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**Differences in productivity and its determinants among
firms from the Czech Republic, Hungary, Poland and
Germany. The case of the cosmetics industry**

W a r s a w , A u g u s t 2 0 0 4

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The paper was prepared under the research project entitled 'EU Integration and the Prospects for Catch-Up Development in CEECs. The Determinants of the Productivity GAP', carried out within the Fifth (EC) Framework Programme - Improving Human Research Potential and Socio-economic Knowledge Base (contract no. HPSE-CT-2001-00065).

The publication was co-financed by the State Committee for Scientific Research and CASE - Center for Social and Economic Research.

Keywords: **productivity, enterprises, industry.**

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Graphic Design: Agnieszka Natalia Bury

DTP: Złożone przez CeDeWu w programie QuarkXPress, fonty © Bitstream.

ISSN 1506-1701, ISBN: 83-7178-355-8

Publisher:

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Abstract

The paper assesses differences in productivity and its determinants among enterprises manufacturing cosmetics and detergents (NACE 245) and located in Germany and in three EU new member states. The database collected through conducting an identical survey in Germany, Poland, Czech Republic and Hungary was used. The results of this firm-level study point on the role of the existence of 'dual economy' of some very highly and very low productive firms, especially among the small enterprises from the new member states. Productivity gap vis-a-vis Germany in this labour-intensive industry disappears in the case of some large enterprises from the CEECs. Generally, higher fixed capital intensity, higher investment rate, lower unit labour costs, more employees improving skills, and higher use of modern communication technology help in narrowing productivity gap. The paper ends with policy recommendations.



I. Introduction

In the literature the notion of productivity is commonly defined as the ratio of output to input use. However, since there are many purposes for productivity measurement, many different measures are in use. Productivity is evaluated in order to trace technological change, to identify changes in technical efficiency and inefficiency, as well as real cost savings in production. At the macro level productivity is a key in assessing standards of living.

In the literature international comparisons of productivity are often used to evaluate changes in competitiveness or the competitive advantages of market actors. Advantages in productivity of a given firm are one basis for competing out its rivals on the market. This is why international comparison of productivity is of significant interest for individual firms, in particular when comparison is narrowed to a specified range of similar products to reduce the extent to which measurement is affected by variations in product composition. This, in turn, places productivity analysis into competition theory. In other words, productivity is not only linked with growth theory, the theory of the firm and national accounts but also with changes in the market share of firms from one country at the cost of firms from other countries, which – in turn - are transferred into differences in growth dynamics, standards of living, and unevenness of changes in living standards among social strata.

On the one hand, over the last 14 years an intense process of restructuring of new EU member states' firms has been taking place, alongside external and internal liberalisation. This has resulted in improvements in productivity for some firms and market exit for many others. The unevenness of improvements in productivity across firms reflects differences in competitiveness between them. On the other hand, as a result of inflows of foreign direct investment into transition countries, new and more effective firms with foreign capital participation have started to operate. Using cheap and relatively well-educated labour and introducing modern technology and new management techniques, they have increased the productivity of their firms. As a result, the process of productivity differentiation of firms in the new member states has been intensified, this in turn impacting in terms of differences in the relative competitive pressure placed on old EU member firms on domestic and EU markets. In developed market economies low productivity firms tend to be squeezed out by high productivity firms. In economies in transition, which by the 1990s had been only partially opened up and retained largely distorted and underdeveloped markets that were subject to highly selective government policies, many low productive firms continued to operate. It follows from the changing market structure in the process of market transition. Today,

however, if they do not improve productivity they will be pushed out of the market, with negative macroeconomic consequences.

The assumed differences in productivity levels between firms from the new member states, similar to those of the old member states, are widely used in the literature as the basis for analysing the average productivity levels of industries in the new member states. However this obscures the high differentiation in productivity among firms. Neglecting this runs the risk of missing the specifics of the transition process, as well as differences in competitive pressures between these firms and the old member state firms. It is highly possible that competitive pressures from new member state firms are limited to a handful of firms and that most can simply be squeezed out of the market. This has important consequence for economic development, especially unemployment changes and poverty, which should be taken into account.

The aim of this paper is to illustrate differences in productivity levels and their underlying factors between firms from three new member states and Germany. Analysis is limited to factors internal to the enterprises. Using the cosmetics industry as a case study, we evaluate and analyse the relative labour and capital productivity and factors of firms in three new member states (the Czech Republic, Hungary and Poland) compared to Germany. Policy implications are also outlined.

In the new member states the cosmetics industry is a branch that enjoys reasonably high competitiveness. Over the last 5 years, for example, the share of Polish cosmetics production on the domestic and EU markets has increased. In the cases of Hungary and the Czech Republic, increasing shares on the EU market were accompanied by drops in domestic market shares. This indicates that new member states' cosmetics firms have been increasing competitive pressure on EU producers within the enlarged EU market.

Competitive productivity implies the introduction of two separate approaches to the productivity gap and factors of production: horizontal and vertical. The former concerns comparison of productivity levels and factors within each country, while the latter deals with comparisons across countries, i.e., among their samples and sub-samples, as well as the best and worst firms. To illustrate differences in productivity between firms from the three new member states compared to Germany three layers of analysis are introduced: comparison between large and small firms' samples, between better and worse sub-samples and between the three best and worst firms. Finally, cluster analysis is used to assign particular firms to groups that have common characteristics and the average productivity levels for these groups are checked. The analysis has a comparative character.

The paper is organised as follows. Section 2 starts with methodology. Section 3 deals with the reliability of samples analysed in the paper. The sample averages and averages of each analysed branch of industry in each country are compared. Section 4 is a presentation of differences in productivity levels between the samples, sub-samples and



firms across the analysed countries. Section 5 deals with the determinants of differences in productivity between the three new member states and Germany. Section 6 shows differences in competition strategies between firms, with a breakdown into firms with different productivity levels and across countries. Section 7 presents the results of clustering firms into groups that share similar features. Conclusions from the analysis and policy implications wrap up the paper.

2. Methodology in brief

This paper focuses on differences in productivity levels and the factors underpinning them in the cosmetics industry. The first method adopted is one of matched-plant comparisons of firms producing cosmetics in four countries: the Czech Republic, Germany, Hungary and Poland. Cosmetics companies were matched in terms of size as well productivity levels. Estimates of productivity levels and factors influencing them are derived from a single survey of companies producing cosmetics and detergents used in all four countries. This approach serves to obtain a relatively consistent data framework and comparable research results across countries.

Choice of productivity measures depends on its purpose. This paper explores single factor productivity measures: labour productivity (LPROD) and capital productivity (CPROD). LPROD is the value added per employee (in euros), while CPROD is value added per fixed asset. Both are based on a value added rather than gross output concept. Estimated value added is obtained as the difference between gross outputs and inputs (both converted into a common currency at an annual average exchange rate), after which productivity comparisons were made. This meant that our measures were sensitive to changes in exchange rates as well as structures of production. the use of nominal exchange rate stems from competitive approach employed in the paper¹. Value added is influenced by material intensity of production and by type of product being manufactured in a given enterprise. Although production in the cosmetics industry is relatively homogenous, one cannot rule out the possibility that the surveyed firms differed in terms of the products they manufacture.

LPROD is based on employment rather than an hourly measure. It is possible that productivity measured per employee and productivity measured on an hourly base will

¹ Real exchange rates and purchasing power-adjusted exchange rates matter when analysis concerns international comparisons of economic development. Here, the emphasis is put on the competitive gains/looses (e. g. one firm pushing out another from a market), hence the use of nominal values (costs, prices) is more appropriate.

differ. If we had measured productivity on an hourly base, the results for German firms would have been higher² and the productivity gap between Germany and the CEEs wider.

Two types of productivity determinants are taken into account: hard (such as fixed capital intensity, penetration rate of innovation, investment intensity and specialization) and soft (human capital, share of services provided by suppliers, customers and other stake-holders with whom the firms were contracted on a long-term basis, as well as email and e-business). Looking at productivity from a competition perspective implies the need to consider differences in competition strategies. These are also included in the analysis.

Analysis is comprised of four layers. Firstly, the reliability of field research sample averages against industry averages are checked. Secondly, based on the number of employees in each country, two sub-samples of firms are distinguished: small (employing less than 50 employees) and large. These are then compared with each other as well as across the analysed countries. Thirdly, in each of the sub-samples two groups are selected: better (LPROD above average) and worse enterprises. A comparison within each country and among them is then made. Fourthly, comparison between the three best and three worst firms across countries is made. Fifthly, we return from detailed analysis based on the divisions of enterprises into better and worse firms back to the sample as a whole. Statistical procedure based on the selection of enterprises similar in terms of fixed capital intensity, labour costs, human capital, business environment, and use of modern communication technologies was employed in order to obtain clusters of enterprises that share specified features. Average productivity levels were calculated for these clusters in order to check whether firms with different characteristics really differ in terms of productivity. In other words, we wanted to check whether one can match the good or bad productivity scores of the surveyed firms from the cosmetics industry with the set of firm-specific potential productivity determinants. This is an alternative and complementary method to the analysis presented in the preceding sections.

3. Description of samples and their importance for chosen economies

The calculations presented in this section are based on data from 116 enterprises from the following industries: soap and detergent, cleaning and polishing preparations,

² At the level of the whole economy, the number of hours worked in Germany is lower than in any of the analysed member states (39.6 hour/week in Germany, and 41.0 in Hungary, 41.4 in the Czech Republic and 41.5 in Poland, according to the headline results of the Eurostat European Labour Force Survey 2003). The same is probably true for the branch analysed here.



perfumes and toilet preparations (NACE 245). The sample consists of data from 22 German, 38 Polish, 37 Czech and 19 Hungarian firms (see). Observations were collected on the basis of an identical survey conducted in Germany and in the three new member states.

Table 1. Distribution of firms by size and country, 2002

	Germany	Poland	Czech Republic	Hungary	Total
Number of small firms	13	17	19	13	62
Number of large firms	9	21	18	6	54
Total	22	38	37	19	116

Source: own calculations.

Although the survey was constructed so as to make the results representative, it is hard to assess whether the obtained samples are typical for each country (see Table 2 and Table 4). Surveyed German firms seem to be more productive, pay higher wages to their employees and have similar ULC to the cosmetics industry average. Polish enterprises are less productive than the branch as a whole and pay lower wages. It seems that the German and Polish samples are not typical in terms of labour productivity. We lack data to verify whether the Hungarian reviewed enterprises are typical. There are arguments suggesting that the Czech sample may be representative. Taken together, the sum of sales of all the surveyed firms accounts for 78% of the total sales of the cosmetics and detergent industry in the Czech Republic in 2001. Total employment of all surveyed Polish firms makes up 43% of total employment of Polish cosmetics firms. However, the German sample accounts only for 4% of sales and 5% of total employment of this branch in Germany.

Table 2. The cosmetics industry in Poland, Czech Republic and Germany, 2000-2002

	Germany 2000	Poland 2002	Czech Republic 2001
Average Wage (in euro)	3 181	847	621
Unit Labour Costs - ULC	15.6	8.5	7.8
Labour Productivity - LPROD	60 100	99 904	n. a.

LPROD = VA per employed in euro; ULC – labour costs per sales, in percent

Source: own calculations.

