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Patterns of Catching-Up in Candidate Countries' Manufacturing Industry

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This paper is part of an ongoing WIIW research on the competitiveness of CEE candidate countries' industry.

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Executive summary

This paper analyses the structural changes that have taken place in CEE candidate countries' manufacturing industry during the last decade. In the more advanced candidate countries for EU membership, industry has been able to recover at least part of its previous position thanks to active restructuring and privatization efforts, fostered especially by inflows of FDI. Employment declined more than output and over five million manufacturing jobs were lost in the region between 1990 and 1999. Production specialization has markedly increased between 1990 and 1999 in nearly all candidate countries. The top five branches account for 60% to more than 70% of manufacturing industry output. The structure of manufacturing industry in the majority of candidate countries is now fairly close to the European pattern both in terms of production and employment (exceptions are Bulgaria, Romania and the Baltic states).

A new pattern of productivity winner and loser branches is emerging: winners are electrical, optical and transport equipment as well as furniture; losers are food and beverages, textiles, leather, wood products and chemicals. Hungary is a productivity leader among the candidate countries; Bulgarian and Romanian labour productivity is just one fourth of the Hungarian level. In several countries wages are growing faster than productivity, implying a gradual deterioration of the international labour cost competitiveness (except Hungary and possibly also Poland). The winner branches have managed to increase their comparative cost advantages vis-à-vis the present EU member states. But some loser branches – such as textiles, leather and wood products – face clear cost problems and may well have higher unit labour costs than Western Europe. Manufacturing industry has been an important target of FDI in the candidate countries, but the sectoral distribution of FDI is highly uneven. FDI has a clearly positive impact on output growth, labour productivity and ULC improvements.

Keywords: *CEE candidate countries, industrial restructuring, productivity comparisons, foreign direct investments.*

JEL classification numbers: *F02, F15, J3, L6, P27*

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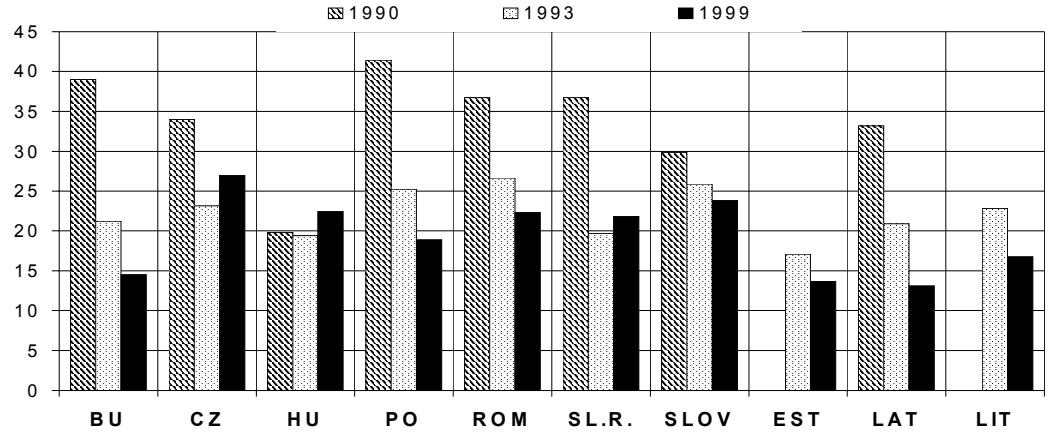
1 Phases of structural adjustment: basic patterns of changing output and employment structures

The majority of candidate countries have inherited a huge industrial sector from the period of central planning. In 1990, manufacturing industry value added accounted for around 40% of GDP in Bulgaria and Poland, and for about 35% of GDP in the Czech Republic, Slovakia and in the Baltic states, but for less than 30% of GDP in Slovenia and for around 20% of GDP in Hungary (Figure 1). Due to considerable structural distortions and production inefficiencies, a high degree of industrialization initially turned out to be a drawback rather than an advantage: it implied, among other problems, also the underdevelopment of other sectors, especially of services.[1] In all candidate countries, industry suffered over-proportionally from the 'transformational recession' at the beginning of transition. The time pattern of this recession varied, largely depending on the date when transformation measures were initiated. In Central and Eastern Europe, the transformational recession started already in 1989/1990 with huge output declines (by about 15% per year) and continued well into 1992/1993. In the Baltic states, the full impact of the crisis came with a delay of approximately two years, and was aggravated by the dissolution of the USSR in 1992.

Figure 1

Manufacturing value added in % of GDP



Source: WIIW Database.

[1] See Landesmann (2000).

The cumulative *decline of industrial output* between 1990 and 1993 amounted to nearly 25% in Central and Eastern Europe (CEEC-7) and probably to more than 50% in the three Baltic states, which suffered additionally from the dissolution of the former Soviet Union. Industry, and especially its manufacturing part, declined in both absolute and relative terms during this period (with the sole exception of Hungary, which managed to keep the share of manufacturing value added in GDP nearly constant – see Figure 1).[2] A number of factors such as the loss of traditional export markets, sudden trade liberalization, restrictive macroeconomic policies and insufficient restructuring played a role. The relative decline of industry went hand in hand with an expansion of services that were grossly underdeveloped under the old system. The industrial recession was mostly over around 1993 (in Poland, where it had started earlier, already in 1992 – see Havlik et al., 2001),[3] though it occasionally returned in several CEECs later on (in Bulgaria, Romania, the Czech Republic, and Slovakia). The Baltic states (especially Latvia and Lithuania) struggled with a severe industrial crisis well into the mid-1990s.

