0.577	0.654	0.692	0.264	161.5
158	0.599	0.599	0.645	0.680	0.704	0.734	0.791	0.841	0.242	140.4
159	0.282	0.306	0.341	0.247	0.321	0.351	0.367	0.319	0.037	113.1
160	0.600	0.600	0.600	0.600	0.700	0.700	0.800	0.800	0.200	133.3
171	0.527	0.554	0.484	0.545	0.529	0.593	0.494	0.552	0.025	104.7
172	0.780	0.819	0.825	0.807	0.774	0.801	0.725	0.737	-0.043	94.4
174	0.978	0.978	0.955	0.955	0.966	0.955	0.934	0.921	-0.056	94.2
175	0.836	0.889	0.895	0.883	0.848	0.884	0.883	0.883	0.047	105.6
176	0.873	0.891	0.909	0.800	0.862	0.862	0.811	0.792	-0.080	90.8
177	1.000	1.000	1.000	0.964	1.000	1.000	0.964	1.000	0.000	100.0
181	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	100.0
182	0.973	0.984	0.973	0.975	0.978	0.964	0.932	0.928	-0.044	95.4
183	0.852	0.815	0.926	0.815	0.815	0.769	0.731	0.692	-0.160	81.3
191	0.892	0.784	0.811	0.831	0.797	0.780	0.627	0.678	-0.214	76.0
192	0.909	1.000	0.939	0.970	0.970	0.968	0.968	0.968	0.059	106.5
193	0.976	0.939	0.939	0.927	0.951	0.974	0.857	0.948	-0.028	97.2
201	0.804	0.735	0.714	0.694	0.755	0.787	0.681	0.787	-0.016	98.0
202	0.792	0.800	0.818	0.839	0.800	0.911	0.839	0.839	0.047	105.9
203	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	100.0
204	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	100.0
205	0.725	0.703	0.757	0.757	0.892	0.811	0.865	0.853	0.128	117.6
211	0.826	0.806	0.826	0.788	0.825	0.832	0.794	0.776	-0.051	93.9
212	0.826	0.870	0.870	0.848	0.833	0.868	0.887	0.904	0.078	109.4
221	0.960	1.000	0.960	1.000	1.000	0.958	0.917	0.958	-0.002	99.8
222	1.000	1.000	1.000	1.000	0.950	1.000	0.950	0.900	-0.100	90.0
231	1.000	1.000	0.800	0.800	0.800	1.000	0.800	0.600	-0.400	60.0
232	0.387	0.516	0.468	0.476	0.438	0.578	0.656	0.641	0.254	165.5
233	0.429	0.429	0.429	0.429	0.429	0.571	0.571	0.571	0.143	133.3
241	0.468	0.515	0.499	0.504	0.521	0.557	0.555	0.571	0.103	122.0
242	0.593	0.593	0.556	0.556	0.667	0.704	0.704	0.778	0.185	131.3
243	0.784	0.784	0.838	0.838	0.892	0.829	0.800	0.857	0.073	109.4
244	0.459	0.496	0.534	0.525	0.525	0.548	0.511	0.522	0.064	113.9
245	0.933	0.978	0.933	0.957	0.957	0.957	0.978	0.978	0.045	104.8

