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ADAPTABILITY OF POLISH MANUFACTURING IN THE FACE OF EU ACCESSION[1]

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Abstract
Is Polish manufacturing prepared for integration with the European single market? Does it have sufficient capacity to cope with the competitive pressures within the Union? Integration theory indicates that adaptability to the single market depends on a country's ability to accumulate and re-deploy resources rapidly in pursuit of new opportunities, while at the same time fully exploiting existing competitive strengths. Accumulation of resources was very successful in the majority of industries at the beginning of transformation and then dramatically deteriorated in the second half of the nineties. It may suggest that Poland was losing its ability to accumulate resources in manufacturing on the eve of accession. The speed of structural change in manufacturing has been increasing over the whole decade, indicating a high degree of industrial mobility of the Polish economy. Resources have been relocated across industries. Re-deployment in exports is much more pronounced than shifts in production and employment. The existing competitive strengths are exhibited mostly in traditional low-skill and labour-intensive industries. Nevertheless the structure of industry has dramatically changed over the period. The share of industries with medium-skill intensity of blue collar workers has crucially increased, the same trend has been reported for research- intensive sectors. Productivity analysis reveals that the rate of labour productivity has been much higher than the rate of TFP growth in the majority of industries in the years 1993-2000.

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1. The analysis presented in the paper is a part of the research projects on Industrial Competitiveness of Polish Industry that have been implemented by the author and the research team of the EU Department of Gdansk University in the years 1999-2003. The project was financed by the Polish State Committee for Scientific Research. The full report on the research results is presented in A. Zielinska-Glebocka ed. 2000 and 2003;

1. Introduction

The 2004 enlargement of the European Union is a challenge to both the enlarged internal market and the accession countries themselves. It has been widely recognized that after accession the candidate countries will have the opportunity to improve their living standards and their prospects in global competition, but at the same time will face fierce competition in the internal market. In accordance with the 1993 Copenhagen criteria, EU membership requires that the candidate country ensures "the existence of a functioning market economy as well as the capacity to cope with the competitive pressure and market forces within the Union". The economic criteria are assessed by the Commission through a number of the Agenda 2000 subcriteria. It is stated in the 2002 Commission Report that "the capacity to withstand competitive pressure and market forces within the Union requires the existence of a market economy and a stable macroeconomic framework. It also requires a sufficient amount of human and physical capital, including infrastructure. It depends on the extent to which government policy and legislation influence competitiveness, on the degree of trade integration a country achieves with the Union and on the proportion of small firms" (European Commission 2002).

The paper is an attempt to assess some aspects of the above described "capacity" in Polish manufacturing in the period 1993-2000. It aims to develop an approach to evaluating the adaptability of Polish industry to the new conditions resulting from joining the internal market.[2] The concept of adaptability used in the paper is based on the definition suggested by the European Commission in the 1999 report on industrial competitiveness (European Commission 1999). According to this definition the economy/industry is adaptable if it can accumulate and re-deploy resources rapidly in pursuit of new opportunities, while at the same time fully exploiting existing competitive strengths. The focus of the paper's analysis is accumulation, mobility, and the existing competitive strengths in manufacturing as three strands of adaptive potential. We assume that the above phenomena give a general but not exhaustive picture of adaptability, thus the full assessment requires further analysis.

The examination is divided into three parts. The first part considers the dynamics of accumulation in Polish manufacturing in 1993-2000. The second part looks at the speed of structural change in production, exports and employment as an indicator of mobility.

The third part provides some indications of the competitive strengths that exist in Polish manufacturing. It looks at trends in productivity and industrial and trade spe-

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2. For other research on Polish manufacturing see: Lipowski 1998, Wziatek-Kubiak 2003

cialisation. Empirical analysis is followed by a brief comment on main findings.

Analysis is based on sectoral data according to the 3-digit NACE classification. The choice of the classification is imposed by data availability. The Polish Central Statistical Office is the source of industrial data and the EUROSTAT Comext database is the source of trade data.

2. Accumulation analysis

Many economists argue that the standard neoclassical growth theory (Solow-Swan models) may be effectively used to describe the process of accumulation in transition economies due to the dominant role of factor endowments as determinants of economic growth and the exogenous nature of technological progress. As stated in neoclassical models the ability to accumulate resources depends to a great extent on gross fixed capital formation and productive tangible investment (Solow 1957, Barro 1998). Physical investment enhances the productivity of labour and through the component of embodied technical progress influences efficiency of production. In accordance with the neoclassical theory we assume that the role of investment is significant for Polish manufacturing on the eve of EU accession.