In the more advanced countries of Central and Eastern Europe, industry has been able to recover at least part of its previous position during the second half of the 1990s thanks to *active restructuring* and privatization efforts, fostered especially by inflows of FDI. Nevertheless, in the year 2000 only Hungary and Poland produced more industrial goods, by 50% and 70% respectively, than in 1990 (see Havlik et al., 2001). In contrast, in Bulgaria and Romania industry shrank by more than 40% during the last decade, in the Baltic states by half, while in the remaining candidate countries the output decline amounted to between 10% and 15% (we shall turn to the related structural changes below).[4]

As a result of combined changes in the manufacturing industry and GDP, only two CEECs could restore (Czech Republic) or even increase (Hungary) the initial shares of manufacturing value added in GDP by 1999 (Figure 1). The process of industrial downsizing is still underway elsewhere in the region, but manufacturing industry still contributes a significant part to the GDP (between 13% and 17% in Bulgaria and the Baltic states, 27% in the Czech Republic). The year 2000 was the second in the past decade (after 1996) when industrial output in all candidate countries increased; current growth prospects are favourable (see Havlik et al., 2001).

Manufacturing industry employment underwent even more dramatic changes during the last decade. As a rule, employment declined even more than output and over five million

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[2] Due to frequent changes in statistical reporting and varying enterprise coverage, data for the first half of 1990s are not fully comparable with later periods.

[3] Unlike other CEECs, the Polish industry underwent a crisis already during the first half of the 1980s and in 1988-1989 as well – see WIIW (1991), p. 104.

[4] Unless otherwise stated, the WIIW Annual Database Eastern Europe and WIIW Industrial Database are used as the main source of data.

manufacturing jobs were lost in the region between 1990 and 1999.[5] These changes reflect the general labour market developments in the candidate countries during the 1990s such as declining overall employment, shifts from industry to the service sector and, last but not least, the emergence of open unemployment.[6] In the second half of the 1990s, only Hungary (and occasionally also Poland) could modestly increase manufacturing industry employment; in the remaining candidate countries manufacturing employment has continued to fall (Table 1). Employment adjustments occurred with a certain time lag after output, first due to delayed lay-offs and hardly any expansion of manufacturing jobs thereafter (again in both absolute and relative terms).

Table 1

Total manufacturing employment

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Absolute loss/gain th. persons
Czech Republic											**99-90**
annual changes in %	-8.1	-10.7	-13.2	-7.0	-5.0	-2.4	-3.4	-2.6	-2.6	-5.7	-644
index 1990=100	100	89.3	77.4	72.0	68.4	66.7	64.5	62.8	61.2	57.7	
Hungary											**99-90**
annual changes	-4.6	-9.9	-14.5	-12.9	-9.1	-4.0	-2.9	0.7	3.4	1.2	-448
1990=100	100	90.1	77.0	67.1	61.0	58.5	56.8	57.2	59.1	59.9	
Slovak Republic											**99-90**
annual changes in %		-15.0	-12.6	-10.4	-5.1	1.0	-1.1	-3.6	-4.4	-3.0	-302
index 1990=100	100	85.0	74.3	66.6	63.2	63.8	63.1	60.8	58.2	56.4	
Poland											**99-90**
annual changes in %	-9.4	-11.4	-13.1	-2.4	-0.3	4.3	-0.2	0.7	-0.7	-3.4	-743
index 1990=100	100	88.6	77.0	75.2	75.0	78.2	78.0	78.6	78.0	75.3	
Romania											**99-90**
annual changes in %		-6.9	-12.5	-7.9	-6.3	-9.6	-2.0	-5.4	-6.2	-11.7	-1768
index 1990=100	100	93.1	81.4	75.0	70.3	63.5	62.2	58.9	55.2	48.8	
Slovenia											**99-90**
annual changes in %	-4.1	-11.6	-10.1	-9.0	-4.7	-5.1	-5.5	-3.2	-0.8	-1.4	-147
index 1990=100	100	88.4	79.5	72.3	68.9	65.4	61.8	59.8	59.4	58.5	
Bulgaria											**99-90**
annual changes in %	-7.1	-20.0	-16.3	-13.2	-9.3	-6.0	-5.5	-2.7	-4.2	-14.2	-826.5
index 1990=100	100	80.0	66.9	58.1	52.7	49.5	46.8	45.5	43.6	37.4	
Estonia											**99-90**
annual changes in %	-3.3	-4.5	-8.8	-16.3	-5.5	13.8	-5.2	-7.0	-3.2	-6.7	-78
index 1990=100	100	95.5	87.1	72.9	68.9	78.4	74.3	69.1	66.9	62.5	
Latvia											**99-93**
annual changes in %					-13.1	-6.2	-0.8	-2.9	0.6	-7.6	-52
index 1993=100				100.0	86.9	81.5	80.8	78.5	78.9	72.9	
Lithuania											**99-92**
annual changes in %				-2.9	-12.0	-13.6	-7.2	-0.1	-1.1	-1.3	
index 1992=100			100.0	97.1	85.5	73.9	68.6	68.5	67.8	66.9	-123

Source: WIIW Database.