The situation in the cosmetics and detergents industry is different in analysed countries. The branch constitutes a relatively small, but dynamic, part of Polish and Hungarian manufacturing. In 1997-2002, its share in Polish manufacturing increased from 1.3% to 1.9% and the dynamics of productivity growth of the Polish cosmetics industry

(90.3%) was higher than the average for Polish manufacturing overall (81.5%). Similarly, the branch increased its share in manufacturing industry sales in Hungary; from 0.55% to 0.64% in 1998-2001, and has been growing faster than the Hungarian manufacturing taken as a whole. The situation for the sector in the Czech Republic looks somewhat different. Until 1999, the Czech cosmetics and detergents industry was growing faster than the manufacturing average. However, since 2000 it has been developing slower than overall manufacturing. In effect, the labour productivity growth of Czech cosmetics and detergents producers in 1997-2001 (21.4%) was nearly the same as for total manufacturing (22.8%). However, taking into account developments in 2000-2001, the branch has most likely been declining in relation to other areas of Czech manufacturing.

Cosmetics and detergents industry sales in Germany grew slower than the German manufacturing average throughout 1997-2000 (by 10.7%, while manufacturing sales increased in real terms by 25.3%). More detailed data reveal that the branch was more dynamic in eastern and less dynamic in western areas. However, taking into account its importance for the rest of German manufacturing industry, it seems that this importance has been continuously weakening in recent years.

Another issue that one should be aware of is the impact of business cycles on productivity performance of different branches of manufacturing. Productivity growth tends to accelerate during periods of economic expansion and decelerate during periods of recession or slowdown. A higher rate of capacity utilisation in a period of an upward economic trend of an economy tends to be accompanied by growth in output measures, whereas input measures remain stable or grow less rapidly. This results in a rise in measured productivity levels. The converse holds for periods of slowdown. The business cycle influences the use of different inputs of firms, hence impacting in turn on their productivity performance.

The year the survey was undertaken, 2002, was one of the economic slowdown in Poland and in the Czech Republic. Polish GDP increased by 1.4% in 2002, while the average growth in 1997-2001 was 3.5%. Similarly, Czech GDP grew by 1.5% in 2002, while it had been growing by 2.1% on average in the preceding years (1999-2001)³. However, 2002 was the last year of slowdown both in the Czech Republic and in Poland and both economies rebounded in 2003. Hungary has been expanding fastest on average, by 4.1%, in 1998-2003, although its rate of growth has been declining. With a GDP increase of 3.5% in 2002, however, it recorded the fastest economic growth in the sample. Germany, with the slowest growing economy in the sample, slowed clearly in

³ Low average growth in 1999-2001 is due to the low 1999 number; it was still the effect of the 1997 Czech currency crisis.



2002, with GDP expanding by only 0.1%, while 2003 was even worse for the German economy. Domestic production fell by -0.1% in real terms and the economy has not yet rebounded. Differences in business cycles between the surveyed countries is therefore clear. While the temporal slowdown was coming to an end in Poland and the Czech Republic and the growth was moderate in Hungary in 2002, Germany was still in the midst of recession. This suggests that the productivity of the German firms in the sample may be underestimated. However, the differences should not be significant, as production in all the analysed economies slowed in 2002.

Another factor external to enterprises that influences differences in estimated productivity levels among countries is government policy. Differences in tax policy between the four countries, mainly in excise duty on cosmetics produced in Poland before 1 May 2004⁴, results in an overestimation of the evaluated relative productivity levels of this branch in Poland, for example. Differences in policy toward small and medium size enterprises (SME) between countries also impacts in terms of differences in productivity. In the new member states, at least in Poland (Hashi, Balcerowicz, 2004), policy towards SME is less active than in the old member states. This means that the

Table 3. Basic indicators for the industrial sector, manufacturing and the cosmetics and detergents industry in Poland, industry totals and surveyed firms, 2002

	Share of total costs in sales %	Unit Labour Costs %	Labour Productivity ** (thous. euro)	Average wage (euro)	Total costs per worker (thous euro)	Total investment outlays per worker (thous euro)	
Industry	95.9	11.8	49.9	588.1	47.9	3.0	
Manufacturing	96.0	10.7	49.6	531.3	47.6	2.4	
Production of cosmetics and detergents	90.4	8.5	99.2	846.6	89.6	3.9*	
Surve- yed firms	Large	69.2	5.9	144.6	706.3	100.0	4.1
	Small	90.8	21.2	25.2	445.0	22.9	0.7
	Ave- rage	69.3	5.9	141.8	700.1	98.2	4.0

Source: own calculations based on GUS statistics and Polish sample

* - Investment outlays per employee were calculated for sections: manufacture of chemicals and chemical products (240 in NACE Rev. 1).

** - Labour productivity calculated as sales per employee.

⁴ Excise rate for cosmetics was 25% before May 2004, and 10% after.

business environment for SMEs in the old member states to a much greater extent supports their development and therefore also affects differences in productivity between the countries.

Table 3 shows differences in the average productivity levels between the surveyed Polish large and small firms as well as between averages in the cosmetics industry. The productivity of small firms in this survey, as compared to the average of the Polish cosmetics industry, was very low. The opposite was observed in the case of large firms, where productivity was above the average for Polish cosmetics and detergents production. This indicates that there are some very productive firms among large Polish enterprises in this survey. Some of them probably have foreign capital involvement.

4. Differences in productivity levels

In open and developed market economies differences in productivity level among firms producing similar products tend not to be large. In the case of homogenous products, high productivity firms tend to push low productivity firms out of the market. To remain and to expand on the market low-productive firms are forced to increase productivity, which results in a narrowing of the productivity gap between them. In transition economies this process can be distorted for some years. The process of changing market structure has a long-term character and a lot of very low productivity firms can remain on the market for several years. Although liberalisation of new member states began more than 10 years ago, the structure of these markets is still fragile and in the process of forming.

In the literature dealing with the productivity gap between new and old member states it is widely assumed that differences in productivity levels between firms in new member states are similar to differences in productivity levels between old member state firms. This assumption allows for analysis of productivity gap based on average data for given branches of industry. However, analysis of the competitiveness of the Czech Republic, Hungary and Poland (Wziatek-Kubiak, Winek, 2004), as well analysis of the Polish economy, (Maczynska, 2001) shed new light on this issue. On the one hand, differences in the levels of unit labour costs, unit intermediate costs, unit cash flows, as well as rates of investment across branches of manufacturing in the Czech Republic, Hungary and Poland have tended to be much bigger than in the case of the EU. On the other hand, however, analysis of the Polish economy reveals that many firms with very low productivity continue to operate and do manage to sell their products. As such, the question arises as to whether, when analysing the productivity gap between new and old



the member countries, it is sufficient to use sample averages as a base or whether it is necessary to introduce an additional framework or cross-section analysis.

In terms of labour productivity levels (LPROD) the three new member states firms' samples differ considerably from their Germany counterparts.

Firstly, average labour productivity of the small firms samples from three new member states was from 2.5 to 8 times smaller than for the large ones (Table 4). The opposite was in the case for Germany.

Secondly, of the samples of small firms from the analysed countries the highest productivity was noted in German small firms and the lowest in Hungarian. Poland's and the Czech Republic's small firms' sample were both somewhere between the two. If one assumes that only small firms compete on the market it is highly possible that Hungarian firms would be pushed out altogether.

Thirdly, the situation was completely different in the case of samples of large firms. The most productive was the sample of Polish firms. Their average LPROD was 20% higher than their German counterparts and twofold higher than their Czech and Hungarian ones. The average CPROD of Polish the sample of large firms was fourfold larger than Germany's and 30% higher than in the Czech Republic and Hungary (Table 4). Even if one takes into account the higher (25% up to 1 May 2004) excise tax on cosmetics in Poland, which increased the evaluated level of productivity of Polish cosmetics firms, its sample of large firms would still have been the most productive. Summing up, of the four countries large firms' samples, the Polish one was distinguished by its high CPROD and LPROD, while Germany's by its high LPROD and very low CPROD. The productivity of Czech and Hungarian large firms' samples were similar, but much lower than their Polish and Germany counterparts.

The much higher standard deviation of productivity levels for new member state firms than German firms calls for more in-depth analysis and a new framework. Introducing, as a criterion for classification, average productivity levels in samples of given firms, two sub-samples have been separated (Table 4): a 'better' sample - with higher than the average sample's productivity level and a 'worse' sample - characterised by lower than average productivity. Although in each analysed country the number of 'better' firms was much smaller than 'worse' firms, the share of sales for 'better' firms was very high. For example, in the Polish case the share of sales of 'better' firms in the large firm sample exceeded 80% and in the case of the Czech Republic and Hungary over 75%. This means that the productivity performance impact of 'better' firms impact very much the average productivity levels of new member state firms' samples. Since, in terms of productivity level 'better' firms are differentiated from the 'worse' sub-sample and impact the average productivity levels of new member state firms' samples, a comparative analysis of these sub-samples is required to shed new light on the differences in productivity levels of the new member states compared to Germany.

Table 4. Labour (LPROD) and capital productivity (CPROD) of the surveyed firms, 2002

		Number of firms	LPROD	CPROD
Poland	Small firms			
	Sample average	17	14 398	2.9
	Better	9	31 593	4.4
	Worse	8	4 755	1.3
	Large firms			
	Sample average	21	82 623	2.5
	Better	5	155 358	3.2
	Worse	16	29 559	1.3
	Germany	Small firms		
Sample average		13	80 595	3.3
Better		5	99 000	2.9
Worse		8	53 844	4.9
Large firms				
Sample average		9	69 834	0.6
Better		3	97 048	0.5
Worse		6	31 621	1.4
Hungary		Small firms		
	Sample average	13	8 031	1.3
	Better	8	12 055	2.3
	Worse	5	3 599	0.5
	Large firms			
	Sample average	6	41 795	1.7
	Better	1	63 388	1.8
	Worse	5	16 193	1.3
	Czech Republic	Small firms		
Sample average		19	26 298	0.4
Better		6	52 029	1.3
Worse		13	19 495	0.2
Large firms				
Sample average		18	40 085	1.6
Better		5	82 960	5.5
Worse		13	20 950	0.7

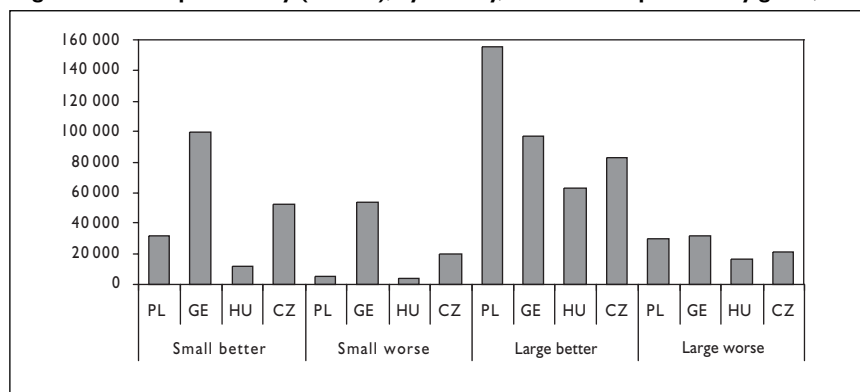
Source: own calculations

LPROD = VA/employee (in euro)

CPROD = VA/fixed assets (in euro)



Figure 1. Labour productivity (LPROD), by country, firm size and productivity grade, 2002



Source: own calculations

Notes: numbers are in euros per employee

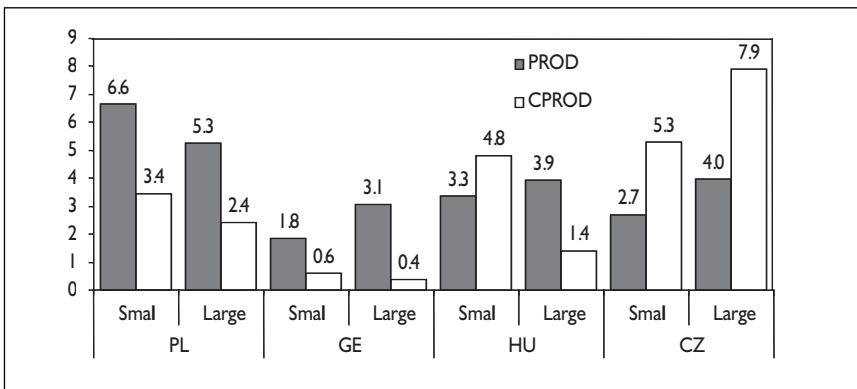
Firstly, differences in average LPROD levels between the two sub-samples of new member state firms' samples were higher than between the average LPROD of small and large samples. This confirms the legitimacy of the introduced classification (Table 4).