The focus of the examination is sectoral dynamics of investment measured by the growth rates at disaggregated level. It illustrates the changes that have taken place over the nineties. The sectoral growth rates of investment have been calculated for the period between 1993-2000 at constant prices of 1993. Growth rates are expressed as average annual percentage changes in physical investment between 1993 and 2000 and in two sub-periods: the first covering the years 1993-1997, characterized by a high rate of investment growth, and the second covering the years 1997 to 2000, in which investment dynamics has evidently fallen. The average growth rates in the above periods are compared to annual growth rates in the initial 1994/93 and the final 2000/1999 years of the study.

In order to get a clearer picture of investment changes we have clustered industries according to their growth rates in the chosen sub-periods and have identified the winners and losers of transformation. The main findings with regard to investment dynamics are as follows (see Table 1):

- the growth rates of investment were relatively higher in the early years of the nineties than in the later
- most industries experienced a dramatic fall in investment in 2000
- fast investment growth was found in the majority of industries between 1993-97 and a fall in investment growth was evidenced in most industries after 1997, especially in 2000
- the results suggest that there were no very important differences in investment

dynamics among particular industries in the first sub-period. The number of industries with growth rates higher than the manufacturing average was over 60 out of 91 under review. There was a fall in investment growth only in 4 industries

• important differences in investment dynamics occurred in the second sub-periods when there was a decrease in investment in one third of industries. The biggest decrease in investment occurred in 2000 when two third of industries were touched by the crisis. Investment inputs were concentrated in a limited number of industries.

The question that arises from the above analysis is whether the performance of investment was different or similar among particular industries in the selected sub-periods. Comparisons of this performance permit grouping industries into clusters in terms of their behaviour at the beginning and at the end of the decade. A group of 30 industries that showed the highest rate of investment growth in 1993-97 are used as a benchmark for analysis (see Table 2). The results suggest that there was a dramatic re-grouping of industries according to the dynamics of investment in the second sub-periods. Only 12 out of 30 industries that can be defined as heavy investors at the beginning of the decade have maintained their strong position after 1997. An acceleration of investment activity may be an evidence of good performance. These industries are presented as cluster 1 in Table 2. The cluster includes mainstream or traditional manufacturing such as accumulators and batteries, motorcycles and bicycles, sports goods, wood products, lighting equipment, as well as more research-intensive industries such as office machinery and computers, TV and radio transmitters, TV, radio, and recording equipment. However, the growth rates fell significantly in five industries of that group in 2000. The fall took place mainly in research-intensive sectors and it may have a negative impact on future competitiveness of Polish manufacturing.

The second cluster of the best performers in 1993-97 includes industries that performed quite well or slightly worse after 1997. The motor industry is the most spectacular example of the cluster that showed a very high growth rate in investment at the beginning of the nineties, a very low but positive rate in 1997-2000 and a severe fall in investment in 2000. A much more successful investment performance was recorded in fabricated metal products and production of medical equipment.

The losers in investment dynamics are grouped in cluster 3. These are traditional industries with relatively high rates of investment growth in the first sub-period, and with big decreases in investment rates after 1997. Among these industries only production of knitted or crocheted fabrics recovered in 2000. Additionally, in the late nineties the emergence of investment potential has been observed in such industries as rubber, ceramic tiles and flagstones, treatment and coating of metals, shipbuilding, cutlery, tools and general hardware, processing of metal waste, instruments for measuring, checking and testing.

3. Structural change

The speed and pattern of change in the structure of manufacturing reflect the mobility and adaptability of the economic system. Over the period 1993-2000 a deep restructuring of production and exports occurred in Polish industry. The restructuring process can be judged by standard statistical indexes that measure degree and structure of specialisation. The changes in specialisation give a picture of how resources are re-deployed within manufacturing. In order to provide a general view of the overall tendency for production, export and employment specialisation we calculated the standard indicators of specialisation.

The first indicator is the Herfindahl index, which is the sum of the squared shares of each industry in total manufacturing. We apply the index in the form suggested by Sapir (1996), Amiti (1999) and the European Commission (EC 1999):

$$H_j = \Sigma (s_{ij})^2$$

where "j" indicates the whole manufacturing sector, "i" a given industry sector and s_{ij} a share of sector "i" production, exports or employment in respective total manufacturing values.