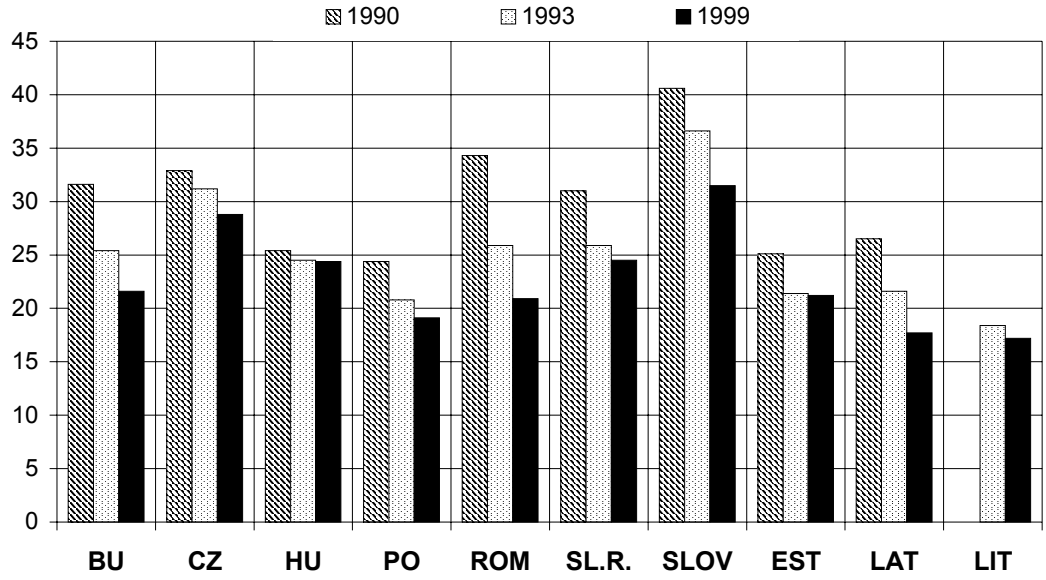
[5] Manufacturing employment has been gradually declining in the EU (by 1.1% per year during 1988-1997) as well – see European Commission (1999).

[6] For more details on labour market developments see European Commission – Eurostat (1999).

In fact, losses in manufacturing employment between 1990 and 1999 amounted to 25% in Poland (about 740 thousand persons), 40% in the Czech Republic (640 th), Hungary (450 th), Estonia (80 th) and Slovenia (150 th), and to more than 50% in Romania (1760 th) and 60% in Bulgaria (800 th). As far as the importance of manufacturing industry as a job provider is concerned, only Hungary has managed to keep the share of manufacturing industry in total employment at the initial (1990) level (about 25% of the total – see Figure 2), and even recorded a slight increase of manufacturing jobs after 1997. In the majority of the remaining candidate countries, the number of manufacturing jobs recently stabilized at around 60% of the initial (1990) level, though the labour shedding does not generally seem to be over yet. Still manufacturing industry is an important job provider in many candidate countries; the highest employment shares in manufacturing industry are currently observed in the Czech Republic and in Slovenia (around 30% of total employment – see Figure 2).

Figure 2

Manufacturing employment in % of total employment



Source: WIIW Database.

2 Candidate countries' manufacturing industry in comparison to the EU

As far as the specialization of manufacturing industry is concerned, we get a mixed picture for the candidate countries – especially regarding production structures.[7] Judged by the concentration ratios (CR5), *production specialization has markedly increased* between

[7] In analogy to indicators from the 1999 Report on the Competitiveness of European Industry, we use here concentration ratios (CR5 and CR3 – share of the 5 and 3 largest two-digit NACE industries, respectively, in total manufacturing) as an indicator of specialization – see European Commission (1999), pp. 1-13.

1990 and 1999 in nearly all candidate countries (except Estonia and Latvia where production specialization was high already at the outset of transition). The top five branches accounted for 60% and more than 70% of manufacturing industry output in the latter period (even 74% in Latvia – see Figure 3). High and growing production specialization can be observed even by concentration ratios of the top three industries (CR3, except Estonia – see Figure 5). This is in sharp contrast to the weak tendency towards specialization observed in the EU over the last decade.[8] Generally, manufacturing industry production in the candidate countries is now *more specialized* than in the EU and thus potentially more vulnerable to various shocks.

In terms of employment, the candidate countries' specialization of manufacturing industry (again measured either by CR5 or CR3) is somewhat less pronounced, though still high. Employment concentration ratios did not change much during the last decade (except in Bulgaria and the Baltic states where specialization increased between 1990 and 1999 – see Figures 4 and 6). Typically, among the top three most important manufacturing sectors in the candidate countries are food, beverages and tobacco (DA), transport equipment (DM), as well as basic metals and fabricated metal products (DJ) in Central and Eastern Europe. Food, beverages and tobacco (DA), textiles (DB) and wood products (DD) are usually among the top producing sectors in the Baltic states – see Figure 7a.

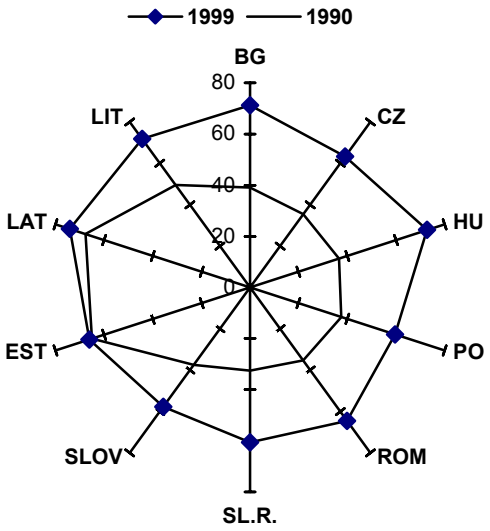
After a decade of downsizing and fast re-shaping, the structure of manufacturing industry in the majority of candidate countries is now fairly close to the European pattern both in terms of production and employment structures. Compared to the EU average industry structure, the latter according to Eurostat data, there are now (year 1999, EU: year 1998) higher shares of food and beverages (DA), textiles (DB), wood products (DD) and basic metals (DJ) industries in some candidate countries (Figures 7a and 7b). On the other hand, the candidate countries have lower shares than the present EU member states in machinery and equipment (DK), chemicals (DG) and – with the notable exception of Hungary – in electrical and optical equipment (DL) as well. The majority of candidate countries in Central and Eastern Europe have nowadays an industrial structure which is positioned somewhere between the less advanced EU countries (average of Spain, Portugal and Greece) and the more advanced EU countries (average of Germany, France and United Kingdom).[9] Manufacturing output and employment structures in Romania and in the Baltic states tend to be more distinct from both the EU and the remaining candidate countries.