Secondly, differences in LPROD between two the outlined sub-samples for each of the new member states were much larger than in the case of Germany. For example, LPROD of the 'better' Polish small firms' sub-samples was 6.6 times higher than the figure for the 'worse' sub-sample (figure 2). In the case of the Czech and Hungary these differences were smaller (3 and 2.7 times, respectively), but still higher than in the case of Germany (1.8 times). Within the large firms sample, differences in LPROD between the 'better' and 'worse' sub-samples were smaller than in the case of small samples but still higher in the three new member states than in Germany. This implies that the process of restructuring of many new member state firms, especially small ones, was very partial and did not result in radical improvement in their productivity. In the nearest future many of these firms will likely be pushed out of the market.

Thirdly, the gap in productivity between the 'worse' small firms' sub-samples of the new member states and Germany was much wider than the gap in average productivity between the small firms' samples. For example, if average LPROD of the Polish small firms' sample was 5 times lower than its Germany counterpart, in the case of the 'worse' firms' sub-samples this difference was 11 times (see). Average data obscures the intensity of the selection processes of new member state firms that is set to take place in the near future.

Fourthly, the low average level of productivity of the new member states sample does not downgrade the possibility of some successful firms emerging. Of the 'better' small

Figure 2. Labour (CPROD) and capital (CPROD) productivity for ‘better’ and ‘worse’ sub-samples, by country and firm size, 2002

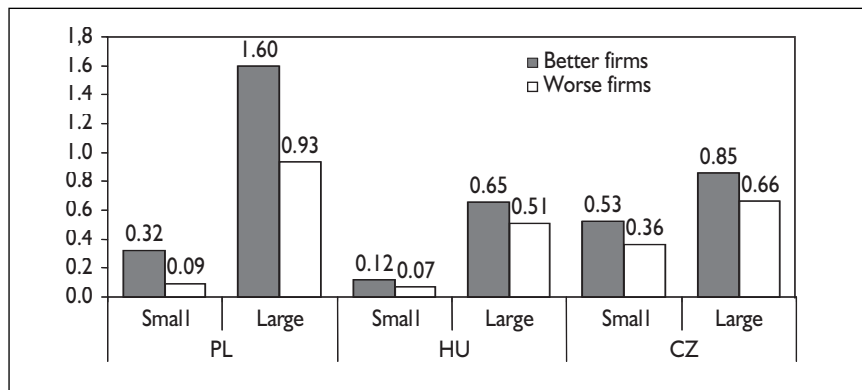


Source: own calculations

firms sub-samples for the three new member states some firms also had reasonably high LPROD⁵.

Differentiation in productivity level is more acute among the small than the large firm sample of the three new member states. The fact that the gap in productivity

Figure 3. Labour productivity of the ‘better’ and ‘worse’ sub-samples from new member states relative to German firms, by country and firm size, 2002



Source: own calculations

Notes: Productivity of respective German firms = 1.

⁵ although relative (compared to Germany), the LPROD for the Polish small firms' sample was very low, with LPROD of one out of three firms similar to the best Germany firm.



between the 'worse' firms' samples for the new member states and Germany was much wider than in the case of the 'better' firms' samples implies that the major problem facing the new member states is the existence of very low productive firms still operating on the market. The gap in productivity of the three best firms of the new member states as compared to Germany was much narrower than the productivity gap of three worst firms.

Differences in productivity level between the small firms' sample of new member states compared to Germany will impact the scale of pushing out new members states small firms from the enlarged EU market and will result in economic growth, a change in standards of living, unemployment and income distribution, as well as poverty. The share of sales of low productive firms in overall sales of the sample was very low, but their share in employment was much higher. Pushing them out of the market would result in an increase in unemployment, especially in Poland, which has the highest unemployment rate and the greatest differences in LPROD within both, but in particular small firms, samples. This means there is an urgent need to expand and improve government policy towards SMEs in the new member states. The problem would appear to be the most important and the most hard to solve for Poland's small firms.

Fifthly, it worth mentioning that the LPROD of the 'better' small firms' sub-samples of new member states was lower than the LPROD for Germany's 'worse' small firms sub-sample. This indicates that in the enlarged EU market, many 'better' (in country terms) small firms from the new member states will be pushed out by relatively (in country terms) 'worse' Germany firms. It also confirms that the average productivity of the new member firms' sample obscure large differences in ability to compete among firms, as it does the scale of the process and its consequences.

In the case of the large firms' sample, differences in productivity levels between 'better' and 'worse' sub-samples for each country, as well as among 'worse' firms' sub-samples between countries, were substantially smaller than among small firms' samples.

In terms of the LPROD and CPROD of large firms, the most productive were found in the Polish 'better' firms sub-sample and the three best Polish firms. This confirms the productivity gap of the large German 'better' firms' sub-samples against the Polish ones⁶. On the other hand, the LPROD and CPROD of large 'worse' Polish and Germany firms' sub-samples were similar, but decidedly higher than their Czech and Hungarian counterparts. This suggests that large 'better' firms from the analysed countries will likely compete the 'worse' Hungarian and the Czech firms out of the market.

⁶ Only in the case of one out of three of the 'best' Polish firms was CPROD lower than the CPROD of the three best German firms. The LPROD of only one out of three 'best' Czech large firms was similar to Germany's 'best' firms.

Very high differences in LPROD between firms from the new member states' samples distinguished them from Germany. In Poland the average LPROD of the three 'best' small and 'best' firms' samples was between 20 (in the case of small) to 30 (in the case of large) times bigger than the LPROD of the three worst ones. A much smaller difference was noted in the case of the Czech (7-8 times) and Hungary (6-15 times) equivalents, but still much larger than in the case of Germany (4 times). In terms of productivity level the Germany firms' samples were relatively most homogenous, while the Polish were the most differentiated.

Summing up

1. Productivity of the small firm samples for the three new member states was much lower than for the large ones. The converse held for Germany.
2. Within the small firm samples the highest productivity level was noted in the German firms samples and the lowest in the Hungarian. Within the large firm samples, the highest productivity level was noted among Polish and also German firms and the lowest in their Hungarian and Czech counterparts. The German small firms' sample and Polish large firms' samples have a higher productivity level in every measure of productivity.
3. The productivity levels of the small and large firms' samples of the new member states were much more differentiated than was the case for the German samples. This concerns differences between the 'better' and 'worse' firms' sub-samples for each new member state, as well as difference between the 'worse' sub-samples of the new member states and their Germany counterpart. The fact that the productivity level of Germany's 'worse' and 'better' small firms' samples was much higher than the 'better' small firms' sub-samples for the new member states implies that Germany firms from lower sub-samples have the potential to push out firms of 'better' sub-samples in the new member states. This has important implications for the future development of the SME sector of the new member states and creates a need to up the pace and scale of restructuring small firms. It raises issues of scale, forms and relevance of government policies towards SMEs in the new member states.
4. The levels of productivity of the large firms sampled from the new member states was less differentiated than for the small firm samples. The main problem of large firms in these countries is not the lack of firms with high LPROD but the very low level of productivity of 'worse' firms' sub-samples from the new member states.
5. Analysis shows that high differences in productivity levels between firms is a distinguishing feature of the new members. It confirms that the process of shaping market structure of the three countries will be intensified in the near future. It also raises the problem of its macroeconomic implications.



5. Factors influencing differences in productivity levels

The LPROD shows how productively labour is used to generate value added. However, it is only a partial productivity measure and partially reflects the productivity of labour in terms of the individual capacity of workers. The LPROD depends to a large extent on the presence and influence of the joint impact from other inputs, such as capital productivity, technical and organisational efficiency, the influence of economies of scale and capacity utilisation. Levels of technology, embodied and disembodied, also affect labour productivity. On the other hand, capital productivity as a partial measure is also influenced by the joint impact of a host of factors such as labour productivity, economies of scale and capacity utilisation. The fact is that some similar factors impact LPROD and CPROD and this creates the danger of misinterpretation of research results. In the paper we focus on LPROD.

In the paper four types of factors directly influencing LPROD level are considered: two of them consider human capital (the share of qualified employee and share of employees upgrading qualifications in total employment), the efficiency of use of labour costs (unit labour costs, which represents the ratio of labour cost to sales) and FCI (the relation between fix assets and number of employees). Labour costs refer to total compensation, that is, wages and salaries before tax, employer's social security contribution and pension and health contributions.

It is widely accepted that employee qualification levels impact LPROD. The problem is that evaluation of employee qualifications is a difficult and subjective matter, especially given that we tend to base it on the opinions of company managers. This opinion is affected, in turn, by qualification level of those who do the evaluating. The higher their level of qualifications the higher the criteria of evaluation tend to be. The case of Polish and Germany 'better' large firms' sub-samples, as compared to the 'worse' firms sub-samples (Table 5), as well as earlier research results from a project analysing the furniture industry and electro-technical and investment goods, appears to confirm this hypothesis. Our hypothesis explains why the correlation between the LPROD level and share of employees improving qualifications was stronger than the correlation between LRPOD level and the share of employees with high qualification level. The higher the LPROD the higher share of employees, including workers, improving qualification. This suggests that the lower LPROD is the lower is the perception of the need to improve qualification and possibly the lower the level of qualification. Only the large 'better' Germany better firms' sample was an exemption to this rule⁷. If the rule works on macro-economic scale it would indicate that government support for improving labour forces qualifications is of great importance.

⁷ Although the share of qualified Germany's employees was similar to the Czech and Polish ones, only a small part of the former had improved qualification.

