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***Anna Wziątek-Kubiak, Iga Magda***

**Differentiation of changes in competitiveness among  
Polish manufacturing industries**

*Warsaw, December 2005*



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CASE – Center for Social and Economic Research

12 Sienkiewicza, 00-944 Warsaw, Poland

tel.: (48 22) 622 66 27, 828 61 33, fax: (48 22) 828 60 69

e-mail: [case@case.com.pl](mailto:case@case.com.pl)

<http://www.case.com.pl/>



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## **Anna Wziątek-Kubiak**

*Anna Wziątek-Kubiak is professor of economics at the Institute of Economics, the Polish Academy of Science, University of Business and an associate of the CASE Foundation. Graduated in 1970 from the Gdańsk University, she also received her PhD there (in 1973). In 1987 she was qualified as an assistant professor at the Department of Foreign Trade of the Warsaw School of Economics (SGH). In 1998 she received the title of a Professor. She has participated in and coordinated numerous research projects, also international, focusing on international economics and the development of economies undergoing transformation. She is an author and co-author of numerous books and articles, some of which have been published abroad.*

## **Iga Magda**

*Iga Magda graduated from the Warsaw School of Economics in 2004. She studied also at the University of Poitiers, France. Currently she is enrolled in PhD studies at the Warsaw School of Economics and cooperates with the CASE Foundation. She is co-author of publications on foreign trade and labour market.*



## **Abstract**

This paper aims to show the uneven process of changes in competitiveness across Polish manufacturing industries during the period prior to Poland's EU membership (1996-2003). Based on the Schumpeterian approach to competitiveness, that is the ability to compete, it looks at changes in competitiveness as effects of competition and its factors. Using two types of measure, four clusters of Polish manufacturing industries are selected: double winners, export-led industries, export-oriented industries and losers. The analysis shows that the use of EU market share as a measure of changes in competitiveness fails to reveal differentiation in levels and changes in relative productivity in those industries that increased their EU market share. It also shows that the larger the initial differences in labour productivity across industries, the stronger the process of differentiation of changes in competitiveness. Systemic transition and external liberalisation are conducive to improvement in the competitiveness of highly productive industries, but create a weak stimulus for improvement in the competitiveness of the most backward ones. Secondly, the higher the investment rate and its dynamics, the larger the increase in competitive pressure on the EU market. This conclusion is of great importance for Polish manufacturing, all of the more so given that the potential to reduce employment seems to have been largely exhausted and investment intensity has dropped considerably, especially since 1998.



## Introduction<sup>1</sup>

In 1991 Poland signed the European Agreement (EA) establishing an association with the European Communities (EC) and their member countries. The EA's commercial element was established in 1992 under the so-called 'Interim Agreement'. In 1994, after ratification by the parliaments of all parties to the EA, the agreement entered into force. It was aimed at gradually establishing a free trade area over a maximum of 10 years in accordance with the principles of reciprocity, although on an asymmetrical basis. Liberalisation was initially fastest on the EC side. It lifted all tariff and non-tariff barriers on industrial products by 1996, except on textiles and automobiles, while Poland abolished trade barriers by 1999 (except on automobiles). The EA contributed to tangible changes in the Polish economy and drove its integration with the EU. It resulted in the adjustment of the Polish economy to the mechanisms and provisions in force in the EC (and subsequently the EU). It also helped foster the systemic transformation, the development of market economy institutions and mechanisms, structural changes and international linkages. As a result of its progress since the start of the 1990s Poland was able to join the EU in 2004 as a full member.

This paper, focusing on Polish manufacturing prior to association with the EU (1996-2003), looks at progress made in improving the competitiveness of Polish manufacturing industries compared to the EU. Since competitiveness is an ambiguous term its essence for the purposes of this paper and its measurements are initially presented. Secondly, differentiation of Polish manufacturing industries (by the NACE classification in a three-digit level and by quality) in respect to changes in competitiveness and its factors is analysed. This makes it possible to discern which industries based in Poland increased their competitive pressure on their EU counterparts in the EU market and which were pushed out of this market<sup>1</sup>.

Assuming that improvement in competitiveness is one of the decisive factors in Polish manufacturing's integration with the EU and at least a prerequisite for it, the analysis will show its progress and the challenges to it which have arisen. It will also deal with the weaknesses of Polish manufacturing prior to Polish membership, which have hampered further progress in integration.

The paper contains 4 sections. The opening section presents the analytical framework used to examine changes in competitiveness of Polish manufacturing. The second section shows the characteristics of the development of the Polish economy since the mid-1990s when the EA came into force and the most intensified liberalisation of trade relations took place. Changes in competitive pressure of Polish manufacturing on the EU market are also included. The third section then turns to the classification of Polish manufacturing according to changes in its competitive pressure on the domestic and the EU market, as well as fundamental factors responsible for differentiation of this pressure across industries. Based on statistical analysis, section 4 shows how differences in competitive pressure between four selected areas of manufacturing reflect differences in fundamentals. In the last section a multi-factor approach is used to select and characterise the winners, losers and "in between" industries. Conclusions wrap up the paper.

## I. Conceptualising competitiveness

Discussing competitiveness issues one faces persistent miscommunication. The reason is that competitiveness is a word that has been given several different meanings. In this paper we use a competitive approach to competitiveness. We presume that competitiveness derives from competition and thus directly reflects the competition struggle. The term "competition" is used in the sense of rivalry among actual and

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<sup>1</sup> 15 EU member and 10 future new member states.

potential competitors. It is synonymous with terms such as "struggle", "contest", "rivalry" and "conflict" [Neumann, Weigand 2003]. Competition focuses on situations in which parties producing substitutes - aiming to achieve the same, but effectively opposite targets - end up in conflict. It includes the process of some firms pushing other firms (and therefore the goods produced by them) out of the market. Competition takes place between all market participants producing non-competitive (price does not cover production costs) and competitive goods, with different competitiveness levels. It allows only for some competitors to survive. Although non-competitive businesses also join the struggle, their products are with time eliminated from the market. Since ongoing and never-ending competition reflects the selection of producers, changes in the competitiveness of a given firm result in changes in its market position [Frischtak 1999, p.86]. Also in the literature one often finds market share being used as if synonymous with a performance indicator of competitiveness [Meeksen, Rayp 2000, p. 275]. This means as well that in our approach competitiveness is synonymous with competitive pressure and reveals the selection nature of competition.

Since competitiveness reflects the ability to compete then, firstly, it implies that it is a relative term. The assessment of competitiveness of a product manufactured by one company through, for example, its productivity should be related to the productivity of its rivals on the market where the competition takes place. Improving productivity alone does not imply a rise in the company's competitiveness, since another company, foreign or domestic, may increase its productivity by a wider margin. In such a case a drop in its international competitiveness level may accompany an improvement in its productivity.

Secondly, since competitiveness reflects competition, its boundaries determine the scope of analysis of competitiveness. The subject of competitiveness research is the product market, its constituent elements and the market for substitutes produced by various companies. Since the range of competition struggle marks the possibilities of verifying competitiveness, the product's competitiveness is verified on both the domestic and foreign markets. It follows that any evaluation of the competitiveness of domestic production based on exports share only has limited research capabilities [Casson 1999]. This is stressed by the fact that changes in market shares also reflect changes in market orientation (domestic or foreign) of production, export and import dynamics as compared to production dynamics and differences in demand dynamics between domestic and foreign markets and shifts in quality of products. Quick growth in foreign demand encourages local producers to develop sales in that market. In such a situation the acceleration of growth in deliveries to the foreign market may be accompanied by decelerating growth of local deliveries, implying an increase in export market share. This in turn may result in a slower increase in a country's share of world production than in international trade.