246	0.447	0.500	0.564	0.538	0.540	0.557	0.577	0.606	0.160	135.7
247	0.732	0.839	0.690	0.707	0.774	0.804	0.774	0.736	0.004	100.5
251	0.831	0.831	0.831	0.887	0.848	0.875	0.887	0.932	0.100	112.0
252	0.828	0.852	0.840	0.861	0.836	0.879	0.873	0.903	0.074	109.0
261	0.857	0.913	0.899	0.924	0.917	0.909	0.864	0.876	0.019	102.2
262	0.950	0.950	0.975	1.000	0.950	0.946	0.868	0.973	0.023	102.4
263	0.800	0.800	1.000	0.800	0.733	0.800	0.688	0.813	0.013	101.6
264	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	100.0
265	0.846	0.846	0.846	0.923	0.846	0.818	0.818	0.909	0.063	107.4
266	0.900	0.950	0.950	0.950	1.000	0.950	0.900	1.000	0.100	111.1
267	0.813	0.875	0.938	0.875	0.938	0.938	0.938	0.938	0.125	115.4
268	0.729	0.792	0.796	0.804	0.783	0.884	0.837	0.895	0.166	122.7
271	0.578	0.684	0.703	0.616	0.619	0.741	0.757	0.791	0.212	136.7
272	0.667	0.708	0.688	0.760	0.792	0.828	0.793	0.922	0.255	138.2
273	0.600	0.680	0.737	0.634	0.686	0.744	0.782	0.705	0.105	117.5
274	0.688	0.720	0.756	0.739	0.734	0.698	0.739	0.771	0.083	112.1
281	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	100.0
282	0.941	0.941	0.941	0.941	0.941	0.889	0.889	0.941	0.000	100.0
283	0.368	0.474	0.526	0.421	0.368	0.368	0.368	0.636	0.268	172.7
286	0.952	0.944	0.952	0.952	0.944	0.929	0.929	0.949	-0.003	99.7
287	0.922	0.903	0.937	0.956	0.927	0.941	0.922	0.939	0.017	101.8
291	0.753	0.776	0.758	0.766	0.789	0.731	0.732	0.704	-0.049	93.5
292	0.793	0.767	0.800	0.801	0.792	0.781	0.745	0.796	0.003	100.4
293	0.913	0.925	0.910	0.925	0.940	0.910	0.866	0.881	-0.032	96.4
294	0.802	0.824	0.786	0.850	0.839	0.817	0.768	0.807	0.004	100.6
295	0.843	0.831	0.823	0.853	0.892	0.854	0.789	0.782	-0.062	92.7
296	0.609	0.522	0.435	0.435	0.391	0.579	0.421	0.368	-0.240	60.5
297	0.800	0.822	0.833	0.778	0.856	0.841	0.802	0.924	0.124	115.5
300	0.849	0.825	0.726	0.831	0.815	0.831	0.723	0.689	-0.160	81.1
311	0.683	0.707	0.677	0.747	0.717	0.667	0.620	0.917	0.233	134.2
312	0.955	0.977	1.000	1.000	1.000	1.000	0.977	1.000	0.045	104.8
313	0.944	0.889	0.889	0.944	1.000	0.941	0.944	0.944	0.000	100.0
314	0.702	0.723	0.766	0.702	0.652	0.674	0.609	0.720	0.018	102.5
315	0.960	1.000	1.000	0.960	0.960	0.960	0.960	1.000	0.040	104.2
316	0.810	0.816	0.855	0.816	0.882	0.842	0.803	0.880	0.070	108.6
321	0.776	0.907	0.860	0.902	0.914	0.938	0.902	0.915	0.138	117.8
322	0.864	0.955	0.955	1.000	0.909	0.909	0.773	0.941	0.078	109.0
323	0.672	0.600	0.723	0.702	0.685	0.713	0.708	0.648	-0.023	96.5
331	0.911	0.875	0.946	0.982	0.946	0.929	0.875	0.907	-0.003	99.6
332	0.815	0.834	0.846	0.872	0.846	0.821	0.705	0.741	-0.075	90.9
334	0.616	0.733	0.709	0.686	0.756	0.698	0.628	0.714	0.098	115.9
335	0.696	0.739	0.609	0.630	0.717	0.587	0.500	0.512	-0.184	73.5
341	0.726	0.780	0.756	0.720	0.829	0.756	0.654	0.720	-0.007	99.1
342	0.818	0.818	0.727	0.955	0.909	1.000	0.955	0.909	0.091	111.1
343	0.897	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.103	111.4
351	0.794	0.824	0.879	0.818	0.824	0.844	0.656	0.719	-0.075	90.5
352	0.730	0.892	0.865	0.865	0.892	0.865	0.676	0.784	0.054	107.4
353	0.619	0.571	0.595	0.605	0.628	0.535	0.452	0.333	-0.286	53.8
354	0.944	0.944	0.861	0.917	1.000	0.972	0.919	0.919	-0.026	97.3
355	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	100.0
361	0.978	0.956	0.978	0.956	0.933	1.000	1.000	1.000	0.022	102.3
362	0.800	0.950	0.950	0.950	1.000	0.950	0.750	0.750	-0.050	93.8
363	0.722	0.722	0.735	0.765	0.765	0.667	0.567	0.500	-0.222	69.2
364	0.806	0.774	0.879	0.879	0.879	0.848	0.758	0.788	-0.019	97.7
365	0.952	0.929	0.929	0.976	0.952	0.952	0.929	0.952	0.000	100.0
366	0.872	0.846	0.905	0.912	0.912	0.919	0.820	0.865	-0.007	99.2
Total MI	**0.804**	**0.814**	**0.821**	**0.821**	**0.835**	**0.837**	**0.809**	**0.823**	**0.019**	**102.4**