[8] See European Commission (1999), pp. 2-15.

[9] Less advanced EU countries are represented by an average of Greece, Portugal and Spain, more advanced EU countries by an average of Germany, France and the United Kingdom.

Figure 3

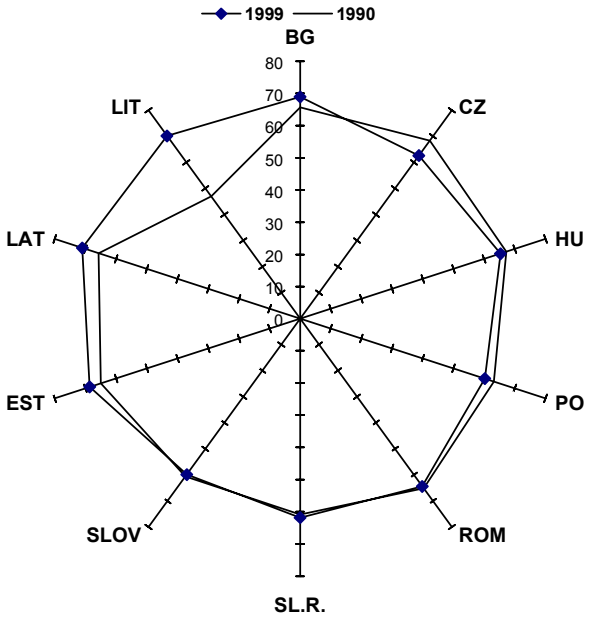
Manufacturing output concentration ratios (CR5)



Source: WIIW Industrial Database.

Figure 4

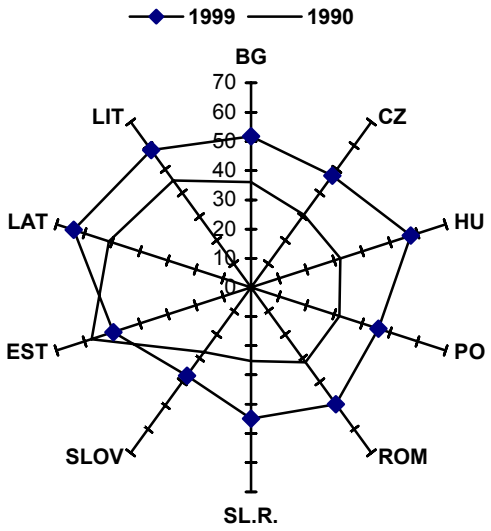
Manufacturing employment concentration ratios (CR5)



Source: WIIW Industrial Database.

Figure 5

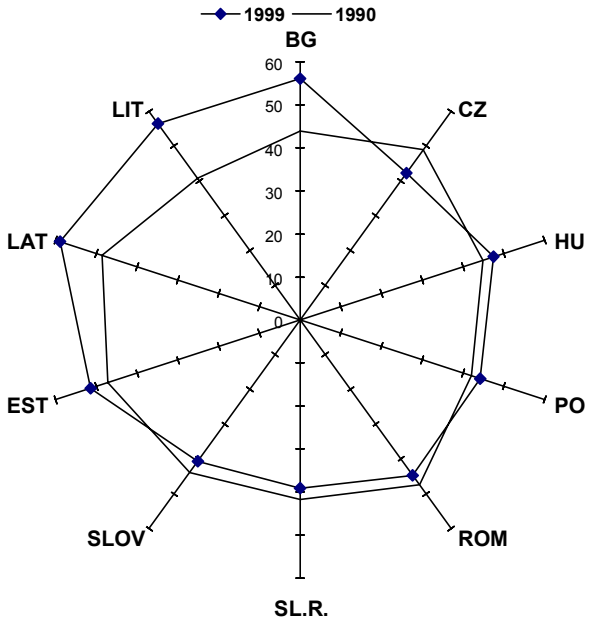
Manufacturing output concentration ratios (CR3)



Source: WIIW Industrial Database.

Figure 6

Manufacturing employment concentration ratios (CR3)



Source: WIIW Industrial Database.