Intuitively, any improvement in domestic production's competitiveness should take place when the share of domestic products in both domestic and foreign markets is rising. Conversely, falling market share in both domestic and foreign markets would indicate a worsening of production's competitiveness. What is most ambiguous is evaluation of changes in the competitiveness of production where changes in domestic and foreign market share are divergent. For example, when the growth of production share in one market (for example the domestic one) is accompanied by a decrease in the share of the other (foreign) market.

Our approach to evaluation of changes in competitiveness is based on the analysis of both domestic and foreign market shares. It differs from the approach in which competitiveness is based exclusively on the evaluation of export market share. In the latter approach, one assumes that firms are operating under conditions of an open economy and thus that virtually all of the country's production is exportable. Since there are no differences between the competitiveness of production exported and that sold on the domestic market total production can be said to have a similar level of competitiveness. These assumptions do not comply with the conditions in Poland in the 1990s.

Thirdly, the forms and methods of competition (price and non-price) are reflected in the forms and methods of changes in competitiveness. In both great importance is given to improving productivity [Porter 1990, p. 9,21] and differentiating products [Porter 1990, p. 10, 29]. Firms challenge not only those consumers already present

in their products' market, but also others, as well as their disposable incomes. Firms want consumers to buy their products instead of goods even from outside the same branch. Therefore competition takes place not only within single branches but also between them. This stems from the continuously higher differentiation of products and the fight for consumers' disposable incomes.

The theoretical importance of diversity and its factors in explaining the evolution of foreign trade is based on the new trade and endogenous growth theories expounded by Krugman, Grossman and Helpman. In these models the concept of quality ladders and vertical product differentiation are included. High-income consumers tend to buy the high quality variants and the number of variants produced within vertical product differentiation depends on the income spread. The differences in consumers' disposable incomes and changes that take place in them have an impact on the range of competition between producers.

Higher quality enables higher price without losing market share. Consequently, in the framework of monopolistic competition, by increasing the quality of goods produced for the domestic market a country can at the same time shift its import demand curve inwards and its export demand curve outwards. It follows from this that an increase in market share may reflect not only an improvement in the relative productivity of the substitute but also an upward shift in the quality ladder. This makes possible entry into a more dynamic part of the market stimulated by an increase in the disposable income of consumers.

The approach to competitiveness presented above determines the methodology used in analysing changes in competitiveness of Polish manufacturing. We assume that changes in the international competitiveness of Polish manufacturing reflect changes in competitive pressure of domestic based producers and their products on foreign (EU) based ones operating on the Polish and the EU markets. As a result of competition domestic based industries' higher competitiveness enables them either to catch up with overall market increase or pushes out foreign competitors from this market. In effect, their share of the market increases.

Since competition takes place both on both domestic and foreign markets, in analysing changes in competitiveness one must also consider changes in domestic and EU market shares. However, one should keep in mind that changes in a given domestic market share, as compared to other (foreign) market shares, reflect other, not exclusively supply side, factors. Shifts in demand dynamics between two markets, as well as the ability of companies to adjust to these changes, are also important. This means that analysis of changes in competitiveness demands the use of a multidimensional approach. One should focus not only on changes in market share but also consider its factors. Secondly, the competitive approach used in the paper implies that Polish and the EU factors will be compared and the relative factors evaluated and applied. Thirdly, since competition takes place within rather than between quality parts the level and changes in relative quality of products will be considered.

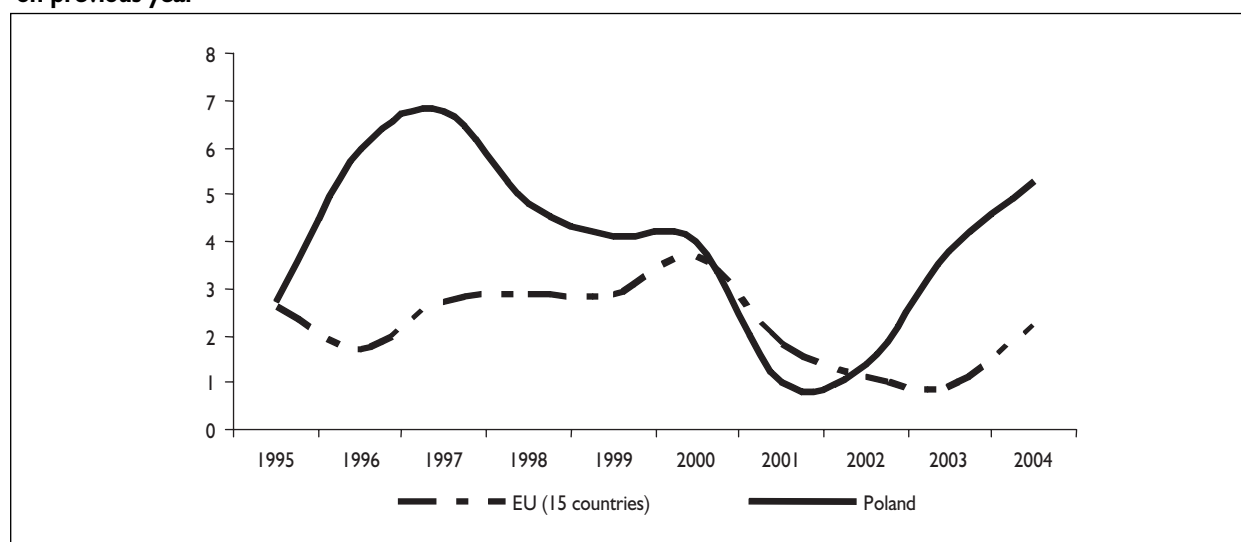
## **2. Growth characteristics of the Polish economy during the period preceding EU membership**

Since the beginning of the 1990s Poland has been on a path of fast economic growth. In 1995-2004 its GDP growth exceeded the EU15 average in every year but 2001 (fig.1). Moreover, the difference in GDP growth between Poland and EU15 keeps widening, allowing Poland to continuously converge towards the European level of economic development. In terms of GDP growth Poland has been a catch-up country.

However, Poland's economic growth has been more uneven and "turbulent" than in the EU. In terms of GDP growth dynamics three sub-periods can be marked out. Up to 1998 growth dynamics were very high, reaching 7% a year. Between 1998 and 2001 they dropped quite considerably (below 1%) and then restarted to increase. The question arises as to whether changes in economic growth were accompanied by changes in the Polish



**Figure 1. GDP growth rate in Poland and the EU15, 1995 - 2004, at 1995 constant prices, percentage change on previous year**



Source: Eurostat.

economy's competitiveness? Did high economic growth accompany an improvement in competitiveness, while the slowdown accompany a deterioration in competitiveness?

Although traditionally Poland's economic growth has been much more inward oriented than other Accession Countries (AC), its foreign trade dynamics in recent years have been very high. The level of openness and orientation of production have changed quite impressively. According to Poland's Central Statistical Office data, the volume of Polish exports in USD increased by almost 400% in the period 1991-2003. Import growth dynamics exceeded those of exports. In 1995-2003 the share of exports in GDP increased from 23.7% to 34.7%, while that of imports rose from 21.5% to 36.9%. The negative trade balance also reflects the large inflow of foreign direct investment into Poland, especially after 1994. The dynamic rise in foreign trade and FDI inflows have contributed significantly to the increase in the investment rate and GDP growth in recent years.

The growth of the Polish economy since the end of the 1990s has to a large extent been the result of a significant rise in labour productivity. The productivity gap between Poland and European Union is still large, though has been diminishing, reaching 48% of the EU level in 2003<sup>2</sup>. However, the productivity gap in manufacturing has been lower than the average for the Polish economy (in 2003 accounting for 52.8 % of the EU-15 level).