*Source: Own elaboration. Data base COMEXT. *RPV based on simple product counts.*

Table 9 Relative product variety in Polish manufacturing industry exports as measured by index proposed by Feenstra et al. (1999)

NACE rev. 1 group	1999	2000	2001	2002	2003	2004	2005
151	0.724	0.794	0.716	0.914	0.948	0.895	0.967
152	0.775	0.754	0.808	0.747	0.917	0.758	0.857
153	0.957	0.929	0.863	0.967	0.953	0.821	0.955
154	0.858	0.958	0.676	:	0.405	1.203	0.879
155	0.689	0.973	0.698	0.941	0.847	0.738	0.951
156	1.838	0.911	0.850	0.857	0.872	0.898	0.919
157	0.998	0.998	0.980	0.999	0.981	0.913	0.947
158	0.974	0.974	0.974	0.993	0.912	0.983	0.985
159	0.813	0.672	0.915	0.911	0.892	0.900	0.917
160	0.985	0.912	0.993	1.000	0.989	1.000	1.001
171	0.896	0.896	0.915	0.940	0.911	0.889	0.925
172	0.994	0.979	0.987	0.992	0.992	0.987	0.992
174	0.999	0.997	0.996	0.990	1.000	1.000	1.000
175	0.998	0.961	0.987	0.994	0.980	0.976	0.987
176	0.993	0.992	1.002	3.233	0.989	0.995	0.998
177	1.000	1.000	1.000	0.867	0.993	1.000	1.000
181	1.000	1.000	1.000	1.000	1.000	1.000	1.000
182	1.000	0.999	1.000	1.000	0.999	0.999	1.000
183	0.998	0.999	1.012	0.984	1.000	1.000	0.995
191	0.989	0.986	0.990	:	1.000	1.000	1.000
192	1.000	0.997	1.000	0.999	1.000	1.000	1.000
193	0.997	0.985	0.997	0.999	0.985	0.999	0.997
201	1.153	1.144	1.000	0.991	0.999	0.998	1.000
202	0.996	0.861	0.998	0.943	1.000	0.992	1.000
203	1.000	1.000	1.000	1.000	1.000	1.000	1.000
204	1.000	1.000	1.000	1.000	1.000	1.000	1.000
205	2.054	2.105	0.624	0.964	0.825	0.962	0.882
211	0.970	0.993	0.965	0.619	0.984	0.989	0.991
212	0.994	0.992	0.998	0.990	0.993	0.987	0.989
221	1.000	0.999	1.000	0.913	1.000	1.000	1.000
222	1.000	1.000	1.000	1.000	1.000	0.996	1.000
231	1.000	1.000	1.000	1.000	0.996	0.999	1.000
232	0.994	0.657	0.838	1.166	0.844	0.915	0.905
233	1.000	1.000	1.000	1.000	1.000	1.338	1.000
241	0.952	0.935	0.953	0.752	0.923	0.947	0.961
242	1.062	1.093	0.987	0.982	1.027	0.933	1.181
243	0.980	0.962	0.989	0.988	0.965	0.998	0.989
244	0.978	0.931	0.988	0.933	0.987	0.964	0.978
245	1.000	0.985	1.000	0.991	1.000	0.993	0.999
246	0.916	0.953	0.917	0.924	0.949	1.012	0.995
247	0.984	0.962	0.981	0.949	0.993	0.944	0.997
251	0.983	0.983	0.993	0.989	0.996	0.994	0.996
252	0.994	0.994	0.992	0.964	0.999	0.996	1.000
261	0.972	0.969	0.990	0.942	0.999	0.997	0.999
262	0.990	0.999	0.991	0.994	1.000	1.000	0.991
263	0.995	1.010	0.998	1.000	1.000	1.004	1.019
264	1.000	1.000	1.000	1.000	1.000	1.000	1.000
265	1.000	1.000	1.000	0.994	1.000	1.000	1.000
266	1.000	0.974	1.000	1.000	0.984	1.000	1.000
267	1.000	0.984	0.982	1.000	0.985	1.000	1.000
268	0.997	0.933	0.996	1.002	0.997	0.989	0.990
271	0.966	0.893	0.956	0.977	0.954	0.885	0.967
272	0.984	0.971	0.978	0.905	0.985	0.915	0.987