Figure 7a

Manufacturing production structure in comparison to the EU, 1999

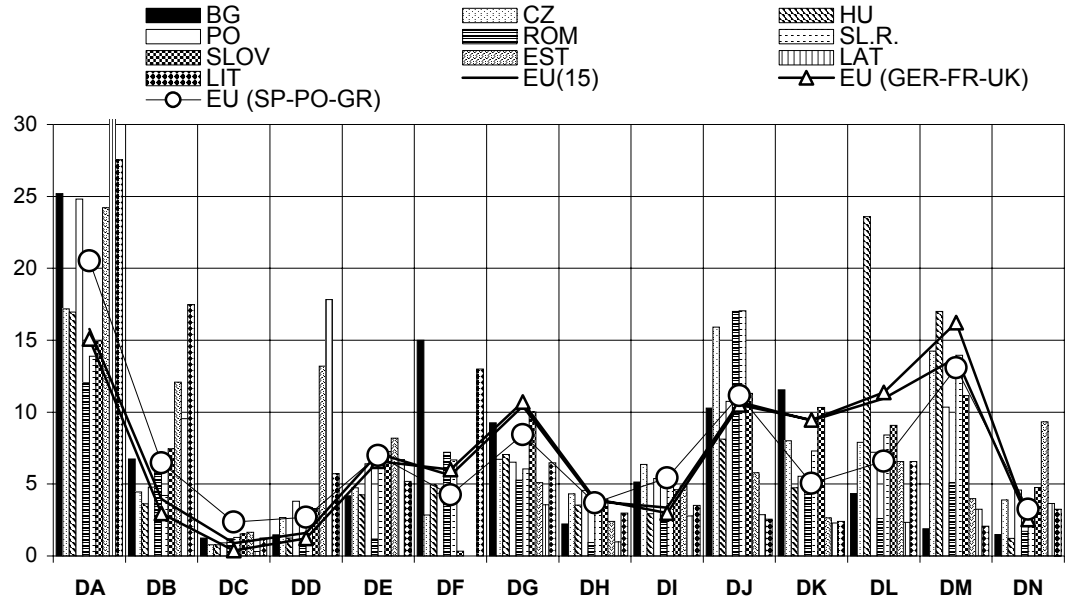
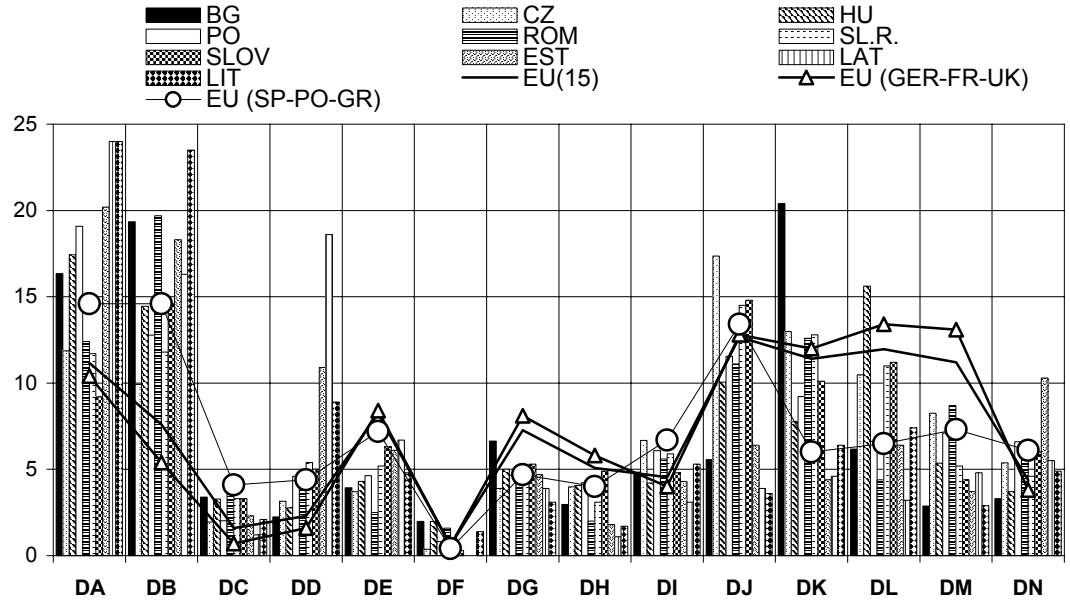


Figure 7b

Manufacturing employment structure in comparison to the EU, 1999



Note: See Footnote 9 and Annex for codes of individual 2-digit NACE industries.

Source: WIIW Industrial Database and Eurostat.

Figure 8a

Deviations of CEE manufacturing production from EU structures, 1999

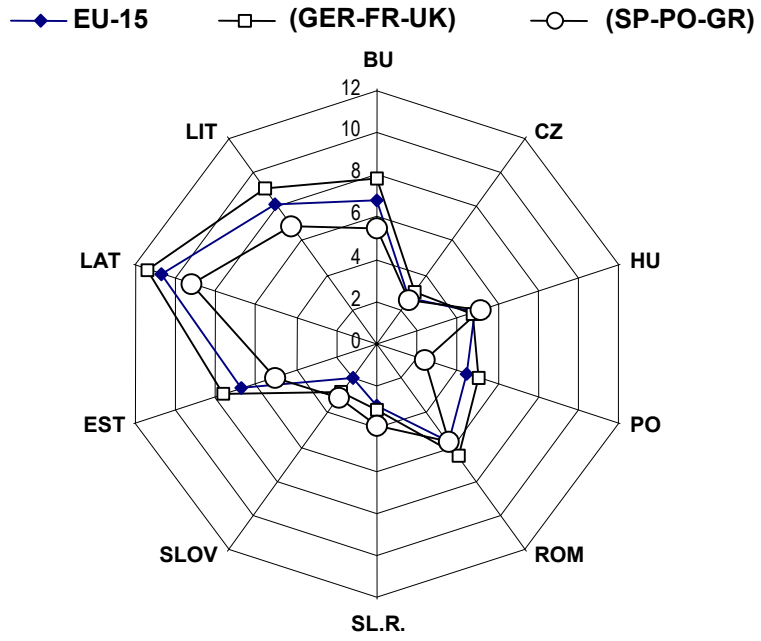
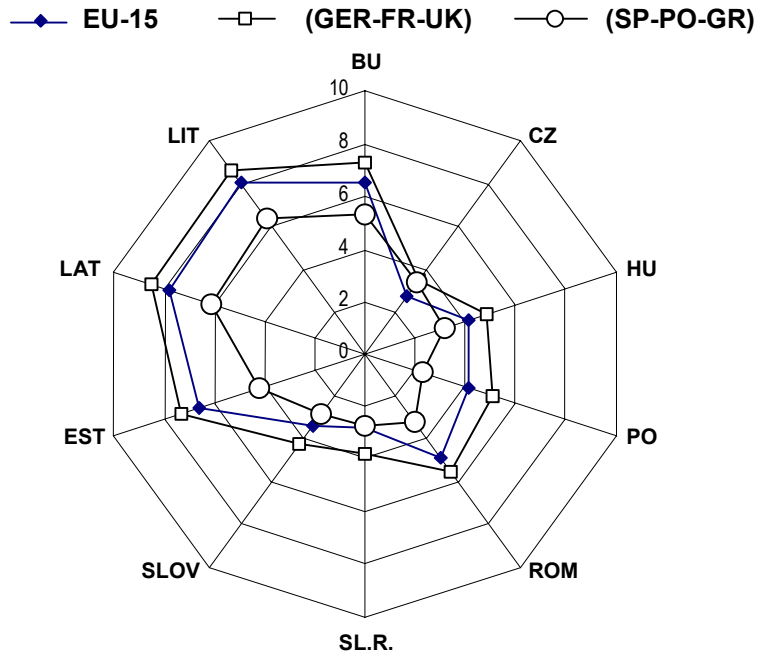


Figure 8b

Deviations of CEE manufacturing employment from EU structures, 1999



Note: See Footnote 10 for the definition of structural deviations.