The index measures absolute specialisation of a country; the bigger the value of this index the higher degree of industrial specialisation. An increase in the index over time indicates growing specialisation and concentration in a limited number of industries, a decrease points to a fall in specialisation and concentration and a rise in industrial dispersion among a bigger number of sectors. The graph presents a tendency in the Herfindahl index for production specialisation, export specialisation and employment specialisation in Polish manufacturing in the years 1993-2000. Over the whole period the index for exports has been almost twice as big as the index for employment and much bigger than the index for production specialisation. The indices suggest a high degree of inter-industry mobility of exports, a moderate mobility of production and a relatively small mobility of the manufacturing labour force. If we look at the development over time we see that production specialisation tended to increase from 1995 to 1998 and has tended to decrease since then. In turn, export specialisation tended to increase at the beginning of the period, decrease later on and increase again in 2000. Employment specialisation tended to remain relatively stable and indicated a high degree of inter-industry dispersion of employment and a small mobility of labour.

The second indicator is concentration ratio measured as the share of the largest five industries in total exports, production and employment. The development of the concentration ratio CR5 is shown in figure 2. The Five-industry concentration ratio

for exports has been very high over the period and the magnitude of the change has been marginal. CR 5 for production was a bit smaller but also relatively stable whereas the ratio for employment was much lower and amounted to 25,3% in 1993 and 24,7% in 2000.

The third indicator of the speed of structural change concerns identification of the sectors that gained and lost shares in manufacturing production in the period 1993 -2000. The results are shown in Table 3.

As shown in the table, it was mainly research-intensive industries that gained shares in total production, and traditional low skill industries that lost more heavily. The trend may suggest that Poland is undergoing the restructuring of its specialisation pattern in favour of the more advanced products that meet stronger demand on international markets.

4. The existing competitive strengths

4.1 Productivity analysis

The productivity analysis of Polish manufacturing is based on measures of productivity growth at the industry level. Non-parametric methods of productivity measurement and index number approach have been applied for measuring single factor productivity and multi-factor productivity TFP (Hulten 2000, Jorgensen and Nishimizu 1978; Samuelson and Swamy 1974; Diewert 1976, 1979).[3] The measures of productivity are based on a concept of gross output that is recommended by the 2001 OECD Productivity Manual for sectoral studies.

Single factor productivity measures are expressed as labour productivity growth rates and capital productivity growth rates based on gross output. In a time-series context the chain principle is used for the measurement of productivity growth (Tornquist approach).

Labour productivity is defined as a ratio of quantity index of gross output to quantity index of labour input where gross output is the value of total turnover at constant prices of 1993 and labour input is the number of employees in an industry.

Capital productivity is measured by the ratio of quantity index of gross output to quantity index of capital input where gross output is the value of total turnover at constant prices of 1993 and capital input is the value of fixed capital at constant prices of 1993.

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3. The full analysis of productivity in Polish manufacturing is presented in: Zielinska-Glebocka 2004.

Multi-factor productivity growth (TFP) is calculated as a difference between the rate of growth of a Divisia index of output and a Divisia index of inputs. The Divisia index of inputs is made up of the logarithmic rates of change of inputs weighted with their respective shares in overall outlays for inputs (OECD 2001). The TFP measure is derived from a Cobb-Douglas production function and it reflects a technological element A(t) of the function in a logarithmic form suggested by Bernard and Jones (1996). It is expressed as follows:

$$Y = A(t)\, F\,(K,L)$$

and

$$A(t) = Y/\, F\,(K,L)$$

In a logarithmic form

$$\ln A\,(i,t) = \ln TFP(i,t) = \alpha \ln (Y/L)i,t + (1 - \alpha) \ln (Y/K)i,t \qquad (1)$$

or

$$\ln A(i,t) = \ln TFP(i,t) = \ln Y(i,t) - \alpha \ln L(i,t) - (1 - \alpha\,) \ln K\,(i,t) \qquad (2)$$

where – Y/L is labour productivity, Y/K is capital productivity, α – is the weight of input shares in total outlays for inputs.

The change in TFP expressed in chain indices is measured by the formula:

$$\%\ \text{change of TFP}=d\ \ln A/dt=\alpha[d\ \ln (Y/L)/dt\ ]+(1-\alpha)[d\ \ln (Y/K)/dt] \qquad (3)$$

and

$$d\ \ln A/dt = d\ \ln Y/\ dt - \alpha\ (d\ \ln L/dt) - (1-\alpha)(d\ \ln K/dt) \qquad (4)$$

The calculations of % TFP change require estimates of the á parameter. The parameter can be estimated as the share of total labour compensation (wages and non-wage compensations payable by employers and employees) in value added or the share of total labour compensation in total costs (Scarpetta and Tressel 2002). The former is better adjusted to reflect short-term changing market conditions, while the latter gives more reliable results under perfect competition.