273	0.955	0.848	0.950	0.990	0.940	0.815	0.912
274	0.964	0.973	0.970	0.999	0.989	0.984	0.970
281	1.000	1.000	1.000	1.000	1.000	1.000	1.000
282	1.000	1.000	1.000	1.000	1.000	1.000	1.000
283	1.000	0.918	0.925	1.000	1.000	0.865	0.779
286	0.995	0.996	0.998	0.997	0.999	0.999	0.996
287	0.994	0.998	0.989	0.998	1.000	0.996	0.994
291	0.988	0.988	0.990	0.983	0.990	0.983	0.972
292	0.990	0.995	0.992	0.987	0.996	0.993	0.995
293	1.098	1.087	0.997	0.927	0.999	1.000	0.995
294	0.976	0.974	0.984	0.873	0.985	0.971	0.981
295	0.976	0.987	0.993	0.959	0.979	0.969	0.993
296	0.899	0.903	1.000	4.678	0.641	0.871	0.961
297	0.969	0.972	1.000	0.963	0.963	0.992	0.997
300	0.786	0.941	1.001	0.998	0.998	1.001	1.000
311	0.870	0.958	0.957	0.923	0.994	0.986	0.982
312	1.000	0.999	0.999	1.000	1.000	1.000	1.000
313	0.999	1.000	1.000	0.999	1.000	1.000	0.999
314	0.993	0.984	0.980	1.011	0.987	0.991	0.991
315	1.000	0.993	1.000	1.000	0.999	0.999	0.995
316	0.971	0.992	0.977	0.998	0.988	1.000	1.001
321	0.997	0.911	0.999	0.309	0.966	0.976	0.996
322	0.998	1.000	0.999	1.000	1.000	1.000	1.000
323	0.967	0.981	0.976	0.975	0.989	0.990	0.996
331	0.961	0.999	0.921	0.939	1.000	0.995	0.994
332	0.982	0.987	1.025	0.992	0.996	0.998	1.001
334	0.998	0.918	0.988	0.994	1.008	0.951	0.992
335	0.976	0.980	0.960	0.900	0.700	0.950	0.994
341	1.337	1.295	0.998	0.987	0.900	0.996	1.000
342	0.988	0.978	1.000	0.943	0.995	0.991	1.000
343	1.000	0.982	0.985	1.000	1.000	1.000	1.000
351	0.987	1.015	0.996	1.159	1.000	1.000	0.996
352	1.000	0.738	1.000	0.967	1.328	0.745	1.000
353	0.935	0.555	0.754	0.962	0.996	0.989	1.069
354	0.994	0.998	0.987	0.947	0.992	1.000	0.999
355	1.000	1.000	1.000	1.000	1.000	1.000	1.000
361	0.998	1.000	0.999	1.000	1.000	0.989	1.000
362	1.000	0.982	0.999	1.000	0.975	1.000	0.999
363	0.884	0.890	0.899	0.909	0.910	0.978	0.907
364	0.863	0.998	0.738	0.986	0.998	0.931	0.995
365	0.996	1.000	1.000	0.995	1.000	1.000	1.000
366	0.988	0.988	0.999	0.970	0.990	0.997	0.998
Total MI	**0.987**	**0.973**	**0.966**	**0.934**	**0.968**	**0.972**	**0.983**

Source: Own elaboration. Data base COMEXT.