Source: Own calculations based on WIIW Industrial Database and Eurostat.

A fairly close structural similarity vis-à-vis the EU of the candidate countries in Central and Eastern Europe, as well as the distinct structure of manufacturing industry in all three Baltic countries, are clearly visible also in the structural deviation indices shown in Figures 8a and 8b.[10] The structure of the Czech, Polish, Slovak and Slovenian manufacturing industry is very close to the EU average while Bulgaria, Romania and especially the Baltic states again stand apart. In most more advanced candidate countries (the only exception being Hungary), the structural similarity of manufacturing industry production and employment are closer to less advanced EU countries (Spain, Portugal and Greece).

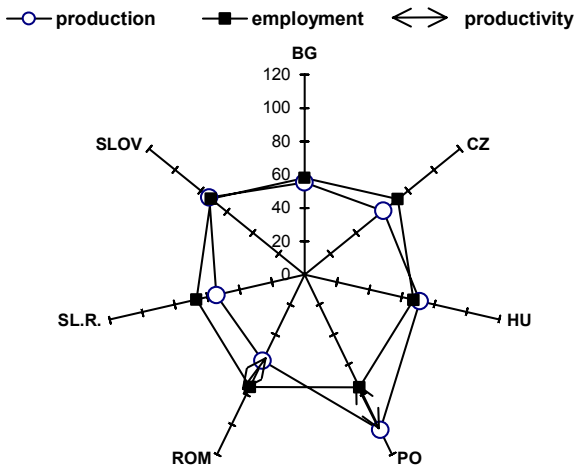
3 Productivity, wage rates and unit labour costs: analysis of the components of cost competitiveness at branch level

The overall developments analysed in chapter 1 mask substantial structural changes within manufacturing industry and its individual sectors. Structural changes reflect *inter alia* different speeds of candidate countries' restructuring and resulting efficiency gains or

Figure 9

Manufacturing labour productivity, 1993

1990 = 100



Source: WIIW Database.

[10] Structural deviations are calculated from 2-digit NACE rev. 1 data for industrial production (at current prices) and employment. For a definition see the following formula:

$$S^* = \sqrt{\sum_k (sh_k^{t_2} - sh_k^{t_1})^2 \cdot (sh_k^{t_1} / 100)}$$

k = individual industry

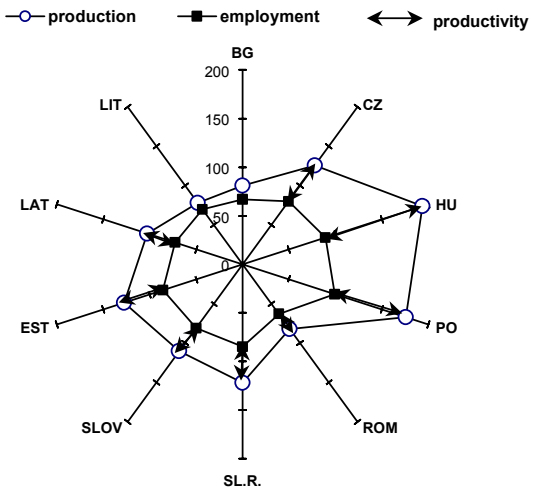
sh_k = share of industry k in total output or employment (in %)

t_i = country index, where i = 1,2; 1 denoting the EU.

Figure 10

Manufacturing labour productivity, 1999

1993 = 100



Source: WIIW Database.

losses at branch level. These structural changes vary across individual candidate countries and over time; the time path of these differences partly reflects the uneven progress in industrial restructuring.

The changes of production and employment shares translate into different gains (or losses) in labour productivity (estimated as gross production at constant prices per employed person in manufacturing industry). During the first period of transition (passive restructuring, lasting until about 1993), an initial productivity drop, due to declining output and delayed lay-offs, occurred in the majority of candidate countries (except Poland; data for Baltic states are not available – see Figure 9). However, a *productivity recovery* started in most candidate countries thereafter and productivity growth has recently been higher than in the EU, implying some productivity catching-up (only in Bulgaria and Lithuania did manufacturing labour productivity continue to decline – see Table 2).[11]

Hungary's performance stands out again: its manufacturing industry labour productivity rose by more than 14% per year during 1993-1999 and more than doubled during this period. The cumulative Polish productivity improvement during the period 1993-1999 exceeded 75% (more than 10% per year), somewhat more than in the Czech and Slovak Republics as well as in Slovenia, Estonia and Latvia (all between 40% and 60%). Productivity gains were much lower in Romania (30%, 4.4% per year); in Bulgaria and Lithuania productivity continued to fall – see Table 2. Apart from Hungary and Poland,

[11] Manufacturing productivity in the EU (estimated from nominal value added) grew by 4.3% per year during 1988-1997 see European Commission (1999), pp. 1-9. The estimated annual rate of productivity convergence between East and West German manufacturing industry during 1992-1997 amounted to 7.4% – see Barrel and te Velde (2000), p. 290.

productivity improvements were in all candidate countries associated with a further shrinkage of manufacturing employment (Figure 10).