The increase in labour productivity came in most cases as a consequence of diminishing employment rather than an increase in the investment rate. The number of people employed in manufacturing industry fell by 21% between 1998 and 2002. The investment rate of Polish manufacturing remains low. It was not only lower than the EU average but deteriorated from 0.73 to 0.69 in the years 1996-2003. Companies were increasing their investments up to 1999 (the rate of investment reached 8.2%). After the economic slowdown between 1999 and 2001, the investment rate fell to a level of 5% and did not change until 2003, despite a revival in economic growth (Table 2). The progressive decline in outlay lead to insufficient investment in many branches, accompanied by an excessively high level of consumption of all kinds of fixed assets, which reached 47.7% in 2003. Considering that investments are a major source of technological progress in Poland it follows that the restructuring of Polish manufacturing, which should support an increase in competitiveness, was rather shallow. Since the potential to improve the competitiveness of Polish manufacturing by diminishing employment has been exhausted, any further improvement in competitiveness depends on an increase in investments.

<sup>2</sup> The productivity measured by value added in PPS per employee, Eurostat data.

**Table 1. Export dynamics and changes in the share of Polish manufacturing in the domestic and the EU market in 1996-2003**

	1996	1997	1998	1999	2000	2001	2002	2003
Dynamics of EU25 intra exports		11	10%	6%	18%	3%	1%	-2%
Dynamics of EU15 intra exports		9%	9%	6%	17%	2%	1%	-3%
Dynamics of Polish exports to EU15		17%	16%	10%	34%	14%	7%	12%
Dynamics of AC exports to EU15		20%	21%	14%	29%	13%	6%	9%
PL share in EU25 market	1.0%	1.1%	1.2%	1.2%	1.4%	1.5%	1.6%	1.8%
PL share in AC exports to EU15 market	27.4%	26.7%	25.5%	24.7%	25.6%	25.8%	25.9%	26.5%
Share of Polish exports to the EU-15 in the EU-25 internal imports	2.4%	2.4%	2.5%	2.5%	2.7%	3.0%	3.4%	3.8%
PL share in domestic market	66.0%	62.6%	60.7%	59.1%	58.8%	58.1%	55.3%	52.8%

Source: Comext data.

In the years 1996-2003 the dynamics of growth in Polish manufacturing exports to the EU-15<sup>3</sup> were far higher than those for EU-25<sup>4</sup> internal export growth: double EU-15 internal export growth and slightly exceeding EU external imports growth (Table 2). Polish manufacturing was taking over a larger part of the European market upsurge than the EU-15 countries and a quite considerable part of EU-15 external imports and EU-25 internal exports. Poland has contributed to more than a quarter of the value of AC's exports to the EU-15 and since 1999<sup>5</sup> this share has continued to increase. One should also take into account the fact that trade among the ACs (not included in the database used for the analysis in this paper)<sup>6</sup> is increasing more considerably than EU-15 trade. We find that Poland's share of the EU-25 market has increased even more considerably and is higher than shown in the numbers estimated.

Two features distinguish changes in the competitive position of Polish manufacturing in the domestic and EU markets. Firstly, a differentiation in the trend and scale of changes between domestic and EU market shares. Secondly, factors of these changes between the three analysed sub-periods.

The quite a considerable increase in the share of Polish manufacturing exports to the EU-15 in total EU-25 internal exports during the analysed period was accompanied by a quite high drop in Polish manufacturing's position in the domestic market. This was result of much higher liberalisation of the Polish than the EU economy and high differentiation in terms of level of competitiveness across Polish as compared to EU industries. In other words, at the very beginning of the economic transformation many low- and non-competitive firms, which sold production on the domestic market operated in Poland. Liberalisation of the Polish economy, which revealed their low competitiveness, resulted in a pushing of them out of the domestic market. Their position has been taken over by foreign companies, competitive domestic firms and new domestic entrants.

Changes in both market shares reflect the operation of factors internal and external to firms. The impact of differences in demand dynamics between domestic and foreign markets, in relative productivity, orientation of production and quality of products on changes in market share has been mentioned (section 1). Each of these factors played a different role in each of the three selected sub-periods.

Deriving competitiveness from the concept of rivalry, and thus treating it as a relative category, implies the need to introduce relative (Polish as compared to EU-15) factors of changes in competitiveness: Relative Unit Labour Costs (RULC), Relative Unit Investment Rate (RUI), Relative Unit Export Value (RUEV) and Relative Unit Intermediate Costs (RUIC). Unit Labour Costs (ULC) is calculated as the labour compensation (wages and salaries plus social contributions) of a particular industry (on a three digit level, NACE classification) related to its total sales. Relative ULC (RULC)<sup>7</sup> is derived by dividing ULC in Poland by ULC in the EU-15 for each of the

<sup>3</sup> The data on Eu trade comes from the Comext database. It is based on trade data expressed in EUR.

<sup>4</sup> At the time, EU15 and 10 future NMS

<sup>5</sup> in 1995-1999 it kept losing with other 9 new member states.

<sup>6</sup> A detailed explanation of differences between two databases in Comext can be found in Annex 2.

<sup>7</sup> In the literature, relative labour productivity is often determined as a relation of an industry's productivity to total manufacturing's productivity.

**Table 2. Characteristics of Polish manufacturing growth**

	1996	1997	1998	1999	2000	2001	2002	2003
RULC PL weighted	0.77	0.79	0.81	0.79	0.75	0.77	0.71	0.62
RULC PL unweighted	1.00	1.04	1.07	1.04	1.02	1.02	0.94	0.80
RUEV PL weighted	0.43	0.45	0.45	0.50	0.53	0.60	0.64	0.67
RUEV PL unweighted	0.70	0.55	0.58	0.61	0.60	0.61	0.69	0.67
RUIC weighted	0.73	0.71	0.68	0.66	0.70	0.69	0.65	0.69
RUIC unweighted	0.68	0.68	0.66	0.65	0.88	0.67	0.65	0.67
Invest rate weighted	5.7%	6.8%	7.2%	8.2%	7.1%	5.7%	5.0%	4.9%
Invest rate unweighted	5.7%	6.2%	7.2%	7.6%	6.8%	6.1%	5.3%	5.2%
Employment dynamics		-5.4%	2.0%	-5.0%	-6.7%	-7.8%	-3.2%	-0.4%
FDI*	5 197	5678	9574	7891	10601	7118	6064	6420
FDI Dynamics		9.3%	68.6%	-17.6%	34.3%	-32.9%	-14.8%	5.9%
Investment dynamics		31.8%	28.9%	-5.8%	-7.3%	-12.6%	0.7%	14.3%

RULC – Relative unit labour costs

RUEV – Relative unit exports value

RUIC – Relative unit intermediate costs

FDI – Foreign direct investment.

\* Data on FDI concerns the whole economy.

Source: New Cronos database. Eurostat. Own estimations for 2002 & 2003 based on Eurostat preliminary results.

industries. Whenever RULC is above one (ULC in AC higher than in the EU) the efficiency of use of labour cost in Poland is lower than in the EU. RUI is the relationship between Polish and the EU-15 investment rate (share of investment in sales), while the RUIC is the relationship between Polish and EU-15 intermediate costs (share of intermediate costs in sales).

As a proxy for product quality we use Unit Export Value (UEV). It is defined as the export euro value of a given industry divided by its physical weight (per kilogram) [OECD Proceedings 1998. p. 94]. In the literature [Aiginger 1998] it is suggested that the unit export value is for many countries a good "overall" quality indicator, since it comprises many different aspects of product quality. Although it reflects changes in quality, shifts between product parts and other value enhancing features (service component, design and advertising) it is not free from some deficiencies<sup>8</sup>. We use the relative RUEV as the measure of the quality position of Polish exports to the EU-15 as compared to EU-15 intra exports for each of the manufacturing industries. The increase in RUEV is a sign of an improvement in the quality of products or a widening of the range of exported commodities within the more differentiated industries. Based on RUEV, Polish manufacturing industries were divided into three quality segments. The first covers industries in which UEV was similar to the EU average ( $RUEV > 0.85$ ). The second segment covers industries in which RUEV was between 0.45 and 0.85 (middle quality), while the third segment has the lowest quality products ( $RUEV < 0.45$ ).