Table 10 Adjusted Grubel-Lloyed indices for Polish manufacturing industry trade with EU15

NACE rev. 1 group	1999	2000	2001	2002	2003	2004	2005
151	0.169	0.184	0.209	0.248	0.193	0.288	0.300
152	0.216	0.200	0.171	0.087	0.092	0.117	0.158
153	0.067	0.065	0.071	0.070	0.065	0.105	0.173
154	0.029	0.012	0.005	0.001	0.006	0.032	0.048
155	0.071	0.093	0.108	0.122	0.124	0.157	0.210
156	0.032	0.051	0.079	0.101	0.084	0.100	0.215
157	0.135	0.136	0.193	0.202	0.300	0.389	0.431
158	0.150	0.170	0.213	0.272	0.324	0.367	0.405

159	0.103	0.126	0.147	0.159	0.244	0.445	0.355
160	0.147	0.374	0.114	0.188	0.495	0.241	0.588
171	0.114	0.088	0.091	0.083	0.091	0.143	0.138
172	0.065	0.069	0.070	0.064	0.058	0.080	0.092
174	0.262	0.266	0.277	0.281	0.255	0.285	0.311
175	0.155	0.193	0.192	0.220	0.250	0.250	0.264
176	0.100	0.106	0.091	0.080	0.094	0.157	0.164
177	0.483	0.490	0.523	0.561	0.569	0.802	0.825
181	0.539	0.529	0.412	0.508	0.575	0.807	0.947
182	0.307	0.265	0.280	0.308	0.319	0.433	0.484
183	0.391	0.312	0.293	0.229	0.204	0.159	0.139
191	0.318	0.379	0.401	0.315	0.260	0.270	0.381
192	0.650	0.746	0.695	0.677	0.571	0.620	0.498
193	0.506	0.484	0.446	0.381	0.405	0.454	0.418
201	0.161	0.175	0.272	0.296	0.308	0.293	0.402
202	0.374	0.436	0.487	0.447	0.474	0.427	0.455
203	0.314	0.275	0.274	0.233	0.155	0.257	0.267
204	0.136	0.177	0.175	0.201	0.212	0.238	0.118
205	0.096	0.116	0.116	0.107	0.083	0.093	0.139
211	0.206	0.231	0.223	0.243	0.234	0.227	0.223
212	0.221	0.299	0.377	0.341	0.341	0.425	0.472
221	0.380	0.395	0.441	0.581	0.654	0.486	0.386
222	0.494	0.521	0.427	0.393	0.460	0.567	0.576
231	0.003	0.002	0.006	0.004	0.002	0.002	0.004
232	0.133	0.296	0.461	0.389	0.365	0.240	0.342
233	0.448	0.542	0.671	0.646	0.686	0.461	0.346
241	0.200	0.206	0.216	0.220	0.203	0.196	0.201
242	0.036	0.050	0.018	0.032	0.051	0.081	0.082
243	0.019	0.027	0.033	0.053	0.058	0.069	0.058
244	0.030	0.021	0.019	0.027	0.034	0.042	0.060
245	0.226	0.345	0.376	0.480	0.562	0.610	0.591
246	0.055	0.049	0.055	0.074	0.077	0.085	0.105
247	0.395	0.439	0.389	0.320	0.280	0.356	0.355
251	0.559	0.607	0.491	0.518	0.506	0.563	0.586
252	0.274	0.308	0.321	0.343	0.378	0.383	0.417
261	0.338	0.342	0.346	0.339	0.306	0.338	0.366
262	0.351	0.382	0.395	0.380	0.385	0.470	0.432
263	0.007	0.009	0.009	0.026	0.064	0.059	0.052
264	0.711	0.614	0.526	0.510	0.621	0.470	0.342
265	0.075	0.126	0.120	0.218	0.232	0.172	0.238
266	0.382	0.414	0.501	0.511	0.346	0.326	0.351
267	0.329	0.309	0.320	0.351	0.384	0.274	0.238
268	0.339	0.366	0.429	0.442	0.433	0.458	0.452
271	0.192	0.190	0.218	0.208	0.177	0.181	0.288
272	0.327	0.338	0.350	0.331	0.308	0.393	0.434
273	0.188	0.228	0.212	0.182	0.127	0.196	0.246
274	0.206	0.227	0.236	0.252	0.281	0.293	0.279
281	0.515	0.541	0.500	0.494	0.503	0.532	0.562
282	0.336	0.402	0.522	0.717	0.802	0.775	0.828
283	0.395	0.165	0.419	0.355	0.320	0.392	0.275
286	0.358	0.399	0.413	0.448	0.418	0.412	0.419
287	0.499	0.538	0.545	0.576	0.576	0.500	0.501
291	0.361	0.321	0.360	0.326	0.366	0.368	0.386
292	0.270	0.331	0.395	0.419	0.414	0.355	0.383
293	0.308	0.318	0.351	0.351	0.474	0.487	0.432
294	0.241	0.376	0.387	0.296	0.334	0.297	0.303
295	0.263	0.287	0.346	0.360	0.371	0.346	0.283
296	0.167	0.047	0.102	0.042	0.018	0.057	0.011