Table 2

Relative productivity gains, winner and loser branches

(average annual change in % for total manufacturing (D) and relative gains in percentage points)

	1997-99 BG	1993-99 CZ	1993-99 HU	1993-99 PO	1993-99 ROM	1993-99 SL.R	1993-99 SLOV	1994-98 EST	93-99 LAT	1993-99 LIT
D	-5.5	6.4	14.4	10.9	4.4	4.9	5.3	10.9	5.8	-6.6
DA	2.5	-4.6	-7.8	-3.9	-4.5	-3.1	-2.8	-6.9	-3.6	-0.5
DB	-1.7	-6.8	-8.5	-3.4	-2.7	-11.7	-0.6	8.3	0.7	-7.0
DC	-5.6	-9.8	-7.7	-1.6	2.1	-4.3	-7.5	5.8	-10.4	-4.9
DD	7.0	-5.6	-4.8	-3.9	-8.3	-11.8	-5.5	14.1	-2.2	-9.8
DE	-1.4	1.9	-1.6	1.8	-1.1	4.4	-7.0	-7.2	-0.8	-23.6
DF	-9.8	-2.1	-12.2	-7.4	-6.1	4.4	-20.1	.	.	1.0
DG	-8.9	-0.5	-11.4	-2.2	-6.3	0.2	0.5	-5.8	-10.6	6.1
DH	-1.9	1.1	-4.6	-0.4	-5.0	-3.8	-1.1	7.6	8.9	9.4
DI	4.9	-1.5	-4.8	0.9	-0.4	-1.0	1.7	4.9	6.9	4.2
DJ	-0.3	-3.7	-2.1	-1.5	-0.8	-5.8	2.7	4.0	12.2	6.7
DK	7.0	1.7	-2.7	2.6	0.8	-1.6	-2.4	5.9	-8.3	-8.9
DL	6.2	12.2	21.9	7.2	16.3	2.8	7.6	9.7	5.1	12.1
DM	-4.8	4.3	19.7	10.1	11.6	21.0	3.2	-3.1	-6.4	15.8
DN	6.8	0.7	-6.5	-1.7	10.5	-2.2	1.9	3.2	.	2.6

Note: See Annex for abbreviations of 2-digit NACE industries. Calculations of relative gains: DA(93-99) - D(93-93) = relative gain DA.

Source: WIIW Industrial Database.

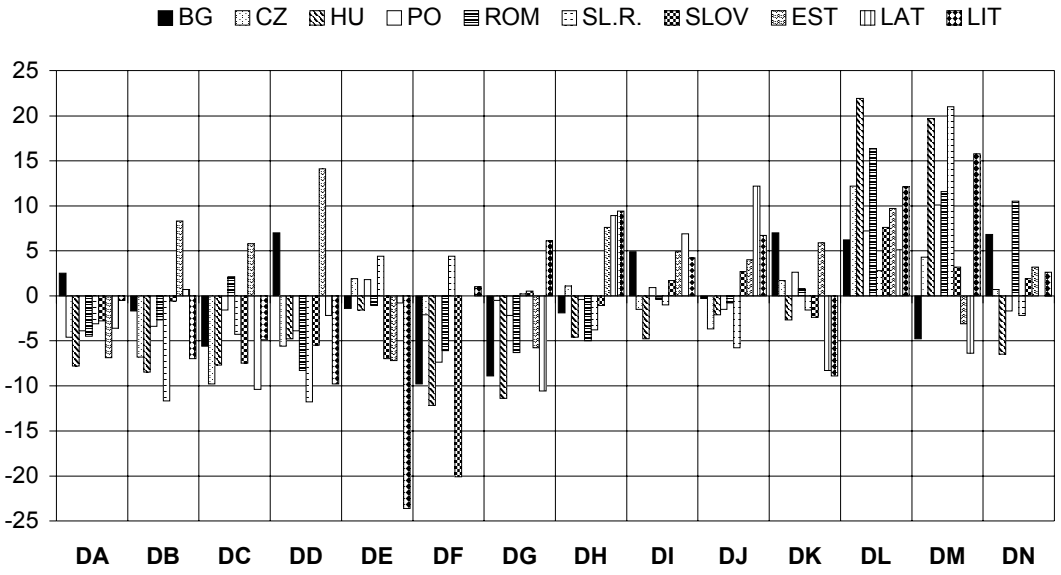
Compared to the initial phase of transition, we detect a *new pattern of productivity winner and loser branches* emerging recently – often quite opposite to that observed in the period of passive restructuring during the early 1990s.[12] Looking at the relative labour productivity changes in the period 1993-1999 by individual branch (relative to the manufacturing industry average), one can clearly distinguish two groups of industries – see Table 2 and Figure 11. Roughly speaking, among the winners (branches with above-average productivity gains during the period 1993-1999) are in most CEECs only two industries: electrical and optical equipment (DL) and transport equipment (DM) as well as (less clearly) other manufacturing (DN) comprising mainly furniture. In the Baltic states (and in the Czech Republic), the winners are also rubber and plastics (DH), other non-metallic mineral products (DI), and basic metals and fabricated metal products (DJ). Manufacturing of electrical, optical and transport equipment has been a clear productivity winner in nearly all candidate countries. In Hungary, productivity in these branches was growing by more than 30% per year during 1993-1999; in the Czech Republic, Poland, Romania and in Slovakia at double-digit annual rates as well.

[12] See also Urban (2000). However, data for the initial transition period are incomplete and less reliable.

Figure 11

Relative productivity gains of industries

annual averages in percentage points, 1993-99, compared to total manufacturing



Note: See Annex for abbreviations of 2-digit NACE industries.
Source: See Table 2.