Table 5. Unit labour costs, labour force qualifications and their upgrading, in percent, by country and firm size, 2002

		ULC	QMTM	QMTW	IQM	IQW	average wage
Poland	Small firms						
	Sample average	21.2	79.1	62.3	30.2	13.7	445
	Better	15.7	64.3	28.3	21.4	19.6	712
	Worse	40.5	86.2	81.3	34.5	10.3	295
	Large firms						
	Sample average	5.9	81.8	42.7	50.3	15.3	706
Better	4.7	95.0	24.5	43.0	27.0	1 029	
Worse	9.9	68.5	43.0	57.7	7.2	471	
Germany	Small firms						
	Sample average	13.8	55.4	51.8	29.3	22.3	1 978
	Better	14.7	42.1	30.7	33.0	26.4	2 453
	Worse	11.8	83.1	79.1	21.7	17.1	1 288
	Large firms						
	Sample average	21.7	33.5	24.8	15.8	3.4	3 640
Better	23.9	43.6	21.9	20.2	3.6	5 449	
Worse	13.0	26.8	26.8	13.4	3.0	1 100	
Hungary	Small firms						
	Sample average	11.9	94.7	96.5	15.8	10.5	400
	Better	10.7	100.0	100.0	18.2	2.3	507
	Worse	15.1	87.5	93.0	12.5	18.6	281
	Large firms						
	Sample average	9.4	83.0	43.7	80.7	12.1	1 141
Better	8.5	79.8	10.0	100.0	4.9	1 543	
Worse	13.4	88.1	79.5	49.7	19.7	664	
Czech Republic	Small firms						
	Sample average	12.4	57.6	34.3	18.4	13.7	619
	Better	8.9	68.8	23.9	21.9	0.0	509
	Worse	13.6	53.8	36.6	17.2	16.0	648
	Large firms						
	Sample average	14.2	48.0	30.6	52.0	35.0	791
Better	9.2	52.4	46.3	48.8	41.0	1 040	
Worse	22.7	45.4	24.6	53.8	32.6	680	

Source: own calculations

ULC – labour costs per sales (in percent)

QMTM - share of qualified management in total management

QMTW - share of qualified workers in total number of workers

IQM – share of management improving/upgrading qualifications in total number of management

IQW – share of workers improving/upgrading qualifications in total number of workers



A close relationship between LPROD level and share of employee improving qualification has important implications. Firstly, it strengthens future negative selection processes on the market, i.e., squeezing out of the market firms with low LPROD. Secondly, if firms with lower LPROD drop out of the market, and workers not improving their qualifications lose their jobs, they will probably stay unemployed. They will most likely be unemployable for the more productive firms, which will capture the production. This would impact labour market structure and performance, resulting in increasing unemployment and impacting on future changes in poverty. Thirdly, the need to increase levels of qualification of employees in firms with low productivity has implications for government policy, which should aim to reverse this fact. This would create an opportunity to increase the productivity of low productive firms, as well as open up the possibility of this labour force being re-employed if its firms go bankrupt.

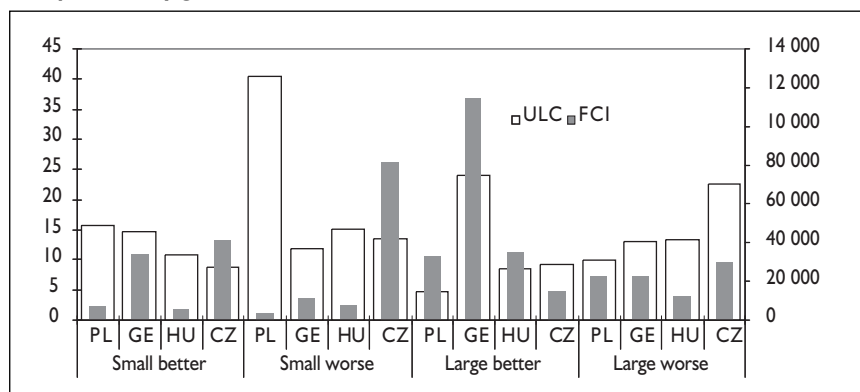
In light of our research, it seems that managers in the new member states and in Germany firms tend to underestimate the need to improve the qualifications of their workers. As a rule, the share of employees that improved qualification was lower than that for the share of managers, although more managers than workers were qualified. Given technical progress, this above rule opens up a threat that the enlarged EU may be short of qualified workers, which, in turn, could increase the productivity gap in relation to the US. This issue also has important implications for the Lisbon Strategy.

Unit labour costs (ULC), fixed capital intensity (FCI which is fixed assets per employee) and fixed capital productivity (FCP is sales per fixed assets) are important sources of productivity differences. The lower the ULC the higher the efficiency use of labour costs. Various research indicates the strong impact of ULC on changes in market share in the analysed new member states (Wziątek-Kubiak and Winek, 2004). Partly this is a result of high labour intensity of production in these countries. High correlation in our samples between ULC and LPROD would appear also to confirm this.

ULC and LPROD are dependent on FCI. The higher FCI and FCP the higher productivity should be. The lower FCI the lower substitution of labour by capital⁸.

Both the FCI and ULC of the new member states firms' samples were very often much lower than the German firms' samples (fig. 4). However, in this respect there were differences between the 'worse' and 'better' firms' sub-samples. The ULC of the better firms' sub-sample of new member states was lower than for their Germany counterpart. The converse held for the small 'worse' firms' sub-samples of the new member states and of the large Czech 'worse' firms' sub-sample. This confirms that ULC was an important source of LPROD differentiation between the two sub-samples.

⁸ in our sample this concerned the Polish small firm sample

Figure 4. Fixed capital intensity and unit labour costs, by country, firm size and productivity grade, 2002

Source: own calculations

Notes: fixed capital intensity (FCI) = capital/employee, in euros, right scale
unit labour costs (ULC) – share of labour costs in total sales, in percent, left scale

Another important reason for the gap in productivity between new member states was very low FCI⁹ and low FCP¹⁰. The impact of relatively (compared to Germany) low FCI on productivity of the new member states was partly neutralized by relatively low ULC¹¹. The high level of FCI for the Czech Republic small firms' sample and German 'better' large firms' sub-sample, which was accompanied by low FCP, suggest over-investment. However, comparison of differences in the levels of ULC and FCI with the levels of productivity, as well as a regression model, indicates that these factors alone do not explain all the differences in productivity between the new member states and Germany.

Our aim is to illustrate the factors influencing the gap in productivity between the new member states and Germany. Given, it seems, that Germany's large firms' sample was over-invested, it was decided that in analysing the large firms' sample the Polish sample would be taken as the point of reference.

The FCI of the Polish large firms' sample was larger than for its Czech and Hungarian counterparts. However, the FCP of Polish firms was lower than for its Hungarian counterparts. This indicates that the high CPROD of the Polish large firms' sample was the result not only of FCI and FCP, but other factors as well.

Comparison of FCI and FCP of large and small firm samples, as well as across countries, indicates large-scale under-investment in the Polish and Hungarian small firms'

⁹ FCI of the new member states was 4-5 time lower than Germany's counterparts, except for the Czech Republic.

¹⁰ Also in case of the Czech Republic.

¹¹ Except for Poland's small firms' sample.



Table 6. Fixed capital productivity, penetration rate of innovation, investment intensity, fixed capital intensity, and specialisation, by country, firm size and productivity grade, 2002

		FCP	PROI	II	FCI	Specialisation
Poland	Small firms					
	Sample average	5.1	6.0	0.01	4920	81.4
	Better	7.6	4.1	0.01	7126	79.2
	Worse	2.4	8.2	0.03	3683	83.8
	Large firms					
	Sample average	4.4	19.3	0.04	33015	64.8
	Better	5.5	0.5	0.00	47920	78.6
	Worse	2.6	48.9	0.19	22141	60.4
	Germany	Small firms				
Sample average		7.0	46.3	0.07	24701	83.1
Better		5.9	34.2	0.06	34176	76.0
Worse		12.0	101.6	0.08	10930	87.5
Large firms						
Sample average		1.8	13.7	0.08	114634	75.0
Better		1.5	10.9	0.07	180221	71.0
Worse		4.5	44.9	0.10	22539	77.0
Hungary		Small firms				
	Sample average	6.4	18.1	0.03	6275	82.1
	Better	10.9	12.4	0.01	5198	81.0
	Worse	3.0	22.4	0.08	7461	83.9
	Large firms					
	Sample average	5.9	23.1	0.04	24664	49.7
	Better	6.2	26.4	0.04	35017	12.0
	Worse	4.8	12.2	0.03	12389	57.2
Czech Republic	Small firms					
	Sample average	0.8	6.8	0.08	73049	86.2
	Better	1.7	16.0	0.10	41091	91.3
	Worse	0.7	5.6	0.08	81499	83.8
	Large firms					
	Sample average	2.6	4.6	0.02	25315	81.6
	Better	9.0	11.6	0.01	15017	84.2
	Worse	1.2	3.0	0.02	29911	82.3

Source: own calculations

FCP – fixed capital productivity, sales per fixed assets, in percent

PROI – penetration rate of innovation, share of investment over existing fixed assets, in percent

II – investment intensity, investment outlays to sales, in percent

FCI – fixed capital intensity, fixed assets per unit of labour, in euros

Specialisation - share of the sales of the two most important products in production, in percent

sample, where FCI was much lower than in the large firms' samples and in the German small firms' sample. As far as the large firms' sample and sub-samples are concerned, the situation looks different. In the case of the 'better' firms' sub-samples in the new member states only Czech large firms were under-invested, while in 'worse' firm sub-samples it was Hungarian ones.

Comparison of levels of FCI for 'better' and 'worse' firms' sub-samples of the three new member states against their CPROD suggest the strong impact of FCI on the CPROD level. The very low FCI of the Hungarian and Poland's small firm sample, accompanied by high FCP, means an urgent need to increase the investment rate. Over the last three years the rate of investment in the Polish small firms' sample has been extremely low. A radical increase in the investment rate of Polish firms, especially small ones, is a basic prerequisite for improvement in their productivity and is important determinant of economic growth in Polish manufacturing.

Differences in ULC, FCI and FCP between 'better' and 'worse' small firms' sub-samples of new member explain to a high degree the differences in productivity between them. This was not a case in the German small firms' sub-samples. ULC of the 'better' small firms' sub-samples for German firms were higher than those of the 'worse', while the FCP of the 'better' was lower than for the 'worse' one. This implies differentiation in the role of ULC, FCI and FCP in LPROD between 'better' and 'worse' firms' sub-samples within Germany and between it and the new member states. In the German case the impact of the above factors on productivity was much weaker than in the three new member states. This indicates that the higher level of productivity the lower role of ULC and FCI. Since the converse holds true, the role of investment in the improvement of productivity of low productive firms is crucial. This especially concerns the Polish and Hungarian small firms' sample. These research results have important policy implications. They affect above all the issue of the role of government in stimulating investment in Poland and Hungary, at least, especially given that in the last three years the gaps in their FCI has been increasing. Without a radical increase in the investment rate, the productivity of low productive firms will without doubt not improve.

Strong differences in productivity level between 'better' and 'worse' sub-samples of new member states was accompanied by differences in levels of ULC, FCI and FCP.

Firstly, the FCI of the Polish and Hungarian small firms' sub-samples was lower than for their German counterparts. Only in the case of the Czech Republic were both small firms' sub-samples' FCI higher than in Germany. The fact that this was accompanied by very low CPROD of Czech small firms' sub-samples suggests their over-investment.

Secondly, the ULC and FCP of 'better' firms' sub-samples for new member states is strongly differentiated from the 'worse' ones. The ULC of 'better' small firms' sub-samples of all new member states was much lower, while the FCP and FCI (except for



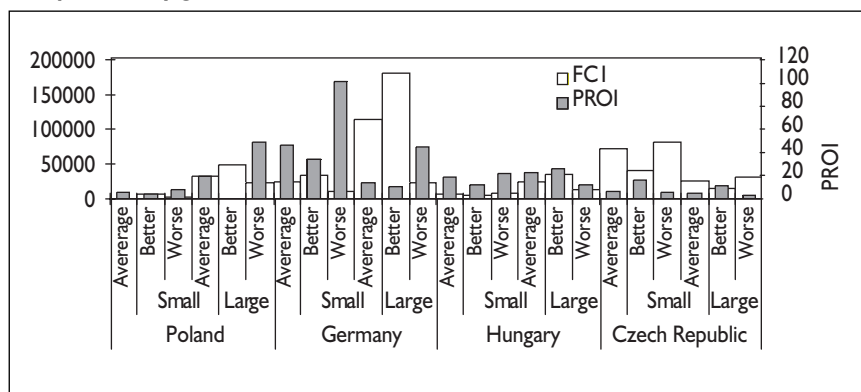
the Czech Republic) were higher than in 'worse' ones. Efficiency of use of labour costs and level of fixed assets of the 'better' firms exceeded the level of 'worse' firms' sub-samples. In the 'worse' firms' sub-samples low relative FCI and high relative ULC impact on lower productivity. In the case of 'better' firms' sub-samples, low FCI (but still higher than for 'worse' ones) was partly neutralised by their low ULC. This suggests that substitution of FCI by high productivity of labour in the 'better' sub-samples of new member states has been taking place.