Changes in the shares of both the domestic and EU markets in 1996-1998 were influenced by the opening up of both markets, which resulted in equalisation of market access for all firms. Diminishing mark-ups for Polish firms resulted in a squeezing of many out of the Polish market. Increasing RULC and diminishing RUI indicate that many did not manage to adjust to new competitive conditions. The drop in value added as an effect of external liberalisation of the Polish market accompanied the increase of ULC. Liberalisation of the EU market created conducive conditions for Polish competitive exporters and new entrants. However, higher dynamics of Polish exports to the EU than those of EU internal exports were not accompanied by any improvement in quality or the RULC of Polish products (Table 2). In effect, in 1996-1998 the gain in Poland's export share was decidedly smaller, and the drop in domestic market shares much higher, than in the subsequent years (Table 1).

The slowdown in economic growth accompanied an improvement in the share of Polish manufacturing exports in the EU market and to a lesser drop in domestic market share than in the first sub-period. This was an effect of an improvement in the RULC, which diminished, and in the quality of products (a higher RUEV).

<sup>8</sup> Changes in unit export values for a given product category may reflect both changes in product quality and changes in product bundle [Aw and Roberts 1986]. The problem is the more serious, the more aggregated the product is. It may be different from the unit prices since it represents a unit of weight rather than price of any unit [Rosati 1998].

The increase in growth dynamics of Polish manufacturing in the third sub-period accompanied a quite large improvement in EU market share, in the quality of products and in the RULC. The considerable drop in domestic market share that accompanied the improvement in EU market share reflected changes in orientation of production from domestic to external.

The Polish case confirms that in the case of a liberalising economy there may be different underlying reasons for changes in both market shares. In the first sub-period the main role was played by a drop in competitiveness (revealed by an increase in the RULC). The high growth dynamics of domestic demand neutralised the drop in domestic market share. In the second period the small drop in the domestic market and gains in the EU market revealed improvement in competitiveness. In the third analysed period the fall of domestic market share was an effect of changes in market orientation of production from domestic to foreign.

Firms compete using price and quality. The problem of evaluating the quality of products stems from the difficulty of using the price/quality relation as a measure of competitiveness. Higher price may be the result of higher quality, but not lower competitiveness. Changes in prices may reflect changes in product quality and a shift among quality segments of a given industry. Increases in prices may accompany an increase in market share provided that such an increase reflects an improvement in the quality of products.

The role of quality in competition and competitiveness analysis is significant for Poland as a catching-up country, as it experiences a rapid change in demand structure towards goods of higher quality and higher price in the medium term. High GDP growth dynamics in Poland imply an increase in both productivity and in consumers' disposable incomes. They might also result in an upward shift in the quality of the products demanded by Polish consumers. As Polish consumers' demand for low quality goods diminishes in relation to higher quality ones, the potential of low quality producers to sell on the domestic and EU markets will also diminish. This means that if Polish producers do not upgrade their products and do not shift to higher quality ones, although they are competitive and compete out other (including EU) producers, they can be locked in a "low-quality trap" [Dulleck 2002]. This would hamper growth opportunities in the long run as well as impact on the integration of Polish manufacturing with the EU market.

The low average level of RUEV (Table 2) of Polish exports to the EU suggests that Polish products meet the demand for low and medium-income consumers. The improvement in the RUEV of Polish manufacturing exports to the EU-15 in 1995-2001 indicates an upward shift in the quality of Polish manufacturing. At the same time the level and changes of RUEV have been deeply differentiated across industries.

### **3. Changes in competitive pressure of Polish manufacturing industries in the enlarged EU market and their factors**

To date the literature on changes in competitiveness has focused on changes in export market share. This approach suggests either that there is no competition in the domestic market or that the functioning of this market is distorted. The need to consider the effect of such competition arises in open and opening economies, where competition also takes place in the domestic market. This is all the more prevalent in the Polish case, firstly because Poland is a relatively large country compared to the other New Member States and most (over 65%) of its production is still domestically oriented, and secondly because the hypothesis that the competitiveness of domestically oriented production is lower than exports is widespread in the Polish economic literature. This leads to the conclusion that a kind of dualism persists in respect to levels and changes in competitiveness. This in turn would mean that analysis of changes in competitiveness based on export market share neglects evaluation of changes in the competitiveness of an important part of Polish manufacturing (section 4). Thirdly, changes in export market share may reflect changes in orientation of production as a result of

differentiation in domestic, as compared to the foreign, demand dynamics in a given period. Fourthly, since May 1st 2004 the Polish domestic market has been a part of the European Single Market. The need to analyse changes in a part of this market in the pre-membership period arises, and all the more so given that one prerequisite for a deepening of integration is improvement in the competitiveness of overall manufacturing.

In the analysed period over 70% of the total number of manufacturing industries saw a reduced share of the domestic market. A similar number of industries improved their position on the EU market. These changes, as well as scale of changes in market share, reveal a deficiency in using a solitary market measure as an indicator of changes in the competitiveness of Polish manufacturing. A new classification is suggested based on changes in both domestic and EU market share. This enables one to separate four parts of Polish manufacturing: double losers (part IV), double winners (part I) and single losers/winners (losers in one market and simultaneously winners in other market, part II and III). It seems logical that industries that saw an improved (or deteriorated) position in both markets saw improved (or deteriorated) competitiveness. However, we are still not able to determine changes in the competitiveness of single losers/winners. The problem that arises is evaluation of changes in competitiveness in the latter parts of Polish manufacturing.

To solve this problem we look at the factors that determine changes in the competitive pressure of industries and then compare differences in them across four selected parts of Polish manufacturing.

In order to identify these factors a multinomial logit model has been constructed. As potential variables influencing industries' competitiveness we chose Relative Unit Intermediate Costs (RUIC), Relative Unit Labour Costs (RULC), Rate of Investment (IR) and Relative Unit Export Value (RUEV).

As the endogenous variable, we chose a variable describing the market performance of a particular industry. By "0" we denote a group of industries whose position both on the European and domestic market deteriorated in the analysed period, "1" are the industries that improved their position on the domestic market though lost in the European one, while "2" groups losers in the domestic market that increased their EU shares. By "3" we denote a group of industries that improved their position both on the domestic and European markets. The "0" group has been chosen as a reference in the model.

The values of relative indicators for a given product group were chosen as a vector of exogenous variables ( $x$ ). The multinomial logit model, where the probabilities that the  $i^{\text{th}}$  product group will fall into a distinguished  $j^{\text{th}}$  category, was specified by the equations below:

$$p_{ij} = \frac{\exp(x_i' \beta_j)}{1 + \sum_{k=1}^3 \exp(x_i' \beta_k)}$$

for  $j = 1, 2, 3$

and:

$$p_{i0} = \frac{1}{1 + \sum_{k=1}^3 \exp(x_i' \beta_k)}$$

The analysis was performed for three sub periods (1996-2003, 1998-2001, 2001-2003). This allows one to see how robust the results were over time and to verify whether the factors influencing market positions change over time.

The performed models turned out to be statistically significant (at a 0.05 level) for all of the three sub periods (for detailed results see tables 3-4) and the 'strength – of – fit' tests proved that they adequately fit the data. However, out of the four variables chosen as potential factors determining competitiveness, only RULC turned

out to be significant regardless of the chosen time period. It improves the odds remarkably of classifying an industry to the 3<sup>rd</sup> best group and its negative coefficients show that a decline in RULC increases the probability of achieving a better market position by a given product group.