297	0.325	0.362	0.469	0.542	0.573	0.554	0.438
300	0.084	0.080	0.073	0.110	0.094	0.134	0.111
311	0.508	0.513	0.542	0.497	0.518	0.500	0.523
312	0.423	0.469	0.553	0.537	0.566	0.655	0.686
313	0.368	0.486	0.486	0.474	0.460	0.500	0.512
314	0.482	0.511	0.465	0.514	0.307	0.467	0.472
315	0.386	0.430	0.445	0.392	0.390	0.439	0.488
316	0.274	0.349	0.334	0.357	0.338	0.365	0.376
321	0.525	0.413	0.368	0.281	0.295	0.208	0.183
322	0.116	0.144	0.116	0.161	0.177	0.276	0.180
323	0.214	0.216	0.197	0.207	0.238	0.269	0.279
331	0.318	0.285	0.280	0.331	0.382	0.441	0.333
332	0.278	0.248	0.314	0.308	0.313	0.312	0.327
334	0.101	0.109	0.082	0.145	0.240	0.360	0.311
335	0.238	0.167	0.389	0.394	0.437	0.631	0.600
341	0.348	0.273	0.219	0.241	0.301	0.313	0.320
342	0.223	0.240	0.326	0.337	0.292	0.340	0.419
343	0.634	0.608	0.663	0.672	0.669	0.709	0.759
351	0.039	0.278	0.083	0.039	0.115	0.136	0.034
352	0.194	0.369	0.176	0.236	0.258	0.293	0.222
353	0.380	0.351	0.547	0.346	0.338	0.383	0.401
354	0.274	0.329	0.366	0.298	0.277	0.272	0.207
355	0.714	0.584	0.411	0.346	0.350	0.502	0.519
361	0.282	0.269	0.267	0.246	0.237	0.226	0.215
362	0.373	0.484	0.396	0.525	0.467	0.633	0.613
363	0.202	0.188	0.236	0.295	0.268	0.192	0.160
364	0.576	0.517	0.511	0.526	0.573	0.452	0.421
365	0.503	0.510	0.537	0.639	0.551	0.513	0.321
366	0.342	0.351	0.365	0.349	0.332	0.354	0.370
Total MI	**0.299**	**0.305**	**0.314**	**0.323**	**0.338**	**0.360**	**0.374**

Source: Own elaboration. Data base COMEXT.

Table 11 Intra-industry trade indices for total manufacturing trade of Poland with EU15

	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
HIIT	0.091	0.075	0.079	0.087	0.096	0.106	0.108	0.117
VIIT - HQ	0.051	0.075	0.069	0.073	0.077	0.086	0.084	0.099
VIIT - LQ	0.158	0.155	0.165	0.163	0.165	0.168	0.182	0.179
GL	0.299	0.305	0.314	0.323	0.338	0.360	0.374	0.395

Source: Own elaboration. Data base COMEXT.