Summing up, FCI and ULC have been the most important factors responsible for differences in LPROD between large and small firms, between the samples of different countries as well as between sub-samples. High ULC and low FCI hamper LPROD growth. However, the higher level of productivity the lower impact of the ULC and FCI, even though there were some exemptions to this rule. This has important implications for the government policy of new member states, especially Poland and Hungary. It confirms that an important prerequisite for improvement in productivity of such firms is the creation of conditions conducive for investment activity.

Differences in FCP and in FCI should translate into differences in investment intensity. However, in this respect two different patterns of this relationship can be distinguished: (1) low FCI and FCP was accompanied by high intensity of investment and (2) low FCI and FCP were accompanied by low intensity of investment. The first model concerns 'worse' sub-samples of large Polish and German firms. The second one concerns the Polish small firms' sample.

On the one hand, lower FCI of 'worse' as compared to 'better' German and Polish large firms' sub-samples was accompanied by higher intensity of investment of 'worse' over 'better' ones (Table 6 and Figure 5). On the other hand, the lower FCI of Polish large 'worse' firms' sub-samples than for their German counterparts was accompanied by a higher investment rate of the former. This suggests a better perception for development of Polish than German large 'worse' firms. If this results in an improvement in productivity of Polish large firms from the 'worse' sub-sample one can expect increasing competition among such firms and in the 'better' large firms' sub-sample for both countries. Lower CPROD of the Polish and German large 'worse' firms' sample, which was accompanied by more investment intensity than 'better' ones, indicates efforts by the former to improve productivity. This will result in increasing competition between Poland's and Germany's large firms and the pushing out of new member states' small firms (providing they produce the same product).

Investment intensity of the Polish small firms' sample, which is characterised by far lower CPROD and LPROD than its Germany counterparts was the lowest among the analysed countries. The fact that three best Polish small firms have not invested at all in the last three years indicates the role of capital in exerting downward pressure on the productivity growth of Polish small firms. This suggests that the gap in their productivity

Figure 5. Fixed capital intensity and penetration rate of innovation, by country, firm size and productivity grade, 2002

Source: own calculations

Notes: fixed capital intensity (FCI) = capital/employee, in euro, left scale

penetration rate of innovation (PROI) – share of investment over existing fixed assets, in percent, right scale

will increase, which may in turn result in many of them exiting from the market.

Differences in specialisation (Table 6) between ‘worse’ and ‘better’ does not explain differences in productivity and the correlation between specialisation and productivity levels was also meaningless. Only in the cases of the Polish and the Czech Republic’s ‘better’ firms’ sub-samples was specialisation higher than in the ‘worse’ sub-samples.

Surprisingly, the share of value of supplies and customers with whom firms have signed long-term contracts was the highest for Polish samples. In many cases this share was higher for ‘worse’ than ‘better’ firms. Small differences across countries and among sub-samples in this respect indicate the small impact of this factor on differences in productivity.

Use of modern communications technology differs greatly between the new member states and Germany. An extremely small share of the Polish small firms’ sample use email and www – in fact 3 times less than their Hungarian counterparts and 7 times less than than in Germany and the Czech Republic. The extremely low use of email, e-business and www by Polish small firm is confirmed in other research. If e-banking is used by 100% of large Polish firms, it is used by only 10% of small ones (“Rzeczpospolita”, 2004a, 2004b).

A similar situation is noted in the sample of large Polish firms. The use of email was much lower than the other countries surveyed. Although in most cases the use of such communication in the ‘better’ firms’ sample was higher than in the ‘worse’ sample, though in this respect Polish large ‘better’ firms still lag behind. Given that analysis shows



Table 7. Use of modern communications technology, networking and strategic planning, by country, firm size and productivity grade, in percent, 2002

			SOCU	SOSU	SOST	SP	e-mail	www	EBUS
Poland	Small	Average	31.9	49.4	21.3	15.5	10.6	10.6	5.3
		Better	33.3	57.8	7.5	9.2	12.2	13.3	8.9
		Worse	30.0	38.6	37.1	22.5	8.8	7.1	0.0
	Large	Average	62.4	74.8	20.5	24.0	32.9	20.0	13.0
		Better	88.0	86.0	15.0	30.0	54.0	28.0	16.0
		Worse	54.4	71.3	21.9	22.2	26.3	17.5	12.0
Germany	Small	Average	80.0	88.5	74.2	51.5	76.2	70.0	31.5
		Better	88.0	90.0	84.0	66.0	76.0	74.0	42.0
		Worse	74.3	87.5	67.1	42.5	76.3	67.1	25.0
	Large	Average	87.2	93.9	60.8	43.9	89.4	76.9	37.5
		Better	88.3	95.0	75.0	50.0	88.3	88.3	63.3
		Worse	86.7	93.3	46.7	40.8	90.0	70.0	22.0
Hungary	Small	Average	78.8	74.1	37.7	26.4	34.2	35.4	19.6
		Better	80.0	75.6	38.8	33.8	35.0	33.8	18.1
		Worse	77.0	71.6	36.0	14.6	33.0	38.0	22.0
	Large	Average	65.0	70.0	50.8	15.8	63.3	47.5	42.5
		Better	80.0	90.0	60.0	30.0	100.0	60.0	40.0
		Worse	62.0	66.0	49.0	13.0	56.0	45.0	43.0
Czech Republic	Small	Average	70.0	64.2	24.7	26.3	72.1	56.8	31.1
		Better	65.0	61.7	15.0	20.8	71.7	41.7	28.3
		Worse	72.3	65.4	29.2	28.8	72.3	63.8	32.3
	Large	Average	72.2	62.2	30.6	26.9	86.1	68.3	34.4
		Better	62.0	58.0	22.0	17.0	84.0	66.0	18.0
		Worse	76.2	63.8	33.8	30.8	86.9	69.2	40.8

Source: own calculations

SOSU - share of suppliers with whom a firm has signed long-term contracts

SOCU - share of customers with whom a firm has signed long-term contracts

SOST - share of other stake-holders with whom a firm has signed long-term contracts

EMAIL - share of business contacts made by e-mail

WWW - share of business contacts made through own web site

EBUS - share of business contacts made by e-business

SP - share of time spent on strategic planning

that the higher the level of productivity the higher the use of this form of communication, the conclusion arises that the use of modern communication technology is conducive to higher productivity levels. This leads into discussion of Polish government policy, which should be geared to improving the use of modern communications technology. The problem of EU policy in relation to Poland in this respect is of importance as well¹².

¹² We refer to the discussion on the introduction in Poland of lower VAT for the use of modern communications technology than is the case in other EU countries.

Table 7 shows that the higher the productivity level the higher the share of time spent on strategic planning. The share of time spent by managers on strategic planning in the 'better' sub-samples¹³ was higher than for the 'worse' sub-samples. It is worth mentioning that managers in the new member states spent 2 times less time on strategic planning than German managers.

6. Strategy of competition versus productivity

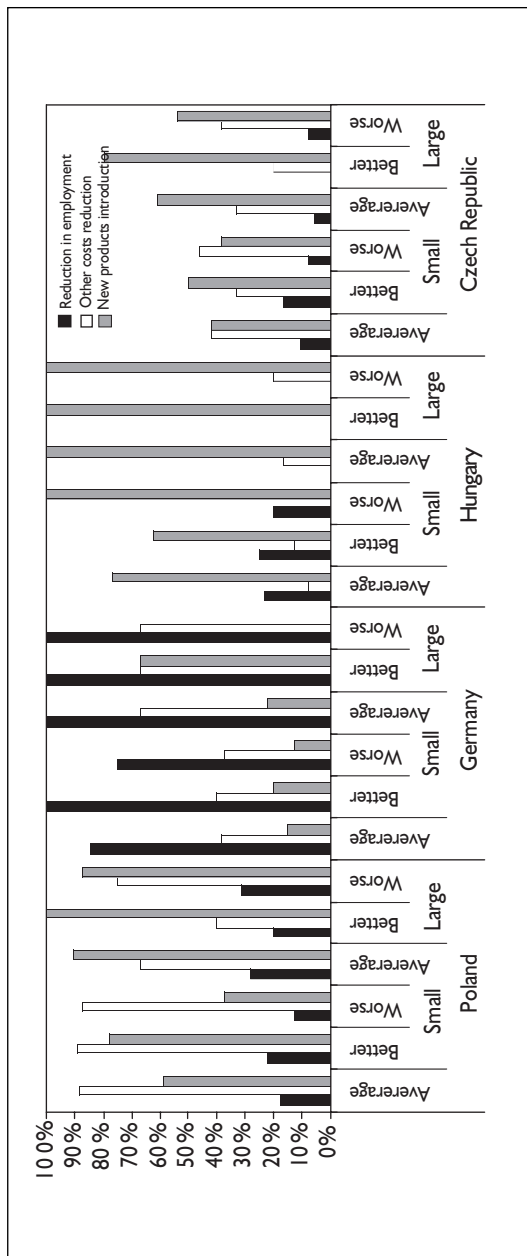
To evaluate differences in strategy of competition between the firms in the analysed countries we introduce two complementary approaches. The first one seeks to pinpoint country specifics and the second specifics that differentiate in terms of firms' productivity levels.

As far as the former approach is concerned, there were relatively large differences in the strategy of competition between Germany and the three new member states. The most important part of the German firms' sample strategy was to reduce employment. More than 90% of surveyed firms put this factor in first place, followed by reduction of other costs. Considering the high investment intensity of Germany the firms' samples, which result in an increase in FCI, it seems that substitution of labour by capital will be a crucial factor in German firms' fight to be competitive and a factor increasing their productivity. Except for the German 'better' sub-sample of large firms, the introduction of new products does not play an important role in the strategy of competition. German firms' strategy will have important macroeconomic consequences, mainly related to decreasing employment in the cosmetics industry in Germany. If German firms do not start to improve their competitiveness and push foreign suppliers out of the market unemployment will rise.

In the case of Polish and the Czech firms' competition strategy, in contrast to Germany, the potential for reducing employment seems to be exhausted. Reduction of other costs and (especially in the 'better' Czech sub-samples) and the introduction of new products are their key elements of their strategies of competition. However, the introduction of this strategy demands an increase in the investment rate. The unfeasibility of Polish firms to reduce employment and the important role played by the introduction of new products in the strategy of competition increase the importance of investment. This confirms that the basic prerequisite of increasing the productivity of Polish firms is an increase in investment intensity.