The value added formula of the α parameter has been chosen for empirical analysis of Polish manufacturing. It was calculated as an average for the years 1993-98 and accounted for the range between 0,331 and 0,864 in particular industries at 3-digit NACE level of aggregation. The median value of á was between 0,55 and 0,70.

The growth rate of Total Factor Productivity is a measure of the genuine technological change that is likely to contribute to labour productivity growth. The bigger the element of TFP growth in labour productivity growth, the bigger the role of

technological progress and the smaller the role of capital deepening in productivity performance. Thus the difference between the labour productivity growth and TFP growth shows the contribution of technology and capital intensity in the development of an industry.

The results of empirical analysis of Polish manufacturing show that the average rate of labour productivity has been much higher than the rate of TFP growth in the majority of industries in the years 1993-2000. If we assume that the growth of TFP expresses a technological factor we can draw a conclusion from the above analysis that **over the past decade capital deepening contributed much more to productivity growth than technological change.** The highest rates of TFP growth were recorded in the WIFO (see Peneder 1999 taxonomy in EC 1999) research intensive industries such as office machinery and computers, TV and radio transmitters, pesticides and other agro-chemical products, TV and radio equipment, instruments for measuring, checking, testing, electronic valves and elements but also in a range of industries classified as high skills or medium skills, including machinery industry and metal products (see Table 7 and 8). Nevertheless, in all these industries labour productivity growth was much bigger than TFP growth and this suggests that the role of the technological element in productivity dynamics was smaller than the contribution of capital deepening.

Productivity analysis also reveals various relationships between other industrial characteristics. Seven characteristics have been chosen for examination of these relationships: employment growth, (E) capital intensity growth (K/L), capital productivity growth (PC), labour productivity growth (LP), TFP growth, production growth (P), and the difference between labour productivity growth (LP) and TFP growth. These characteristics were used for grouping industries into relatively homogenous clusters. To this end statistical cluster analysis is applied. On the basis of the Ward method of statistical clustering, 87 industries under review have been grouped into 9 clusters. The characteristics of the clusters and examples of industries included are given in Table 5 and Table 6 presents the average values of the main characteristics for particular clusters.

The data in Table 6 confirm the general findings that TFP growth has been much smaller than labour productivity growth over the whole period. Thus, capital deepening contributed significantly to labour productivity growth in the majority of industries. The biggest growth of labour productivity was experienced by industries clustered in group 1, 3, 4 and 5, whereas the rate of productivity growth was very small in clusters 7, 8 and 9 - which include all together one third of the industries under review. Only clusters 2 and 7 recorded significant employment growth, while industries in cluster 5 and 6 evidenced a fall in employment.

4.2 Specialisation pattern

In order to look at the specialisation pattern and comparative advantages in Polish manufacturing we employed the WIFO taxonomy of industry by factor intensities (in tangible and intangible investment) defined as WIFO I, as well as in skills - defined as WIFO II (Peneder 1999).

The first taxonomy focuses on industrial structure and comparative advantage depending on relative endowments of capital and labour (tangible investment) and advantages raised by intangible investments in marketing or innovation. 3-digit NACE industries are clustered by input combinations into 5 groups: mainstream manufacturing, labour intensive industries, capital intensive industries, advertising intensive industries and research intensive industries. The production shares of industries and relevant export specialisation coefficients in trade with the European Union classified by the WIFO I groups in Polish manufacturing are presented in Table 7.

At the beginning of the nineties Poland exhibited the smallest shares of production in the group of research intensive industries and the biggest shares in marketing-driven industries. The former additionally enjoyed the lowest export specialisation in trade with the EU. The most pronounced characteristic of export performance was very strong export specialisation in labour-intensive industries. Over the decade Poland has significantly improved its performance in research-intensive industries in terms of production shares and only slightly improved its export specialisation pattern with the EU. The data show that Poland still remains most specialised in labour-intensive, capital-intensive and some mainstream industries and least specialised in research-intensive industries.

The second WIFO taxonomy of industrial structure is based on skill types identified as low skills, medium skills (blue collar), medium skills (white collar) and high skills. The production shares and relevant export specialisation coefficients of industries classified by skill intensities are reported in Table 8.