Table 12 Estimation results with the use of system GMM

Model	1	2	3	4	5
l.lntfp	0.696 (86.91)***	0.673 (78.96)***	0.691 (85.70)***	0.626 (60.15)***	0.657 (64.03)***
const	0.404 (9.32)***	0.604 (14.68)***	0.391 (7.79)***	0.959 (19.44)***	0.635 (15.14)***
lnps	0.046 (19.40)***	0.045 (18.61)***	0.050 (4.29)***	0.034 (12.62)***	0.041 (14.43)***
expr	0.001 (3.47)***	0.001 (4.81)***	0.001 (9.26)***	0.001 (1.15)	0.001 (0.10)
fown	0.002 (12.19)***	0.002 (14.49)***	0.002 (9.26)***	0.002 (16.60)***	0.002 (11.40)***
inv	-0.471 (29.55)***	-0.467 (-28.54)***	-0.455 (-27.73)***	-0.371 (-23.86)***	-0.395 (-23.96)***
tl	0.008 (2.51)**	0.005 (1.50)	0.008 (2.84)***	0.011 (3.27)***	0.013 (3.77)***
rpv		-0.158 (11.49)***		-0.191 (-13.81)***	
varf			-0.038 (-7.77)***		-0.036 (-6.43)***
Time effects	no	no	no	yes	yes
F test	2644.05	2102.91	2468.87	1903.29	2160.49
Hansen test	81.66	83.88	81.31	78.45	80.28
AB for AR(1)	0.008	0.008	0.009	0.007	0.008
AB for AR(2)	0.635	0.763	0.757	0.143	0.179

Own calculations. Estimations carried out in STATA with the use of xtabond2 module.

a) Log of TFP is the dependant variable.
b) Value of t-statistic in brackets. In accordance with procedure proposed by Arellano and Bond t-statistics were calculated as a division of coefficients obtained from 2-step system GMM estimation by mean errors of estimation of the same model estimated with 1-step system GMM estimator.
c) Number of observations – 593.
d) Significant at *** - 1 per cent. ** - 5 per cent. * - 10 per cent level of significance.
e) Test F for statistical significance of specification.
f) Hansen’s test of over-identifying restrictions.
g) Arellano-Bond test for first and second order autoregression; Prob values given.

Annex

A. 1 Classification of manufacturing industry groups (NACE rev. 1) by types of goods

NACE rev. 1 group	Description	Category of sector
151	Production, processing and preserving of meat and meat products	Consumer non-durables
152	Processing and preserving of fish and fish products	Consumer non-durables
153	Processing and preserving of fruit and vegetables	Consumer non-durables
154	Manufacture of vegetable and animal oils and fats	Consumer non-durables
155	Manufacture of dairy products	Consumer non-durables
156	Manufacture of grain mill products, starches and starch products	Intermediate goods
157	Manufacture of prepared animal feeds	Intermediate goods
158	Manufacture of other food products	Consumer non-durables
159	Manufacture of beverages	Consumer non-durables
160	Manufacture of tobacco products	Consumer non-durables
171	Preparation and spinning of textile fibers	Intermediate goods
172	Textile weaving	Intermediate goods
174	Manufacture of made-up textile articles, except apparel	Consumer non-durables
175	Manufacture of other textiles	Consumer non-durables
176	Manufacture of knitted and crocheted fabrics	Consumer non-durables
177	Manufacture of knitted and crocheted articles	Consumer non-durables
181	Manufacture of leather clothes	Consumer non-durables
182	Manufacture of other wearing apparel and accessories	Consumer non-durables
183	Dressing and dyeing of fur; manufacture of articles of fur	Consumer non-durables
191	Tanning and dressing of leather	Consumer non-durables
192	Manufacture of luggage, handbags and the like, saddlery and harness	Consumer non-durables
193	Manufacture of footwear	Consumer non-durables
201	Sawmilling and planing of wood, impregnation of wood	Intermediate goods
202	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fiber board and other panels and boards	Intermediate goods
203	Manufacture of builders' carpentry and joinery	Intermediate goods
204	Manufacture of wooden containers	Intermediate goods
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	Intermediate goods
211	Manufacture of pulp, paper and paperboard	Intermediate goods
212	Manufacture of articles of paper and paperboard	Intermediate goods
221	Publishing	Consumer non-durables
222	Printing and service activities related to printing	Consumer non-durables
231	Manufacture of coke oven products	Energy
232	Manufacture of refined petroleum products	Energy
233	Processing of nuclear fuel	Energy
241	Manufacture of basic chemicals	Intermediate goods
242	Manufacture of pesticides and other agro-chemical products	Intermediate goods
243	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	Intermediate goods
244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	Consumer non-durables
245	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	Consumer non-durables
246	Manufacture of other chemical products	Intermediate goods
247	Manufacture of man-made fibers	Intermediate goods
251	Manufacture of rubber products	Intermediate goods
252	Manufacture of plastic products	Intermediate goods
261	Manufacture of glass and glass products	Intermediate goods
262	Manufacture of non-refractory ceramic goods other than for	Intermediate goods