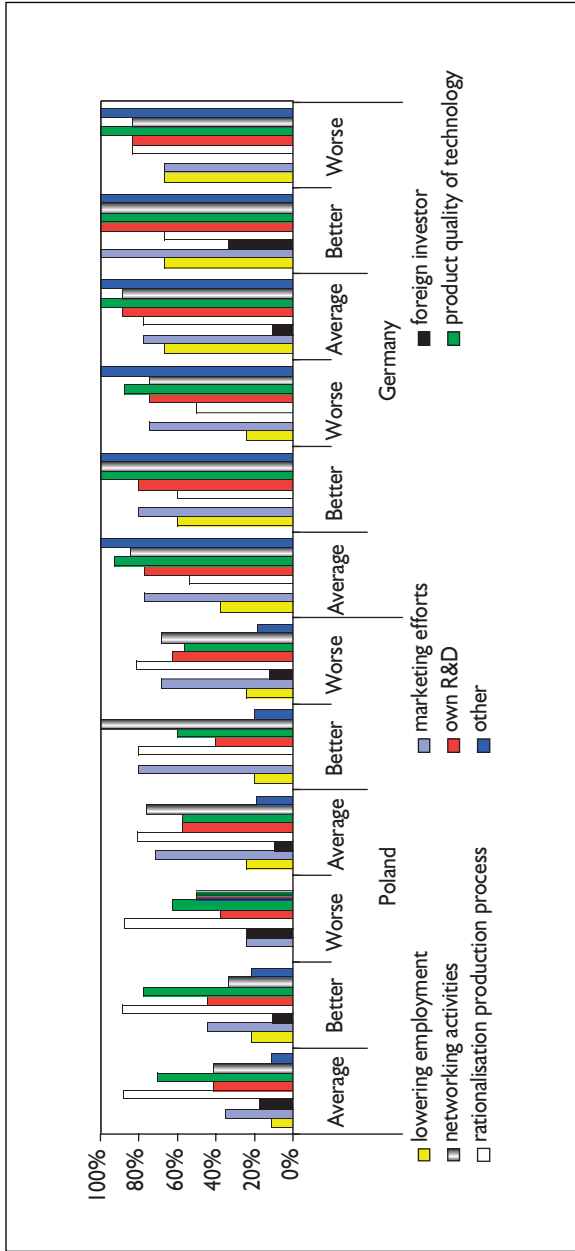
¹³ except for the Czech and Polish 'worse' sub-samples of small firms

Figure 6. Competitive strategies, by country, firm size and productivity grade, 2002



Source: own calculations
 Notes: the share of firms that declared a willingness to follow a given strategy

Figure 7. Assessment of productivity determinants in Poland and Germany, by firm size and productivity grade, 2002



Source: own calculations



The strategy of Hungarian firms is somewhat surprising. Its most important factor is introducing new products. Very few firms consider reduction of other costs or employment cuts. This is either because they have exhausted their potential to improve productivity or have found new product markets in which they expect to be competitive.

Differences in productivity levels between the samples and sub-samples were accompanied by differences in firms' strategy of competition. The introduction of new products plays the central role in the strategy of competition most often in the case of highly productive firms. In the case of firms with medium productivity, the introduction of new products and other costs of production play a major role. Reduction of other costs is the most frequently used tool in the strategy of competition of firms with low productivity. However, an important role here is also attached to the introduction new products. The exception to this rule is Germany, across all samples and sub-samples. Summing up, in terms of strategies of competition the productivity leaders most frequently use the introduction of new products. In the case of firms that are catching up firms mainly in new member states this role is played by other cost reductions. Employment reductions play the major role only in case of German firms.

In strategy of productivity () there were no great differences between each countries' samples and between sub-samples within each country. However, some specifics were highlighted. In the large Polish sub-sample the most frequent factor for increasing productivity was expected to be networking activities, marketing efforts and rationalisation of production. In the German case it was own R&D, product quality of technology and rationalisation production processes. Own R&D continues to play only a minor role in Polish firms' strategy of competition.

7. Cluster analysis

This part of the paper is based on the clustering of enterprises which are similar in terms of fixed capital intensity, labour costs, human capital improvement, use of e-mail and stability of business contacts. Average productivity levels are then calculated for these groups in order to check whether firms of different characteristics differ in terms of productivity. In other words, we wanted to check whether we can link the set of firm-specific potential productivity determinants with good or bad productivity scores for the surveyed firms from the cosmetic industry.

Cluster analysis is usually used to assign cases to groups. Group members share certain properties in common and it is hoped that the resultant classification will provide some

insight into a research topic. The procedure is widely used in the social sciences, including economics. It suffices to mention the example of research by Neven (1994), who used German industry-level data and clustered branches according to their factor intensities. After obtaining five clusters that differed in labour, capital and human capital intensity, he calculated comparative advantages in trade with other countries for each of the clusters. Neven's taxonomy has been widely used also for other countries (including the current new member states), to assess whether they have a comparative advantage in producing labour-, capital-, and/or human capital-intensive commodities. Levin (1988) used firm level data and grouped enterprises similar in terms of their learning through licensing, conducting their own R&D and acquiring low-cost technological information. After obtaining three clusters that shared the same R&D-related characteristics, he calculated their R&D intensities, as well as product and process innovations, thus linking R&D spillovers with firms' competitive strategies.

Here, the method has been applied for the following reasons:

- It is an alternative and complementary method to the analysis presented so far.
- Enterprises are grouped according to sets of characteristics. In other words, we are comparing firms which – at the same time – are similar according to many variables.
- Observations from the overall sample are used, without discriminating for the localisation of their business activities.
- We are not assuming the existence of a productivity gap between German and CEE enterprises a priori. In fact, the assumption seems to be correct when we look at the data on productivity levels among large and small firms from Germany and from the CEECs – sometimes a gap exists between the firms in the sample, while in some cases (large Polish and German firms) it does not.
- The method clearly distinguishes between characteristics of the enterprises in the sample (possible factors influencing productivity) and the outcome – productivity levels.

7.1. Methodology

Firstly, all the firms in the sample were grouped according to five indicators. The indicators were selected from the range of the already discussed measures and on the basis of their potential relevance in explaining the productivity gap between German and CEE enterprises.

We have seen in the previous part of this paper that it is possible to distinguish a set of “hard” and “soft” potential productivity determinants for this sample of enterprises. The efficient use of labour and capital clearly influences labour productivity and it is a crucial factor in improving the productivity of the weakest firms. However, “softer”



factors like improvements in employee qualifications, as well as stable business contacts and efficient communications are also possible factors important for achieving higher productivity among the firms in the sample. Therefore, the following indicators were chosen to discriminate among all firms and calculate clusters of similar enterprises:

- unit labour costs (measuring the efficiency of the use of labour),
- fixed capital intensity (fixed assets per employee, showing the efficiency of the use of capital),
- percentage of the workforce upgrading skills (improvement of human capital),
- share of clients with whom the firm has long-term contracts (stability of business environment),
- percentage of business contacts made by e-mail (use of modern communications technology).

As earlier, we have assumed that firms of different sizes and oriented towards different markets operate differently. Hence, cluster analysis was performed separately for two sub-samples: small and large firms from the cosmetics industry.

Two clusters were obtained for small firms and three clusters for large firms samples. For each of the clusters, average productivity measures were calculated in order to assess whether similar firms differ in terms of labour and capital productivity.

The reasons, for which data from all the countries were used together, without discriminating first in terms of localisation, were the following:

- We were primarily interested in obtaining firm-specific characteristics within each sub-sample in this part of the analysis.
- This approach allows us to check, at firm-level data, whether the productivity gap between similar western German and CEEC enterprises really exists, without assuming it in the first place.
- The scarcity of the German data does not allow for any representative comparison between western German and CEEC indicators. In this approach, we can easily see how many enterprises entered a chosen cluster and at the same time be aware of the constraints stemming from the overall small numbers of observations.

With fixed assets intensity as one of the variables chosen for the selection of clusters, clusters differ in size. Even when standardised, fixed capital intensity is the strongest differentiating factor, resulting in an unequal distribution of observations into particular clusters.

As in the previous section, the analysis is based on data from 116 firms, 22 of them located in Germany (7 in the west and 15 in the east¹⁴), 38 in Poland, 37 in the Czech Republic and 19 in Hungary.

¹⁴ Here, the difference between eastern and western German firms was included, as the number of firms from one country did not matter in the selection, and as the same time this division yielded interesting results.

The procedure for each of the two subgroups started from the hierarchical clustering method. On the basis of squared Euclidean distances, the optimal number of clusters was specified. It was two for small firms and three for large firms. Then, clustering procedure for the two sub-samples was performed again with the specified number of clusters.

7.2. Clustering results – small cosmetics manufacturers

Surprisingly, the two groups of small firms selected on the basis of similar use of capital, labour and other factors did not differ much in terms of labour productivity. They were very different only when capital productivity was concerned. Nevertheless, a short description of the two clusters is provided below.

Small enterprises from the cosmetics industry that have higher labour and capital productivity (cluster 1 in Table 8) are characterised by:

- higher than in cluster 2 unit labour costs (but the difference rather small),
- around 20% of the workforce upgrading skills (more than in cluster 2),
- managers spending 28% of their time on strategic planning (less than in cluster 2),
- lower product innovation,
- lower investment intensity, lower fixed capital intensity, but nearly 40% of investment is put into new assets,
- higher share of clients with long-term contracts (70%),
- 45% of business contacts made by e-mail (much less than in cluster 2).

Enterprises clustered here did not differ from the other group in terms of scale of production. 60% of sales of both clusters was down to their most important product. This category groups 53 small enterprises that are more productive than the remaining 9. Almost all small German enterprises, almost all Polish and all Hungarian firms fell into this category. The majority of Czech firms are also found here.

In contrast, firms with lower productivity (cluster 2) were characterised by:

- lower ULC, similar wages,
- less than 10% of workers upgrading skills,
- managers spending nearly 40% of their time on strategic planning (more than in cluster 1),
- 2.5 times higher than in cluster 1 product innovation,
- higher investment intensity; but 80% of investment goes on replacement of old capital stock,
- less stable business environment,
- over 60% of business contacts via e-mail (better result).

This cluster consists mainly of Czech firms.



It seems that among the surveyed small firms three rather “soft” factors, workers upgrading skills, investment in enlarging capital stock, and stable demand for the merchandise, are the only possible causes of the slightly higher average productivity of the first cluster of firms. This outcome is counterintuitive and suggests that there are other factors influencing productivity that are omitted here. The other reason is that the sample is not homogenous.¹⁵

In order to check for possible selection bias, both clusters were divided into groups of more and less productive firms¹⁶. It turned out that both samples were not homogenous in terms of labour productivity. There was one outlier in cluster 1 and two outliers in cluster 2. These were firms that had labour productivity above or close to the average, plus two standard deviations. While 52 enterprises of cluster 1 had labour productivity in the range of 0.2-87.5 thousand euros, one western German firm recorded LPROD at a level of 167,000 euro per employed¹⁷. Similarly, in cluster 2, all 7 Czech firms recorded labour productivity in the range of 17-45,000 euro and two enterprises (Polish and eastern German) were much more productive – 120,000 euro per employed on average.

Intra-cluster differences among the groups of outlined firms¹⁸ are given in columns 3-4 and 6-7 of Table 8. Because fixed capital intensity was strong the differentiating factor in the clustering procedure and intra-cluster differences of this variable are negligible and fixed capital intensity is not linked with much higher labour productivity. However, intra-cluster differences suggest that lower unit labour costs, together with employing a qualified labour force (judging by high labour costs and location in urban areas¹⁹), investment in new assets and a stable business environment, can explain the large differences in productivity levels between three highly productive “benchmark” firms and the remaining small enterprises. In addition, a German firm from cluster 1 probably found an advantage over the rest of the similar but less productive firms in frequent changes of its main product (50 times per year on average) and in the good access to e-mail and the Internet.