**Table 3. Results of the multinomial logit for 1996-2003**  
(Group "1" has been excluded from the analysis as it contained only one industry within this period of analysis)

1996 – 2003		Group	
		2	3
Intercept	Coefficient	0.7	3.4
	Std. Error	2.8	3.6
	p-value	0.8	0.3
RUIC	Coefficient	0.03	0.00
	Std. Error	0.03	0.04
	p-value	0.39	0.97
IR	Coefficient	0.51	0.16
	Std. Error	0.66	0.81
	p-value	0.44	0.84
RULC	Coefficient	-0.02	-0.04
	Std. Error	0.01	0.02
	p-value	0.12	0.03
RUEV	Coefficient	0.00	0.01
	Std. Error	0.01	0.02
	p-value	0.76	0.54
Log – likelihood:		117.9	

However, in the period 2001-2003 the rate of investment turned out to be a statistically significant factor of market performance (table 4). The greater the share of investment in an industry's turnover the higher the odds of a better market performance. The coefficients of the other variables included in the analysis - RUIC and RUEV - are not statistically significant and their signs vary across groups and models. Therefore, these variables cannot be interpreted as factors important for market performance in the analysed period.

From the model we can conclude that the basis for the increase in both market shares was improvement in the ability to compete measured by the level of RULC - regardless of the time period. i.e. both during a period of economic growth and slowdown. The level of investment also played an important role, mainly in the 2001-2003.

**Table 4: Results of the multinomial logit for 1998-2001 and 2001-2003**

		1998-2001			2001-2003		
		Group			Group		
		1	2	3	1	2	3
Intercept	Coefficient	1.90	0.41	2.91	4.34	1.56	1.79
	Std. Error	5.38	2.60	2.97	4.91	3.04	3.31
	p-value	0.72	0.87	0.33	0.38	0.61	0.59
RUIC	Coefficient	-0.03	0.02	-0.01	-0.11	0.00	-0.02
	Std. Error	0.06	0.03	0.03	0.07	0.03	0.04
	p-value	0.66	0.47	0.86	0.10	0.94	0.59
IR	Coefficient	1.16	0.94	1.02	2.61	2.69	2.92
	Std. Error	1.26	0.65	0.74	1.24	0.96	0.99
	p-value	0.35	0.14	0.17	0.06	0.01	0.00
RULC	Coefficient	-0.03	-0.02	-0.03	-0.04	-0.04	-0.04
	Std. Error	0.03	0.01	0.01	0.03	0.01	0.02
	p-value	0.28	0.08	0.01	0.14	0.01	0.01
RUEV	Coefficient	-0.01	0.00	0.00	0.02	0.00	0.00
	Std. Error	0.03	0.01	0.01	0.02	0.01	0.01
	p-value	0.73	0.77	0.96	0.50	0.69	0.76
Log - likelihood:		159.7			144.10		

## 4. Diversification of Polish manufacturing according to changes in competitive pressure on the enlarged EU market in 1996-2003

As the logit model reveals, changes in both market share follow changes in RULC and, since 2001, also in the investment rate. The question which arises is which classification of manufacturing (based only on EU market share or on both domestic and EU share) better revealed differentiation of changes in competitiveness across manufacturing.

Two stages of analysis were introduced. The focus of the first one are changes in the share of Polish export to the EU-15 in EU-25 internal exports (EU market shares). Then the analysis is extended by considering changes in both the domestic and EU markets. In each of these approaches different parts of manufacturing are selected. The average level RULC and RUEV and their changes in the three sub-periods for each part will be calculated.

Based on the criteria of the direction of changes in Polish industries' exports in the EU-25's internal exports, two parts of Polish industries are selected: those that increased their share in the EU-25 market (part I) and those whose position in the EU market deteriorated part.

Average RULC and RUEV were calculated for each part in a given sub-period (Table 5).

**Table 5. Changes in RULC and in RUEV of industries that saw improved and diminished shares in the EU market in 1996-2005**

	period	Average level			Average changes (in %)		
		Industries which increased their share in the EU market	Industries which decreased their share in the EU market	Total manufacturing	Industries which increased their share in the EU market	Industries which decreased their share in the EU market	Total manufacturing
RUEV	1996-1998	0.59	0.50	0.57	17	-5.6	12.8
	1998-2001	0.62	0.58	0.61	16.2	0.4	12.5
	2001 - 2003	0.68	0.63	0.67	5.6	4.4	5.5
	1996 - 2003	0.61	0.52	0.60	41.4	12.5	35.7
RULC	1996-1998	1.01	1.14	1.04	6.1 / 74 /*	13.9 / 16/	7.4
	1998-2001	0.99	1.24	1.04	-5.7/ 71 /	-3.6/ 19/	-5.2
	2001 - 2003	0.88	1.11	0.92	-18.3	-21.3	-19.0
	1996 - 2003	0.96	1.13	1.0	-17.3	-24.6	-19.4

Source as in Table 1.

\* In bracket - number of industries

Although in 1996 in terms of the level of RULC most industries in part I did not have competitive advantages over their EU counterparts, their RULC was lower than industries from part II. The growth dynamics of the average RULC in the former were lower than the latter. Improvement in the relative labour productivity of industries in the first part supported an improvement in their EU market share. Lack of competitiveness of the industries in the second part in terms of relative labour productivity over the whole period resulted in a drop in their EU market shares. The Polish case tends to support the conventional wisdom on the importance of changes in export share as a measure of changes in competitiveness. However, the first part of Polish manufacturing was not only very large but also highly differentiated. This creates a rationale for introducing additional measures allowing the scale of this differentiation to be measured.

The Polish market is still an important, though diminishing, part of Poland based manufacturing. As much as 2/3 of Polish manufacturing turnover was sold on this market in 2003. The question arises as to differences in relative labour productivity between industries that increased and those that saw diminished domestic market share as compared to industries whose position in the EU market improved and deteriorated. The more that industries

saw a worsened domestic market position, contrary to the development of their EU market share. The answer to this question allows for in-depth analysis on the reliability of the level and changes in RULC as a measure of changes in competitive pressure.

We have introduced a new classification for Polish manufacturing. Its dominant criteria remain changes in EU market share. However, changes in domestic market share are also introduced. As a result, 4 sub-parts of Polish manufacturing are selected. Sub-part I (top) comprises industries that increased their share of both the domestic and EU-25 intra exports. Sub-part II consists of industries that increased their share in the EU and simultaneously decreased their share in the domestic market. Sub-part III contains industries that increased their share in the domestic market, but simultaneously saw a diminished share in the EU market. In sub-part IV (bottom) only those industries that in a given period lost their shares in both markets were included.

We should keep in mind that average RULC and RUEV for each selected sub-part in a given sub-period are influenced by shifts of industries among the pre-defined parts. Some industries in the first sub-part that increased both relative labour productivity and export intensity shifted to the second sub-part. Since this process was accompanied by an increase in labour productivity of most of the industries of the second sub-part its average RULC diminished. The opposite was the case for sub-part four. Industries whose RULC was high and increased were shifted into sub-part four. Since the RULC of some industries of this sub-part deteriorated the average RULC of this sub-part deteriorated as well. As sub-part III is very small (covering 2-4 industries) it is excluded from further analysis.