	construction purposes; manufacture of refractory ceramic products	
263	Manufacture of ceramic tiles and flags	Intermediate goods
264	Manufacture of bricks, tiles and construction products, in baked clay	Intermediate goods
265	Manufacture of cement, lime and plaster	Intermediate goods
266	Manufacture of articles of concrete, plaster and cement	Intermediate goods
267	Cutting, shaping and finishing of stone	Intermediate goods
268	Manufacture of other non-metallic mineral products	Intermediate goods
271	Manufacture of basic iron and steel and of ferro-alloys (ECSC)	Intermediate goods
272	Manufacture of tubes	Intermediate goods
273	Other first processing of iron and steel and production of non-ECSC ferro-alloys	Intermediate goods
274	Manufacture of basic precious and non-ferrous metals	Intermediate goods
281	Manufacture of structural metal products	Capital goods
282	Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers	Capital goods
283	Manufacture of steam generators, except central heating hot water boilers	Capital goods
286	Manufacture of cutlery, tools and general hardware	Intermediate goods
287	Manufacture of other fabricated metal products	Intermediate goods
291	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines	Capital goods
292	Manufacture of other general purpose machinery	Capital goods
293	Manufacture of agricultural and forestry machinery	Capital goods
294	Manufacture of machine- tools	Capital goods
295	Manufacture of other special purpose machinery	Capital goods
296	Manufacture of weapons and ammunition	Capital goods
297	Manufacture of domestic appliances n.e.c.	Consumer durables
300	Manufacture of office machinery and computers	
311	Manufacture of electric motors, generators and transformers	Intermediate goods
312	Manufacture of electricity distribution and control apparatus	Intermediate goods
313	Manufacture of insulated wire and cable	Intermediate goods
314	Manufacture of accumulators, primary cells and primary batteries	Intermediate goods
315	Manufacture of lighting equipment and electric lamps	Intermediate goods
316	Manufacture of electrical equipment n.e.c.	Intermediate goods
321	Manufacture of electronic valves and tubes and other electronic components	Capital goods
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	Capital goods
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods	Consumer durables
331	Manufacture of medical and surgical equipment and orthopedic appliances	Capital goods
332	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment	Capital goods
334	Manufacture of optical instruments and photographic equipment	Consumer durables
335	Manufacture of watches and clocks	Capital goods
341	Manufacture of motor vehicles	Capital goods
342	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	Capital goods
343	Manufacture of parts and accessories for motor vehicles and their engines	Capital goods
351	Building and repairing of ships and boats	Capital goods
352	Manufacture of railway and tramway locomotives and rolling stock	Capital goods
353	Manufacture of aircraft and spacecraft	Capital goods
354	Manufacture of motorcycles and bicycles	Capital goods

355	Manufacture of other transport equipment n.e.c.	Consumer durables
361	Manufacture of furniture	Consumer durables
362	Manufacture of jewelry and related articles	Consumer durables
363	Manufacture of musical instruments	Consumer durables
364	Manufacture of sports goods	Consumer non-durables
365	Manufacture of games and toys	Consumer non-durables
366	Miscellaneous manufacturing n.e.c.	Consumer non-durables

Source: Own elaboration based on Commission Regulation (EC) No 656/2007 of 14 June 2007 concerning short-term statistics as regards the definition of main industrial groupings (MIGS).

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