Taking into account both inter- and intra-cluster differences, one can conclude that differences in the use of capital are not linked with differences in labour productivity in this sample of small cosmetics manufacturers. However, a qualified labour force, low unit

¹⁵ in terms of productivity; outliers may cause that average results are biased.

¹⁶ by LPROD

¹⁷ With average LPROD of 36,300, all the firms in the range of 200-87,500 euro are well within the limits of average ± 2 standard deviations. However, every firm with LPROD above 98,400 is an outlier.

¹⁸ Here, column 3 vs. column 4 and column 6 vs. column 7 of Table 8 are compared. The differences within each cluster that are at the same time common for both clusters are listed.

¹⁹ high value of the indicator of infrastructure.

Table 8. Clusters of firms with similar characteristics, small enterprises, 2002

Indicator	Cluster 1			cluster 2		
		Average without outlier (52)*	W. German firm (1)*		Czech average (7)*	other firms (2)*
I	2	3	4	5	6	7
LPROD	36 274	26 489	166 667	32 221	27 314	120 026
CPROD	2.695	9.033	8.000	0.238	0.224	0.942
share of the most important product in total sales	0.611	0.604	1.000	0.610	0.613	0.600
unit labour costs (ULC)	0.143	0.213	0.100	0.113	0.157	0.072
monthly labour costs per employed	897.4	792.9	2777.8	898.3	751.4	1949.1
share of workers upgrading skills	0.182	0.177	0.417	0.077	0.073	0.091
share of time spent on strategic planning	0.276	0.269	0.600	0.361	0.364	0.350
investment intensity (I/sales)	0.058	0.042	0.100	0.091	0.106	0.071
share of investment into new assets	0.360	0.355	0.600	0.206	0.079	0.650
fixed capital intensity	13 457.8	10 086.8	20 833.3	135 464.0	134 123.8	145 621.3
product innovation during last 3 years	12	9	150	30	38	1
share of clients with long-term contracts	0.682	0.679	0.800	0.567	0.514	0.750
EMAIL	0.458	0.447	1.000	0.622	0.700	0.350
WWW	0.422	0.410	1.000	0.444	0.443	0.450
Indicator of infrastructure (0-1)	0.521	0.516	0.760	0.529	0.486	0.680
Perception of competition (0-1)	0.494	0.488	0.800	0.444	0.471	0.350

Source: own calculations

* - number of firms in parentheses

labour costs, investment in the enlargement of capital stock and a stable business environment are possible factors supporting higher than average productivity.

However, it is highly possible that there also exist other factors influencing productivity levels among the small cosmetics and detergents producers of this sample.

**Table 9. Distribution of firms among two clusters, small enterprises, 2002**

	cluster 1		cluster 2	
	number of firms	% share of each country sample	number of firms	% share of each country sample
German (western)	3	100%	0	0%
German (eastern)	9	90%	1	10%
Polish	16	94%	1	6%
Czech	12	63%	7	37%
Hungarian	13	100%	0	0%
Total	53		9	

Source: own calculations

These factors can be of different nature:

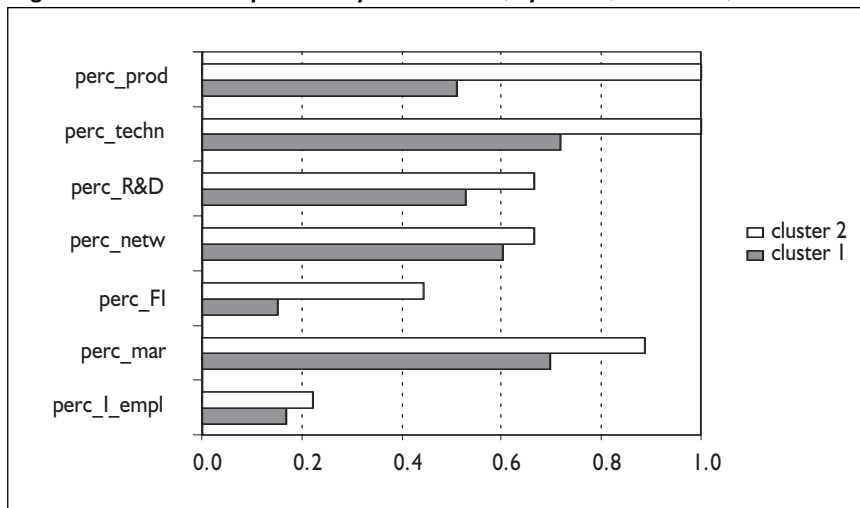
- small firms of the cosmetics industry operating in CEE face different market conditions than German enterprises. They operate on the still transforming markets, subject to external shocks (like sudden changes in the business environment);
- it is also possible that some of the small firms from the CEE are producing not only cosmetics and detergents. They may be involved also in other forms of activities. Otherwise, with such low productivity, they should not have stayed on the market.
- small firms from Poland, Hungary, the Czech Republic and Germany may serve completely different market segments, producing goods of a different value added. Hence we are comparing incomparable market segments.

We now turn to perceptions about ways of improving productivity by these firms and their competitive strategies. The average importance attached to particular strategies for each of the two clusters are outlined in the graphs that follow. Less productive enterprises of cluster 2 judge correctly that in order to be more productive they should re-organise and manufacture commodities of higher quality.²⁰ Extending marketing efforts is their next priority. The more productive enterprises of cluster 1 have on average less concentrated views on the possible factors that influence their productivity, with the exception of assigning low importance to finding a foreign investor.

The small firms probably believe that they are using the labour factor relatively efficiently and therefore do not see lowering employment either as a way to improve productivity or as a tool to be more competitive. This with the notable difference of the already mentioned western German firm in cluster 1 that sees lowering employment as

²⁰ Assuming that producing commodities with higher value added is the same as producing commodities of higher quality.

Figure 8. Assessment of productivity determinants, by cluster, small firms, 2002



Source: own calculations

Notes: share of firms marking a given strategy as important

perc_prod – rationalisation of the processes of production,

perc_techn – manufacturing higher quality or more technologically advanced products,

perc_R&D – engaging in/extending own R&D,

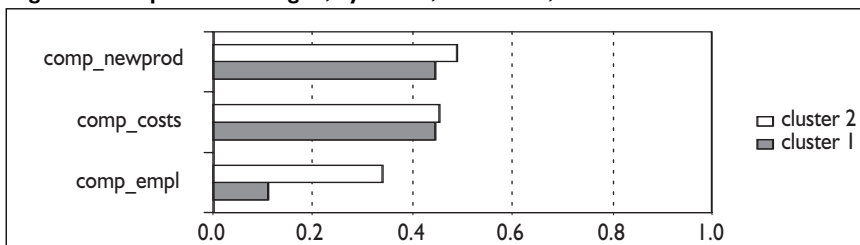
perc_netw – engaging in/extending networking activities,

perc_FI – finding foreign investor,

perc_mar – engaging in/extending marketing efforts,

perc_l_empl – lowering employment.

Figure 9. Competitive strategies, by cluster, small firms, 2002



Source: own calculations

Notes: share of firms declaring to follow a given strategy.

comp_newprod – introducing new products,

comp_empl – lowering employment,

comp_costs – lowering other costs.



the primary tool for competitive gains (and is indeed more productive and has low unit labour costs).

7.3. Clustering results – large cosmetics firms

The outcomes obtained for large enterprises in the cosmetics and detergents industry are more straightforward. As a result of hierarchical and k-means classifications, three clusters of large firms that differ in terms of characteristics and productivity levels were obtained. One cluster (cluster 2 of Table 10) included firms with high labour and “middle” capital productivity, the other – the most numerous (with 41 firms, cluster 3) – included enterprises with low labour and high capital productivity and the last was composed of two outlying firms with “upper middle” productivity and low capital productivity, characterised by very high fixed capital intensity.

Let us start from a description of the second cluster, which groups enterprises with the highest labour productivity (and “middle” capital productivity, see). The cluster consists of 11 large enterprises from Central and Eastern Europe (see). It is worth mentioning that none of the western German firms fell into this category. However, the three most productive Polish firms (and at the same time the most productive firms in the whole sample of firms from all 4 countries) entered this cluster. The firms from this cluster are on average characterised by:

- „middle“ scale of production; no different from cluster 3, around 50% of sales is due to the first product,
- the lowest ULC, the lowest wages,
- 26% of workers upgrading skills (lower than in less labour productive cluster 3),
- managers spend less than 30% of their time on strategic planning,
- the highest product innovation (on average, 4 products introduced every year),
- high fixed capital intensity (nearly 4 times higher than in cluster 3),
- very low and the lowest in this sample investment intensity; 36% of investment is put into new assets,
- 80% of contracts with clients of a long-term nature,
- the most intensive users of modern telecommunications technologies.

The next group (cluster 3 of) is the most numerous. These are 41 enterprises with the lowest labour and the highest capital productivity. The firms are from both the CEE countries and from western Germany. These firms share the following properties:

- „middle“ scale of production; no different from the most productive cluster 2, around 50% of sales due to the primary product,

- „middle“ ULC, relatively low (but higher than in cluster 2) wages,
- 30% of workers upgrading skills (the best result),
- managers spend less than 30% of their time on strategic planning,
- average product innovation (on average, 3 products introduced every year),
- the lowest fixed capital intensity,
- relatively high investment intensity; 30% of investment is put into new assets,
- 70% of contracts with clients of long-term nature,
- average use of modern telecommunications technologies.

Finally, the last group (cluster 1 of) is very small, and consists of only two firms: one western German and one Polish firm. These enterprises, relative to the rest of the sample, have high labour and low capital productivity, and are characterised by:

- large scale of production (100% of sales is due to the first two products),
- the highest unit labour costs, very high wages (due to the high wages of the western German firm),
- over 90% of the workforce NOT upgrading skills (none in the western German firm, only 20% in the Polish firm),

Table 10. Clusters of firms with similar characteristics, large enterprises, 2002

Indicator	cluster 1	cluster 2	cluster 3
LPROD	92 295	113 624	46 228
CPROD	0.452	1.880	2.778
share of the most important product in total sales	0.750	0.495	0.511
unit labour costs (ULC)	0.236	0.048	0.108
monthly labour costs per employed	5170.1	771.9	882.5
share of workers upgrading skills	0.094	0.260	0.305
share of time spent on strategic planning	0.155	0.288	0.276
investment intensity (I/sales)	0.070	0.009	0.065
share of investment into new assets	0.175	0.364	0.297
fixed capital intensity	204 251.6	60 437.0	16 641.8
product innovation during last 3 years	3	11	8
share of clients with long-term contracts	0.875	0.791	0.710
EMAIL	0.575	0.700	0.620
WWW	0.625	0.536	0.459
Indicator of infrastructure (0-1)	0.694	0.701	0.554
Perception of competition (0-1)	0.500	0.464	0.499

Source: own calculations



- managers spend 85% of their time on current operational activities,
- the lowest product innovation (on average, 1 new product per year),
- the highest fixed capital intensity (12 times higher than in cluster 3),
- the highest investment intensity, but only 18% of investment is put into new assets,
- nearly all contracts with clients of long-term nature,
- high use of modern communications technologies for business contacts.