**Table 6. Changes in RULC and in RUEV of four parts of Polish manufacturing in 1996-2005**

	Industries whose share in the EU market increased		Industries whose share in the EU market diminished	
	share in the domestic market increased (I sub-part)	share in the domestic market diminished (II sub- part)	share in the domestic market increased (III sub-part)	share in the domestic market diminished (IV sub-part)
<b>number of industries</b>				
1996-1998	14	58	4	14
1998-2001	22	49	3	16
2001-2003	19	52	2	17
<b>RULC level</b>				
1996-1998	1.03	1.01	0.99	1.19
1998-2001	0.89	1.03	1.14	1.3
2001-2003	1.01	0.86	1.02	1.12
<b>RULC dynamics (in %)</b>				
1996-1998	-1.3%	12.8%	-10.6	22.0
1998-2001	-0.6%	-5.8%	-11.7	-0.1
2001-2003	-0.4%	-17.8%	-16.4	-22.1
<b>RUEV level</b>				
1996-1998	0.54	0.60	0.41	0.52
1998-2001	0.64	0.62	0.52	0.59
2001-2003	0.61	0.69	0.67	0.62
<b>RUEV dynamics (in %)</b>				
1996-1998	12%	11%	-8	6
1998-2001	12.7%	28%	4.8	10.1
2001-2003	24.1%	9.1%	-16.8	7.6

In the analysed period the drop in RULC was quite considerably differentiated among the parts. The greatest progress took place in the case of export oriented industries (sub-part II). If differences in RULC between the first and second sub-parts were meaningless in 1996-1998 they increased quite considerably in the following periods. The analysis covering changes in both domestic and EU market shares adds new insight into the research on differentiation in changes in competitive pressure among industries that increased EU market shares. It also shows differences in behaviour of domestic as compared to export-oriented industries operating in different competitive environments. Less fierce competition on the Polish market during the period of revitalising growth (2001-2003) did not force industries selling a considerable part of their production on the domestic market to increase their efficiency. Stronger competition on the EU market forced Polish export-oriented industries to continuously improve their relative productivity (Table 6).



Changes in the growth dynamics of Polish manufacturing also accompanied a differentiation in the adjustment of sub-parts that increased compared to those that saw diminished both domestic and EU market share. During the slowdown in economic growth (1998-2001) the former industries improved their RULC quite considerably. This was not the case for the latter industries. A continuous drop in both market shares forced some of them to intensify restructuring only at the beginning of the 2000s.

Surprisingly, the newly introduced classification does not reveal differentiation in the quality of products among selected sub-parts. However, in this respect each sub-part was highly differentiated.

Summing up, the part covering industries whose EU market share increased was highly differentiated. Since exports were the major source of manufacturing growth production in these industries stimulated growth in Polish manufacturing. However, within this part export-oriented industries shine most brightly, increasing the quality of their products and their labour productivity the most. The more they diminished the RULC and increased the RUEV the more they increased pressure on their EU counterparts. The progress of double winners was less visible. They strengthened their domestic market position and also increased competitive pressure on the EU market. However, their progress was weaker than of the export-oriented industries. Those industries that saw reductions in both market shares remained non-competitive.

The Polish case shows that in the medium term the increase in RULC results in a drop in both domestic and EU market share. However, improvement in EU market share conceals the strong differentiation in level and improvement in relative productivity among industries.

## 5. The final picture of differentiation in Polish manufacturing: winners, losers and in-between clusters

In the previous section we focused on changes in competitive pressure and its factors in three sub-periods. Since these changes were uneven among the 3 selected sub-periods and across industries the results of the research were very much dependent on the period of analysis. Quite often an increase in market shares in a given period was neutralised by a drop in the following periods. In some cases changes in market share were very small and may have reflected statistical and data base errors. In this section we intend to show the picture of differentiation in terms of improvement in competitiveness across industries in the mid-term, in 1996-2003. Restructuring aimed at improvement in competitiveness, as well as at differentiation of improvements in competitiveness factors across industries in different sub-periods, will be included.

As the previous section shows, the part that increased its EU market share was strongly differentiated. The most competitive were export-oriented industries. However, this sub-part in terms of level and changes in RULC covering over 50 out of 90 industries was differentiated. In order to analyse the performance of Polish industries vis-a-vis their European competitors a cluster analysis was performed, making possible a determination of those groups of industries with similar characteristics. Several factors describing or influencing changes in competitive pressure were chosen as category variables:

- Variables describing the position on the EU and domestic market (respective shares) and improvements or deterioration in these positions.
- Variables measuring the level of relative unit labour costs and changes. The rationale for introducing this measure is the fact that changes in market share follow changes in RULC. Besides this we select those industries that are important players in the European market, those that have the potential of winning the competition fight with their European adversaries, lagging industries as well as losers.

As a result, the 86 industries<sup>9</sup> have been grouped into four cluster, named by their characteristics (the content of clusters by industries see annex 1):

<sup>9</sup> 10 industries had to be excluded from the analysis due to lack of certain data (160, 173, 183, 232, 233, 272, 273, 275, 284, 285, 300, 362).

- double winners.
- export-led industries.
- export-oriented industries.
- losers

**Table 7. Characteristics of the clusters**

	Level				changes (in %)			
	1996	1998	2001	2003	1996-1998	1998-2001	2001-2003	1996-2003
<b>double winners (22 industries)</b>								
RULC	0.68	0.72	0.7	0.61	6	-3	-13	-10
RUIV	6.7	8.2	5.4	5.1	22	-34	-6	-24
employment					6.2	-10.2	2.2	-2.6
RUEV	75.1	75.7	91.2	91.6	1	20	0	22
domestic market shares	71.9%	69.6	72.1	71.7	-3	4	-1	-0.3
EU market shares	0.9%	1.1%	1.7%	2.0%	18	50	20	111
<b>export-led (23 industries)</b>								
RULC	0.8	0.81	0.76	0.57	1	-6	-25	-29
RUIV	7.6	8.7	5.3	6.2	14	-39	17	-18
employment					-4.1	-21.1	3.5	-21.7
RUEV	56	66.8	71.1	74.2	19	6	4	33
domestic market shares	56.4	49	41	36.5	-13	-16	-11	-35
EU market shares	1.2%	1.5%	2.5%	3.0%	27	68	21	159
<b>export-oriented (30 industries)</b>								
RULC	0.93	1.04	1.06	0.84	12	2	-21	-10
RUIV	6	7.4	5.2	4.4	23	-30	-15	-27
employment					-10.5	-22.6	-13.3	-39.9
RUEV	44.1	46	51.3	53.6	4	12	4	22
domestic market shares	58.6	53.3	48.5	45	-9	-9	-7	-23
EU market shares	1.1%	1.1%	1.3%	1.4%	1	14	11	27
<b>losers (12 industries)</b>								
RULC	1.2	1.34	1.41	1.17	12	5	-17	-3
RUIV	6.7	6.6	5	5	-1	-24	0	-25
employment					-7.7	-25.8	-11.3	-39.2
RUEV	34.4	37.5	40.4	39.3	9	8	-3	14
domestic market shares	41.1	34.3	29.6	26.2	-17	-14	-11	-36
EU market shares	1.3%	1.1%	0.9%	0.7%	-11	-24	-19	-45
<b>Average of manufacturing</b>								
RULC	0.77	0.81	0.77	0.62	5	-5	-19	-19
RUIV	6.3	7.5	4.8	5	19	-36	4	-21
employment					-3.5	-18.2	-3.6	-23.9
RUEV	55	58.8	66.5	68.2	7	13	3	24
domestic market shares	58.7	54.1	50.5	47.6	-8	-7	-6	-19
EU market shares	1.0%	1.2%	1.5%	1.8%	11%	33%	17%	73%

### Double winners

The distinguishing feature of double winners was their very high productivity (turnover per employee) in 1996 as compared to other clusters and the EU average level. In 1996 the productivity of this cluster was 38% higher than the export-led industries, 54% higher than export-oriented industries and 178% higher than losers. Since wages in this cluster were similar to the average in Polish manufacturing high productivity determined low RULC. However the improvement in the RULC of this cluster was an effect of a restrictive wage policy rather than improvement in productivity. The latter increased the least as compared to other clusters. The relatively small drop in employment, did not play a role in maintaining low RULC or high productivity. The main problem of these industries is a low and diminishing investment rate. Restrictive wage policy and slow improvement in productivity show that a drop in the investment rate after 1999 hampered further improvement in productivity and expansion in sales in short term thereafter. As long as the dynamics of the investment rate do not increase considerably they may lose their strong position on both the domestic and EU markets.