The data on industrial structure show that Poland is a country less specialised in high-skill industries and more specialised in low-skill and blue collar industries. Nevertheless, the pattern of production specialisation has significantly changed in the nineties, production shares of medium-skill blue collar industries have doubled and those of low-skill industries significantly decreased. The changes may suggest that Poland has been improving its industrial and export specialisation since the beginning of transformation. In terms of the sophistication of the production pattern it will remain, however, a EU periphery after the accession.

The findings of the WIFO taxonomy are confirmed by the analysis of changes in Polish exports structure measured by CN 2-digit classification between 1989 and 2001. The product groups that have heavily lost shares in total Polish exports to the

EU in the analysed period are as follows: livestock, meat products, dairy products, mineral fuels, iron and steel, copper. The first three groups of food products strongly recovered their export performance after 1 May 2004, when Poland entered the EU. The winners in terms of shares in total exports are the following: furniture, lighting equipment, mechanical vehicles and accessories, non-electrical machinery, electrical machinery and clothing. The results are in line with general conclusions about a relatively high extent of structural change in exports to the EU.

4.3 Trade performance of Poland on EU enlarged market

In order to assess the competitive position of Polish manufactured products on the EU enlarged internal market we looked at EU import market shares calculated for goods imported by the EU countries from Poland.[4] The market shares were calculated for the internal trade of EU-25 expressed as a sum of internal trade of EU-15 and external trade of EU-15 with the 10 accession economies (ACCs). Due to lack of availability of adequate data, trade flows within ACC-10 had to be excluded. We assume that import market shares express trade competitiveness on a particular product market. The analysis of statistical data on market shares shows the significance of imports from Poland for the enlarged internal market as a whole and for individual EU countries in individual manufacturing segments expressed as 3-digit NACE groups. The examination of import market shares for the whole EU reveals that Poland is an important supplier on the big internal market - comprising 25 member states- of manufactured goods that can be characterized as traditional or mainstream. The analysis for Germany, the most important Polish trade partner, confirmed the findings for the whole EU. In terms of market competition it can be concluded that Poland as a new member of the EU will supply the whole internal market mainly with food products, textiles and clothing, furniture, wooden products, metal goods, mineral products, coke products, ships and boats and lighting equipment. Thus, in the above sectors the other EU peripheries may face crowding out effects, unless they undertake adjustment efforts (such conclusions on the effects of Eastern enlargement may be found in Baldwin 1994, Baldwin et. al 1997,

4. The analysis of import market shares is a part of the research project titled: Changes in Industrial Competitiveness as a Factor of Integration: Identifying Challenges of the Enlarged European market. Contract No. HPSE-CT-2002-00148. Calculations were based on the Eurostat's COMEXT database on intra- and extra- EU trade. In order to examine the impact of changes in trade in manufactured goods on individual industrial sectors in Member States, data on trade flows in 8-digit CN product groups were converted to 4-digit CPA2002 groups of products by activities and than to 3-digit NACE groups (with the use of Eurostat official correspondence tables).

Emerson and Gros 1998, Egger and Kratena 2003). Table 9 presents a list of products with the highest import market shares for the whole EU and for Germany in 2001.

5. Conclusions

The empirical analysis revealed that:

- the average annual rate of investment growth within manufacturing was very high in the first half of the nineties and then dramatically deteriorated in the second half. It may suggest that Poland is losing its ability to accumulate resources in manufacturing.
- the speed of change in manufacturing has been increasing over the period, as evidenced by the Herfindahl index, concentration ratios and lists of industries with the largest increase and decrease in production shares. The high speed of structural change, particularly in exports, may be evidence of the appropriate speed of adjustment to the EU single market and the process of catching up with European industry performance
- empirical results concerning the existing competitive strengths in Polish manufacturing show that Poland has the biggest competitive advantages in traditional low-skill and labour-intensive industries. Nevertheless the structure of industry has dramatically changed over the period. The share of industries with medium-skill intensity of blue collar workers has crucially increased; the same trend has been reported for research- intensive sectors.
- Productivity analysis reveals that the rate of labour productivity has been much higher than the rate of TFP growth in the majority of industries in the years 1993-2000. According to economic theory this suggests that the role of the technological element in productivity dynamics was smaller than the contribution of capital deepening.