Table 11. Distribution of firms between two clusters, large enterprises

	cluster 1		cluster 2		cluster 3	
	number of firms	% share of each country sample	number of firms	% share	number of firms	% share of each country sample
German (western)	1	25%	0	0%	3	75%
German (eastern)	0	0%	2	40%	3	60%
Polish	1	5%	5	24%	15	71%
Czech	0	0%	4	22%	14	78%
Hungarian	0	0%	0	0%	6	100%
Total	2		11		41	

Source: own calculations

In summation, the following firm-specific features (common to clusters 1 and 2 and at the same time different from cluster 3) can be linked with higher labour productivity in the analysed sample of large enterprises from the cosmetics and detergents industry: high fixed capital intensity, intensive use of modern telecommunications technologies, stability of business contacts and localisation in areas with better infrastructure. In addition, firms from cluster 2, which enjoy the highest labour productivity, have very low unit labour costs, pay low wages, are very innovative and invest intensively in enlarging their existing capital stock. When compared with small firms of the same industry it is evident that business contacts are more stable for the group of large enterprises and even in the group of the least productive large firms (cluster 3), over 70% of contracts with clients are of a long-term nature.

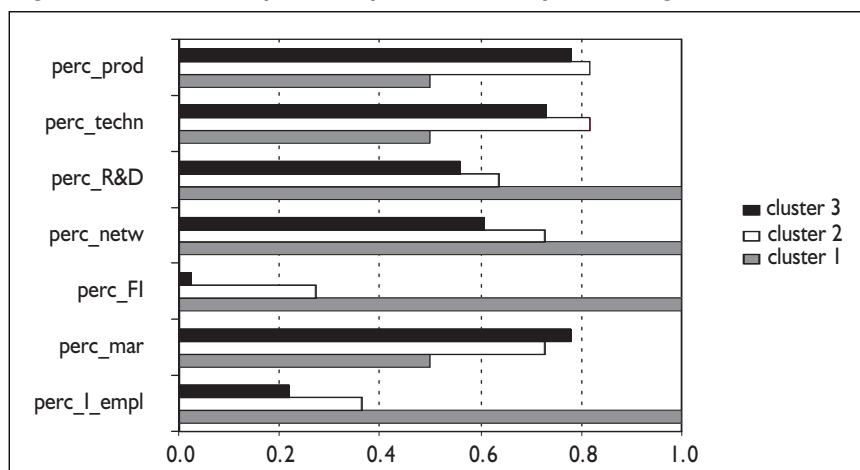
Investment in new assets and upgrading skills supports higher capital productivity. However, it seems that capital is most productive in enterprises where it is scarce (cluster 3).

The most productive firms (cluster 2) assess as perfect their competition strategies as well as possible ways to further improve their productivity. They not only compete by introducing frequent changes to products, half of them on average drive rival commodities out of the market by lowering employment and other costs (see Figure 11).

Managers of two also highly labour productive firms of cluster 1 are less aware of their firms' strategies. They declare that they compete by introducing new products, while in reality they introduce on average one product per year, which makes them the least innovative group in the sample of large firms. They also compete also by lowering costs other than those related to labour, although at the same time they judge, correctly, that they should have decreased employment in order to gain productivity (see Figure 10). They also perceive the need to find a foreign investor, extend networking activities and/or engaging in R&D (see Figure 10). These strategies would probably help them in becoming more innovative, thus increasing their productivity.

Enterprises grouped in cluster 3 can increase the productivity of their workers in two ways: either by producing commodities with higher value added or by lowering employment, or both. Managers here perceive, rightly, the need to move up in the value chain by declaring that manufacturing higher quality products and extending networking activities can help them most in productivity improvement. They also see the need to re-organise their enterprises but at the same time underestimate the role of decreasing

Figure 10. Assessment of productivity determinants, by cluster, large firms, 2002



Source: own calculations

Notes: share of firms marking a given strategy as important.

perc_prod – rationalisation of the processes of production,

perc_tech – manufacturing higher quality or more technologically advanced products,

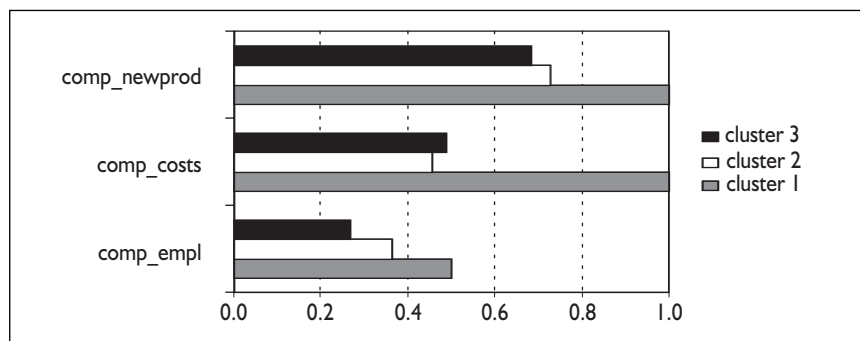
perc_R&D – engaging in/extending own R&D,

perc_netw – engaging in/extending networking activities,

perc_FI – finding foreign investor,

perc_mar – engaging in/extending marketing efforts,

perc_l_empl – lowering employment.

**Figure 11. Competitive strategies, by cluster, large firms, 2002**

Source: own calculations

Notes: share of firms declaring to follow a given strategy.

comp_newprod – introducing new products,

comp_empl – lowering employment,

comp_costs – lowering other costs.

employment (see Figure 10). They also underestimate the role of finding a foreign investor. This is somewhat strange since these firms are under-invested and could gain additional capital by finding a foreign investor. An explanation may be that the majority of these firms are already owned by foreign capital. However, if this is not the case, it seems that the management of these enterprises is not aware of the firms' weaknesses.

Summary

Our field research was based on analysis across countries and among firms that differed in terms of productivity levels, between what we termed 'worse' and 'better' sub-samples, as well as between the three best and worst firms. Conclusions concerning country specifics and specifics of firms differing in terms of productivity levels are outlined below.

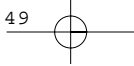
1. The following features distinguish the firm samples for the three member states from Germany:

- extremely high differentiation in productivity levels among firms in the large and small samples and much bigger than between the two samples. This is linked to the process of shaping the market structure of the new member states, which is a major part of their transition. The productivity gap between firms in the 'worse' sub-samples of the new member states and Germany was far greater than in case of the 'better' firms' sub-samples. The major problem of the new member states is not the lack of highly productive firms but the continued operation of many very low productive firms. This means that the selection process issue among the firms in the surveyed countries will come to the fore in the nearest future.
- very low productivity level of small firms' samples for the new member states. Since productivity of the 'better' sub-samples of small firms of the new member states was lower than Germany's 'worse' sub-sample and the investment rate of the former was much lower than the latter, the continuation of the process of deep and wide selection and the squeezing out of small firms in the new member states is very likely to be taking place.
- large firms in the new member states produce comparable products, serve mass markets and are highly productive. The most productive were Polish firms and the least were their Czech and Hungarian counterparts. In-depth analysis of 'worse' firms' sub-samples shows that Polish and German firms will likely move up the productivity ladder.²¹ This indicates increasing competition between Polish and German firms of this survey from today's 'better' and 'worse' sub-samples and increasing their competitive pressure on Czech and Hungarian firms.
- more labour intensive production and higher intensity of work per employee in the new member states. The lower role played by R&D in strategy of

²¹ The result refers to this sample, and may not be true for the whole branch, which has been losing its relative importance to the rest of the manufacturing industry in Germany.



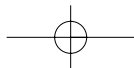
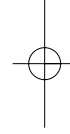
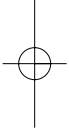
- competition of these firms indicates that they will focus on a low technology type of production
- very low capital intensity and investment rate, especially in Polish firms. This implies low substitution of labour by capital, in contrast to German firms' strategy.
 - Exhausting possibilities to lower employment in productivity improvement, especially in Poland.
 - lower share of managers' daily time spent on strategic planning, indicating a less stable business environment.
 - extremely low use of modern communications technology of Polish firms.
2. Specific conclusions for firms are based on comparisons between 'better' and 'worse' firms' sub-samples. Lower productive firms are characterized by lower fixed capital intensity and investment rate, higher unit labour costs, a lower share of employee improving qualifications and lower use of modern communications technology.
 3. Research indicates that the higher the productivity the lower the role of fixed capital intensity and unit labour costs. It was shown in the clustering analysis that in spite of the "hard" determinants of productivity, like labour costs and investment, achieving higher productivity is also a question of sets of other, "soft", factors related to good management. These are: ability to compete by being innovative and at the same time securing long-term contracts with clients and being up-to-date with modern communications technologies. Moreover, the correct assessment of a firm's strength and weaknesses helps very much in the efficient use of factors of production.
 4. Clustering analysis also confirmed that small and large firms from the cosmetics and detergents industry operating in the three new member states and in Germany have indeed different productivity determinants and face different constraints. While it is possible that the productivity of the small firms was influenced by factors not accounted for in the survey, the results obtained for large firms are straightforward. Clustering analysis performed on the group of large cosmetics firms shows that low labour costs are still the advantage in new member states, especially in the Czech Republic and Poland. If coupled with adequate investment and wise management, they can lead to higher labour productivity than in the western German firms.
 5. Firm-level analysis also shows that small firms are more aware of their business environment and more adequately assess their own competitive strategies than large enterprises. Views about ways to improve productivity among the group of large enterprises are more blurred and only the most productive large firms evaluate correctly what they should do in order to be more productive.
 6. There exist differences in productivity performance of rural and urban firms, irrespective of whether they are large or small or whether they are from CEE or



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Germany. Firms located in urban areas – which enjoy better infrastructure, better access to a qualified labour force and modern technologies – are much more productive. In addition, smaller firms located in urban areas have productivity no different from the productivity of large enterprises.





Policy implications

Investment policy

The role of investment in productivity improvement, especially of low productive firms, is crucial. The very low relative fixed capital intensity of the new member states, which is accompanied by low unit labour costs, high intensity of work and exhaustion of the potential to reduce employment are the main arguments supporting the urgent need to stimulate investment in the new member states. This is a prerequisite for moving up the quality ladder and maintaining comparative advantages of lower costs of labour in these countries. Given the hypothesis that the lower the productivity the higher the role of fixed capital intensity in productivity improvement, there is an urgent need to create the environment which will support the increase in the investment rate in these countries.

SME policy

Very low productivity of SMEs of the new member states compared to Germany, as well as very low fixed capital intensity and investment rates, low share of employees improving qualifications, as well as unstable business environments are the main arguments for improvements in SME policy in the new member states. Since most production in the analysed branch is of a labour-intensive character and low labour costs are still a key advantage of the new member states, the low mark-up on wages (especially social security contributions) is of special importance. Another argument for the improvement in SME policy is extremely high differentiation in productivity levels among the SMEs in the samples, suggesting a broad process of squeezing them out of the market in the nearest future.²²

Education and training policy

Differences between 'better' and 'worse' firms' sub-samples in the share of employees improving qualifications, reinforce the selection process on the market and have important macroeconomic implications. The lower the level of productivity the smaller the share of personnel upgrading skills. Thus, trainings as a determinant of productivity level influences and will continue to influence the process of selection of firms. If 'better' firms push out 'worse' firms from the market, the problem of unemployed, which does not act to raise qualifications, will grow. Without further training

²² This hypothesis is based on the assumption that the small firms in the samples produce the same products. However, it is very possible that small firms serve completely different market segments.



people will, furthermore, stay unemployed, adding to already large structural unemployment in some of the new member states (especially in Poland). The issue of government policy in education and training, especially of workers who are, as our research results reveals, much less involved in education and training than managers, is therefore being pushed high up the agenda. The problem is also related to the Lisbon Strategy.

Regional policy

The differences in productivity levels of rural and urban firms create the need for a policy supporting investment in infrastructure and the development of rural areas.



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