As compared to other clusters it is distinguished by a very high RUEV, which improved quite considerably. The operation of these industries in the same quality segment as EU counterparts and an increase in EU export share imply that they compete strongly on the EU market. The more so given that although they maintained a strong position on the domestic market their export dynamics were quite high. The competitive advantages they possess resulted in a quite high share in the EU market<sup>10</sup>. They either pushed out their EU counterparts from the EU market or gained an increasing part of the increment in EU market demand. On other hand, they maintained a very strong position on the domestic market. Not surprisingly these industries were a dynamic part of Polish manufacturing turnover. Their share in the turnover of Polish manufacturing increased from 36% in 1996 to 38% in 2003 (Table 8).

### Exports-led industries

In terms of progress made, export-led industries were the stars of Polish manufacturing. Export intensity was highest and increased most. Their expansion was pulled by export. In 1996 their productivity (turnover per employee) was 38% lower, while their RULC was 18% higher than that of the double winners. In the analysed period their productivity almost doubled while the increase in wages was the smallest among all the clusters. In 2003 their RULC was the lowest, while productivity almost the same as double winners. Beside the large increase in productivity and drop in RULC the distinguishing feature of these industries was that they had the highest level of investment rate and lowest drop during the analysed period.

Among these industries, the progress in competitiveness covered two stages. This started from shallow restructuring, which was based on a considerable drop in employment. Since 2000 a quite large increase in investment rate, the biggest among the four clusters, was a major factor behind the technological progress made and the increase in production capacity. It also supported the increase in productivity that allowed for export expansion. Restrictive wage policy resulted in a drop in the RULC. The competitive advantages possessed by industries in this cluster made possible the increase employment after 2000. Both forms of restructuring drove dynamic export expansion. They also helped to improve the quality of exported products, although still lower than double winners industries. However, the quality of products was highly differentiated among export-led industries<sup>11</sup>.

The strong and increasing export orientation resulted in the largest drop in domestic market share of all industries of this cluster. On the other hand we should bear in mind that in the mid-1990s their position on the domestic market was much weaker than the double winners. The high dynamics of export growth, supported by an improvement in RULC, high investment rate and improvement in RUEV, resulted in their having the biggest increase in EU market share. In 2003 the share of 16 out of 23 industries in this cluster in the EU market exceeded 2%. These industries were the major force behind the dynamics of Polish manufacturing exports to the EU. They also stimulated growth in Polish manufacturing production the most. In effect, their share in Polish manufacturing turnover increased the most (Table 8).

### Export-oriented industries

In 1996 in terms of level and changes in RULC, investment rate and RUEV these industries lagged far behind export-led industries. Lower productivity (turnover per employee) of most of these industries was accompanied

**Table 8. Share of clusters in Polish manufacturing turnover**

	1996	1998	2001	2003
Double winners	36%	37%	38%	38%
Export-led	24%	26%	25%	28%
Export-oriented	22%	20%	18%	16%
Losers	6%	6%	5%	5%

<sup>10</sup> Share in the EU market was below 1% only in case of only 4 industries of this cluster.

<sup>11</sup> In 2003 as much as 10 out of 22 industries of this cluster competed in the same quality range as the EU counterparts. They increase competitive pressure on the EU producers. In the remaining industries of this cluster RUEV was still much lower although dynamically increasing.

by higher wages than for double winners and export-led clusters. The progress they made in all respects was rather small. Weak (below average for Polish manufacturing) improvement in RULC in 1996-2001 was an effect of very low improvement in productivity and quite high increase in wages. The strong drop in the employment rate was neutralised by the increase in wages. In effect, they continued a strategy of shredding employment until 2003 at least. The continuous drop in the investment rate confirms that during the analysed period they focused exclusively on shallow restructuring. Although their share in the EU market increased, their share of Polish manufacturing production dropped. A continuous drop in investment and low RUEV will hamper further expansion on the EU market. This all the more so given that the substantial drop in employment suggests that the potential to increase exports by shallow restructuring has been exhausted. A comparison of this cluster with both losers and export-led industries suggests that they are a kind of "in between" or slow restructuring industries.

### **Losers**

These industries differ quite considerably from others in all respect. In 1996 their productivity lagged furthest behind other clusters at almost 3 times lower, while wages were only a little lower than double winners. A very high RULC reflected the lack of competitive advantages of most industries in this cluster. Although they cut employment as much as export-oriented industries their RULC almost did not change at all. A very low and diminishing investment rate did not drive any improvement in labour productivity. The lowest quality of products among the selected clusters implies that they compete mainly with non-EU producers in the domestic and EU markets. Lack of competitiveness resulted in the drop in domestic and the EU market shares. As a result, their share in Polish manufacturing turnover dropped the most (Table 8).

## **6. Conclusions**

The catching up of Polish manufacturing has been accompanied by quite strong differentiation in levels and improvements in competitiveness across industries. The analysis shows: firstly, that although both the domestic and EU market share are more precise measures of changes in competitiveness of Polish industries than export market share indicator, they are still not free from some deficiencies. The use of EU market share conceals the scope and intensity of the process of differentiation in level and changes in relative labour productivity and quality of goods within industries that increased their EU market share.

Secondly, while analysing changes in the competitive pressure of Polish based industries on EU based industries it is necessary to consider the quality of industries' goods. Analysis shows that the double winners and export-led industries increased their competitive pressure on EU based producers producing similar products in terms of quality. Most export-oriented industries produced lower quality goods. Contrary to widespread expectations, the competitive pressure of Polish industries producing low quality goods was quite weak.

Thirdly, most Polish manufacturing industries exhausted the possibility of increasing labour productivity by cutting employment. In 2001-2003 both double winners and export-led industries increased employment. The drop in employment in the two other clusters was much smaller. This suggests a crucial role will be played by a strong increase in the investment rate and technological progress for future improvements in the competitiveness of Polish manufacturing.

Two general rules seem to govern the process of differentiation of competitiveness across Polish manufacturing industries. Firstly, the lower the initial level of relative labour productivity of industry, the smaller the improvement that was achieved and the larger the initial relative productivity, the higher its improvement. This means that the larger initial differences in labour productivity across industries, the stronger the process of differentiation of changes in their competitiveness. The process of systemic transition and external liberalisation

are conducive to improvement in the competitiveness of highly productive industries. This created a weak stimulus for improvement in the competitiveness of the most backward ones.

The second rule is that the higher the investment rate and its dynamics the bigger increase in competitive pressure on the EU market. This conclusion is of great importance for Polish manufacturing. All the more so given that the potential to diminish employment seems to have been exhausted and investment intensity dropped off considerably, especially since 1998.