Table 1: General trends in investment dynamics in manufacturing in the years 1993-2000

(average annual growth at constant prices of 1993)

	1994/93	1997- 1993	2000-1997	2000-1993	2000/1999
• Number of industries under review[a]	95	91	95	90	100
• Average annual growth rates of investment for the whole manufacturing sector	23,9%	32,3%	31,5%	22,1%	-15,0%
• Number of industries with fall in investment growth rates	37	4	32	1	64
• Number of industries with growth rates higher than the manufacturing average	40	62	30	65	57 (of which fall in 21)

a) *the number of industries in the two-sub-periods differs due to availability of statistical data*

Table 2: Clustering of industries according to the rate of investment growth in various sub-periods

Industries with the highest rates of investment growth in 1993-1997 clustered into groups	Annual average growth rates of investment in 1997-2000 (% rates in parenthesis)	Investment growth rate in 2000 in relation to 1999 in %
Cluster 1		
300 Office machinery and computers	Very high rise(271,9))	Strong fall
314 Accumulators, batteries	Very high rise (156,0)	Strong fall
285 Treatment and coating of metals	Very high rise (84,3)	Very high rise (170,1)
354 Motorcycles and bicycles	Very high rise (101,1)	Very high rise (140,4)
362 Jewellery and related articles	Very high rise (326,2)	Strong fall
364 Sports goods	Very high rise (75,4)	Very high rise (146,6)
322 TV and radio transmitters, phone equipment	Very high rise (56,7)	Moderate fall
323 TV and radio equipment	Very high rise (57,2)	Strong fall
315 Lighting equipment	High rise (39,3)	High rise(39,3)
205 Other products of woods	Very high rise (47,7)	Moderate fall
204 Wooden containers	Very high rise (62,4)	Strong fall
313 Isolated wire and cables	High rise (32,2)	Moderate fall
Cluster 2		
372 Non-metallic waste	Weak rise(4,0)	Strong fall
341 Motor vehicles	Very weak rise (o,6)	Strong fall
268 Other non-metallic mineral products	Weak rise (9,3)	Moderate fall
343 Parts and accessories for motor vehicles	Moderate rise 24,6	Strong fall
331 Medical equipment	Weak rise (5,9)	Moderate rise 17,3
281 Structural metal products	Moderate rise 18,6	Moderate fall
287 Other fabricated metal products	Moderate rise 26,7	Very high rise 68,1

Cluster 3	Moderate fall	Strong fall
232 Refined petroleum products	Strong fall	Strong fall
192 Luggage, handbags, saddlery	Strong fall	Strong fall
154 Vegetable and animal oils and fats	Moderate fall	Weak rise
342 Bodies for motor vehicles	Strong fall	Strong fall
282 Tanks, reservoirs, central heating radiators	Moderate fall	Strong fall
202 Panels and boards of wood	Moderate fall	Strong fall
293 Agricultural and forestry machinery	Strong fall	Moderate fall
203 Builders' carpentry and joinery	Strong fall	High rise (51)
176 Knitted and crocheted fabrics	Strong fall	Moderate fall
261 Glass and glass products	Strong fall	Strong fall
181 Leather clothes		

Table 3: The speed of change of production in Polish manufacturing

	3-digit NACE industries	1993 % share	2000 % share
Sectors with largest increase in shares in total manufacturing production	Motor vehicles,	2,22	7,50
	Refined petroleum products	5,07	7,29
	Furniture	2,03	3,32
	Parts and accessories for motor vehicles	0,69	2,36
	TV, radio and recording equipment	0,55	1,61
Sectors with largest decrease in shares in total manufacturing production	Beverages	8,43	4,31
	Meat products	6,66	4,26
	Tobacco products	3,21	1,35
	Dairy products	4,57	3,19
	Basic chemicals	4,31	2,86

Table 4: Industries with the highest productivity growth

(productivity growth measured as average annual rates in the years 2000-1993)

10 top industries with the highest labour productivity growth in 2000-1993	**10 top industries with the highest total factor productivity growth in 2000-1993**
Office machines and computers	Office machines and computers
Refined petroleum products	Forging, pressing and forming metal
TV and radio transmitters, telephone equipment	TV and radio transmitters, telephone equipment
Other non-metallic mineral products	Pesticides, other agro-chemical products
Forging, pressing and forming metal	Bodies for motor vehicles
TV, radio, recording equipment	Cutlery, tools and general hardware
Bodies for motor vehicles	Other first processing of iron and steel
Basic iron and steel	TV, radio, recording apparatus
Motor vehicles	Processing of metal waste
Cutlery, tools and general hardware	Basic iron and steel
10 bottom industries with the lowest labour productivity growth in 2000-1993	**10 bottom industries with the lowest total factor productivity growth in 2000-1993**
Leather clothes	Leather clothes
Insulated wire and cables	Refined petroleum products
Wooden containers	Processing of non-metallic waste
Coke oven products	Beverages
Ceramic tiles and flagstones	Accumulators, primary cells and batteries
Tobacco products	Insulated wire and cables
Beverages	Tobacco products
Dairy products	Publishing
Publishing	Pharmaceuticals
Pharmaceuticals	Ceramic tiles and flagstones

Table 5: Industries clustered by productivity characteristics

Cluster	Characteristics
Cluster 1 (1 industry) Refined petroleum products	Big production growth, big labour productivity growth, big capital productivity growth, very big capital intensity growth, fall in TFP growth,, big difference between labour productivity growth and TFP growth, moderate employment growth
Cluster 2 (2 industries) Motorcycles and bicycles, jewellery articles	Big production growth, big employment growth, very big capital intensity growth, very small productivity growth (single and TFP), big difference between labour productivity growth and TFP growth
Cluster 3 (3 industries) TV and radio transmitters, Bodies for motor vehicle	Big production growth, big productivity growth (single and TFP), small employment growth, big capital intensity growth, big difference between labour productivity growth and TFP growth
Cluster 4 (9 industries) Vegetable and animal oils and fats, Lighting equipment, Motor vehicles, Parts and accessories for motor vehicles	Big production growth, big employment growth, very big capital intensity growth, big labour productivity growth, big TFP growth, big difference between labour productivity growth and TFP growth
Cluster 5 (13 industries) Knitted fabrics, Panels and boards of wood, Bricks, construction products, cement , iron and steel, Domestic appliances, furniture	Moderate production growth, moderate labour productivity growth, moderate TFP growth, big K/L growth, small capital productivity growth, fall in employment growth, small difference between labour productivity and TFP growth

Cluster 6 (28 industries) Food products, Textile products, Leather products, Pulp, paper, Metal products, Electrical machinery, electronic components, Ships and boats, Sports goods, Instruments	Moderate production growth, moderate labour productivity growth, moderate TFP growth, small K/L growth, Fall in employment growth, small difference between labour productivity growth and TFP growth
Cluster 7 (4 industries) Wooden containers, Ceramic tiles, Treatment and coating of metals, Insulated wires and cables	Very big production growth, very big employment growth,, small labour productivity growth, small capital productivity growth, very small TFP growth, very small difference between labour productivity growth and TFP growth
Cluster 8 (7 industries) Beverages, Tobacco products, Publishing, Paints and coatings, Pharmaceuticals, Detergents, cleaning perfumes	Moderate and small production growth, moderate employment growth, small labour productivity growth, small capital productivity growth, small TFP growth, moderate K/L growth, small difference between labour productivity growth and TFP growth
Cluster 9 (17 industries) Meat products, Dairy products, Other food products, Wooden products, Paper products, Rubber products, Plastic products, Glass products, Medical equipment, Games and toys	Small production growth, small and moderate employment growth, small single factor and multi-factor productivity growth, small K/L growth, very small difference between labour productivity growth and TFP growth

Table 6: Productivity characteristics of the nine clusters identified in Polish manufacturing

	C – 1	C- 2	C– 3	C– 4	C- 5	C- 6	C - 7	C - 8	C – 9
Average production growth in %	129,7	47,3	50,2	37,2	14,7	10,7	39,2	9,1	14,2
Average labour productivity growth in %	85,8	15,5	47,1	28,8	18,3	16,4	3,3	4,7	8,1
Average capital productivity growth in %	51,8	4,8	29,0	8,8	2,8	12,8	3,9	-4,5	6,4
Average TFP growth in %	-7,3	3,0	26,6	12,3	10,8	12,4	0,6	-2,6	6,1
Average capital intensity growth in %	93,8	245,2	29,5	32,2	21,3	9,3	10,8	16,6	4,8
Average employment growth	11,7	24,7	2,0	10,8	-3,6	-4,5	34,9	5,9	5,1
Difference between labour productivity and TFP growth	93,2	12,6	20,5	16,5	9,6	3,4	2,7	7,3	2,6

Table 7: Production shares in total manufacturing and export specialisation coefficients (WIFO I industrial taxonomy by input combinations - tangible and intangible assets in 1993-2000)