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# Annex

## Annex I: Clusters

<b>1<sup>st</sup> cluster</b>	
151	Production, processing, preserving of meat, meat products
153	Processing and preserving of fruit and vegetables
155	Manufacture of dairy products
157	Manufacture of prepared animal feeds
158	Manufacture of other food products
159	Manufacture of beverages
202	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards
203	Manufacture of builders' carpentry and joinery
211	Manufacture of pulp, paper and paperboard
212	Manufacture of articles of paper and paperboard
222	Printing and service activities related to printing
231	Manufacture of coke oven products
245	Manufacture of soap, detergents, cleaning, polishing
247	Manufacture of man-made fibres
252	Manufacture of plastic products
261	Manufacture of glass and glass products
263	Manufacture of ceramic tiles and flags
266	Manufacture of articles of concrete, plaster, cement
268	Manufacture of other non-metallic mineral products
281	Manufacture of structural metal products
282	Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers
342	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
<b>2<sup>nd</sup> cluster</b>	
171	Preparation and spinning of textile fibres
174	Manufacture of made-up textile articles, except apparel
175	Manufacture of other textiles
191	Tanning and dressing of leather
243	Manufacture of paints, varnishes and similar coatings, printing ink and mastics
251	Manufacture of rubber products
262	Manufacture of non-refractory ceramic goods other than for construction purposes; manufacture of refractory ceramic products
271	Manufacture of basic iron and steel and of ferro-alloys (ECSC)
286	Manufacture of cutlery, tools and general hardware
287	Manufacture of other fabricated metal products
297	Manufacture of domestic appliances n.e.c.
312	Manufacture of electricity distribution and control apparatus
313	Manufacture of insulated wire and cable
314	Manufacture of accumulators, primary cells and primary batteries
315	Manufacture of lighting equipment and electric lamps
316	Manufacture of electrical equipment n.e.c.
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
341	Manufacture of motor vehicles
343	Manufacture of parts, accessories for motor vehicles
352	Manufacture of railway, tramway locomotives, rolling stock
355	Manufacture of other transport equipment n.e.c.
361	Manufacture of furniture
366	Miscellaneous manufacturing n.e.c.
<b>3<sup>rd</sup> cluster</b>	
152	Processing and preserving of fish and fish products
154	Manufacture of vegetable and animal oils and fats
156	Manufacture of grain mill products, starches and starch products
172	Textile weaving
176	Manufacture of knitted and crocheted fabrics
177	Manufacture of knitted and crocheted articles
181	Manufacture of leather clothes
201	Sawmilling and planing of wood, impregnation of wood
204	Manufacture of wooden containers
205	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
221	Publishing
241	Manufacture of basic chemicals
264	Manufacture of bricks, tiles and construction products

265	Manufacture of cement, lime and plaster
267	Cutting, shaping and finishing of stone
274	Manufacture of basic precious and non-ferrous metals
283	Manufacture of steam generators, except central heating hot water boilers
291	Manufacture of machinery for the production and use of mechanical power, except aircraft, vehicle and cycle engines
292	Manufacture of other general purpose machinery
293	Manufacture of agricultural and forestry machinery
294	Manufacture of machine-tools
295	Manufacture of other special purpose machinery
296	Manufacture of weapons and ammunition
311	Manufacture of electric motors, generators and transformers
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
351	Building and repairing of ships and boats
354	Manufacture of motorcycles and bicycles
363	Manufacture of musical instruments
364	Manufacture of sports goods
365	Manufacture of games and toys
<b>4<sup>th</sup> cluster</b>	
182	Manufacture of other wearing apparel and accessories
192	Manufacture of luggage, handbags and the like, saddler
193	Manufacture of footwear
242	Manufacture of pesticides and other agro-chemical products
244	Manufacture of pharmaceuticals, medicinal chemicals and botanical products
246	Manufacture of other chemical products
321	Manufacture of electronic valves and tubes and other electronic components
331	Manufacture of medical and surgical equipment and orthopedic appliances
332	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
333	Manufacture of industrial process control equipment
334	Manufacture of optical instruments, photographic equipment
353	Manufacture of aircraft and spacecraft

## Annex 2: Database comparison

The main source of information on European trade at a detailed level is the Comext database. It contains information on EU-15 imports and exports to all other countries in the world [EU-15+10 special trade module]. When estimating EU-25 intra exports we used data on EU-15 intra exports, EU-15 exports to the 10 AC, EU-15 imports from the 10 AC. Trade between the 10 ACs was omitted due to the lack of such data in the Comext database. However, it has been estimated that this trade accounts only for about 1-1.5 % of EU-25 intra exports.

There are two drawbacks of the methodology (resulting from the available data):

- Firstly, the 10 AC's exports to the EU-15 are proxied by EU-15 imports from these countries. The data on imports and exports differ because of the calculation's methodology: imports are valued on a "cost, insurance and freight (CIF)" basis, while exports are valued at a "free on board (FOB)" basis.
- Secondly, the 10 AC's exports are underestimated by the value of their exports to other ACs.

These data are available only from 1999 onwards (the new Comext database - [EU-25 since 1999 module]). Thank to their availability we were able to estimate the error of proxing EU-25 intra exports by EU-15 data - it accounted for 1.3 % of total EU-25 intra exports. However, since 1999 this gap kept widening.

The differences in the volumes have not been significant in general, although varied in time - and what is more important - have been significantly differentiated across countries and industries. Thus, the actual shares of Accession Countries in EU-25 intra exports have been consistently lowered, as shown in the table A2.

**Table A1: EU intra exports in the two databases (in Mio ).**

	1999	2000	2001	2002	2003
<b>EU25 (available since 1999)</b>	1 366 159	1 612 182	1 665 423	1 690 557	1 660 443
<b>EU15+10 special trade</b>	1 353 947	1 596 366	1 646 699	1 668 543	1 639 970
<b>Difference</b>	0.9%	1.0%	1.1%	1.3%	1.2%

Source: Comext.



**Table A 2: Difference in export value between the two databases (underestimation)**

	1999	2000	2001	2002	2003
<b>10 AC</b>	0.5%	0.1%	0.3%	2.1%	-1.2%
<b>PL</b>	4.8%	4.3%	5.7%	7.0%	5.5%
<b>H</b>	0.9%	2.2%	-1.7%	6.9%	-3.5%
<b>CZ</b>	3.7%	0.5%	2.7%	1.3%	0.9%

Source: Comext.

Market share calculated with the data (EU-15 + 10 Special Trade) consistently lowers the actual shares of ACs in EU-25 intra exports (EU-25 since 1999). The reason behind this is the lack of data on the 10 AC's intra trade, which, as the data show plays an increasingly important role. This is particularly interesting in the case of the Czech Republic as its share in EU-25 intra exports - at the level of 2.15% in 2003 - is in a quarter based on its trade with other ACs.

**Table A3: Shares of exports of AC-3 in the EU-25 internal exports according to two different data base**

		1999	2000	2001	2002	2003
PL	EU25 since 1999	1.43%	1.62%	1.83%	1.96%	2.20%
	EU15 + 10 Special Trade	1.20%	1.37%	1.51%	1.59%	1.81%
H	EU25 since 1999	1.34%	1.46%	1.54%	1.67%	1.62%
	EU15 + 10 Special Trade	1.25%	1.33%	1.46%	1.46%	1.54%
CZ	EU25 since 1999	1.51%	1.59%	1.84%	1.97%	2.15%
	EU15 + 10 Special Trade EU	1.18%	1.30%	1.47%	1.60%	1.76%

Source: Comext.

Another interesting issue arising from the application of the new database is exports' quality partition, impossible to evaluate using the EU15 + 10 special trade database. The quality of Polish goods exported to the European Union was much higher (in 2003 the RUEV was 0.66) than the quality of goods exported to the AC (0.43). What is more, the relative quality of Polish goods exported to the EU-15 kept increasing over time, whereas the relative quality of exports to ACs was constant (Table A4).

**Table A4: RUEV of Polish exports to the EU-25 since the 1999 module**

	1999	2000	2001	2002	2003
PL exports to EU25/EU25 intra exports	0.50	0.52	0.57	0.60	0.61
PL exports to EU15/EU25 intra exports	0.51	0.54	0.61	0.65	0.66
PL exports to AC/EU25 intra exports	0.42	0.42	0.42	0.40	0.43
PL exports to AC/AC intra exports	1.30	1.18	1.16	1.18	1.19

Source: Comext.