Type of industry	1993	1998	2000
G1 – mainstream industries			
• Share in production in %	18,63	17,61	19,06
• Export specialisation	0,601	0,871	0,962
G2 – labour intensive industries			
• share in production in %	14,42	15,61	15,85
• export specialisation	2,974	2,797	2,708
G3 – capital intensive industries			
• share in production in %	20,42	21,37	21,73
• export specialisation	0,964	1,348	1,202
G4 – marketing-driven industries			
• share in production in %	38,53	31,55	27,94
• export specialisation	0,906	0,788	0,805
G5 – research intensive industries			
• share in production in %	7,76	13,58	15,08
• export specialisation	0,350	0,372	0,472

Export specialisation coefficient is measured as a ratio between: (Poland's exports of industrial cluster to the EU divided by Poland's total manufacturing exports) and (extra - EU exports of industrial divided by total EU exports)

Table 8: Production shares in total manufacturing and export specialisation coefficients (WIFO II taxonomy by skill types in 1993-2000)

Type of industry	1993	1998	2000
G1 – high –skill			
• share in production in %	11,0	9,28	9,29
• export specialisation	0,26	0,21	0,26
G2– medium- skill (white collar)			
• share in production in %	22,97	24,67	29,38
• export specialisation	0,53	0,67	0,60
G3 – medium – skill (blue collar)			
• share in production in %	10,98	20,34	21,29
• export specialisation	1,83	2,07	2,55
G4 – low-skill			
• share in production in %	54,83	45,41	39,72
• export specialisation	1,80	1,73	1,53

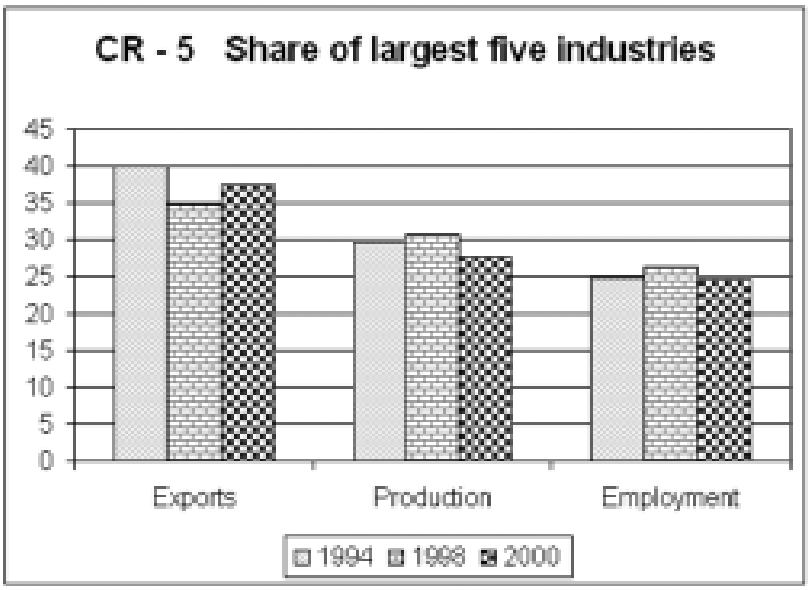
Export specialisation coefficient measures as in Table 7

Table 9: Import market shares of EU and Germany in trade with Poland in 2001

List of 3-digit NACE sectors with the highest EU market shares in imports from Poland	List of 3-digit NACE sectors with the highest German market shares in imports from Poland
153 Fruits and vegetables (5,0%)	Fish products (12,4%)
174 Made-up textile articles (9,3%)	Fruits and vegetables (12,4%)
182 Clothing (6,2%)	171 Textile fibres (8,5%)
183 Fur clothes and articles (10,8%)	174 Made-up textile articles (22,8%)
203 Wooden building elements (8,3%)	182 Clothing (15,3%)
204 Wooden containers (12,4%)	183 Fur clothes and articles (25,2%)
205 Other products of wood (17,8%)	204 Wooden containers (39,1%)
231 Coke oven products (35,9%)	205 Other products of wood (37,5%)
262 Ceramic goods (4,8%)	231 Coke oven products (41,1%)
265 Cement, lime and plaster (3,7%)	265 Cement, lime, plaster (14,1%)
281 Structural metal products (8,4%)	281 Structural metal products (23,0%)
283 Steam generators (8,0%)	283 Steam generators (35,1%)
313 Insulated wire and cable (5,1%)	351 Ships and boats (21,9%)
315 Lighting equipment (4,4%)	352 Railway locomotives (24,6%)
351 Ships and boats (10,0%)	355 Other transport equipment (23,5%)
361 Furniture (11,4%)	361 Furniture (25,6%)

Figure 1

Figure 2



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