On the other hand, the loser branches in terms of relative productivity gains are frequently the manufacturing of food, beverages and tobacco (DA), textiles (DB), leather (DC), wood products (DD), coke and refined petroleum (DF) and chemicals (DG) – see Table 2 and Figure 11. In some cases, labour productivity in these branches has even declined in absolute terms. Apart from the majority of manufacturing branches in Bulgaria and Lithuania, this has happened e.g. in the leather industry (DC) in the Czech Republic and in Slovenia, in the wood industry (DD) in Romania and Slovakia, etc. In general, there is clear evidence that the more sophisticated manufacturing branches (electrical, optical and transport equipment being among the most prominent examples) have strongly improved their productivity performance recently while the initial success of some traditional sectors (such as food and beverages, rubber and plastics and non-metallic minerals) has vanished in the more recent period of transition. The sectoral pattern of productivity changes in the candidate countries has thus been somewhat different from that observed in the present EU member states.[13] Also the variability of productivity change among branches has been greater in the candidate countries than in the EU.

[13] Relatively fast (nominal) productivity improvements in the EU were observed in tobacco, radio, TV and communication equipment, other transport equipment and basic metals. Slower (nominal) productivity growth occurred in office machinery, wearing apparel and fur, furniture, printing and publishing – see European Commission (1999), Table 1.2.

Box 1

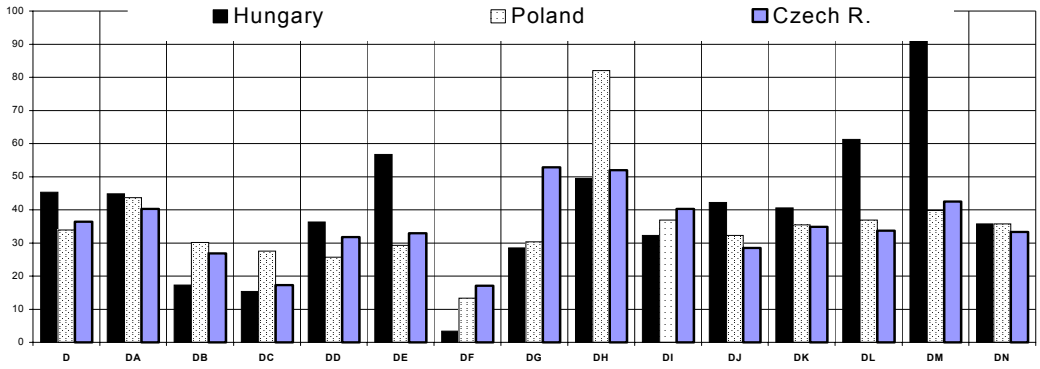
Manufacturing labour productivity in international comparison

International productivity comparisons are hampered by the conversion of the national output data to a common currency. The use of market exchange rates is not appropriate for this purpose (especially for CEECs, mainly due to their grossly undervalued currencies and fluctuating exchange rates). Alternative proxy converters are either purchasing power parities (PPP – see Table 5 below), or – much better – branch-specific **unit value ratios (UVR)** which compare prices of representative products. UVR estimates for the year 1996 are available only for the Czech Republic, Hungary and Poland relative to Germany from a recently completed research project, jointly conducted by the WIIW and the University of Groningen.[14] The estimated Hungarian manufacturing industry labour productivity was about 41% of the German or Austrian level in 1996, the respective Czech-German productivity relation was 37%, the Polish-German productivity relation was 34%, all with fairly large sectoral differences.[15] Figure B1 shows a productivity level comparison for the year 1998, after extrapolation from 1996 UVR-based branch-specific benchmarks.

Figure B1

Manufacturing labour productivity (UVR-based), 1998

(Austria = 100)



A closer look at the performance of individual branches shows that relatively smaller productivity gaps were observed especially in manufacturing of pulp and paper (DE), rubber and plastic products (DH), electrical equipment (DL) and transport equipment (DM) in Hungary; of rubber and plastics (DH) in Poland; and of chemicals (DG), rubber and plastics (DH) in the Czech Republic. Hungary's labour productivity in transport equipment industry was practically equal to that of Austria. On the other hand, productivity gaps in textiles (DB), leather manufacturing (DC), as well as in coke and refined petroleum products (DF) were especially large in all three countries.[16]

Table 3 provides crude estimates of labour productivity levels (gross production per employee) in the candidate countries' manufacturing industry and its sectoral variation. For a cross-country comparison, data in national currencies were converted into a common

[14] See Monnikhof and van Ark (2000).

[15] It is interesting to note that a productivity gap of about the same order existed between East and West German industries in 1992. By 1997, East German labour productivity reached about 65% of the West German level – see Barrel and te Velde (2000).

[16] Taking into account that (nominal) productivity in the EU has been growing by 4.3% per year during 1988-1997 (in Austria by 8.8%, in Germany by 5.2%) – see 'European Commission (1999, p. x.). Guger (2000, p. 543) gives an estimate for hourly productivity growth between 4-5% per year in both Germany and Austria during 1995-1999.

unit (ECU) with purchasing power parities. The first data set (PPP96) results from national productivity figures converted into a common currency unit with 1996 purchasing power parities for the whole GDP (PPP96, using Austria as a benchmark).[17] This conversion leads to higher productivity estimates for the candidate countries. The second data set uses as a conversion factor PPP for gross fixed capital formation in 1996 (PPPCAP96) where the price levels in the candidate countries are relatively high (presumably due to imports). This conversion thus leads to lower productivity estimates for the candidate countries. Given the close correspondence of the latter productivity estimates to the theoretically superior UVR-based productivity data (see Box 1) for the Czech Republic, Hungary and Poland (which are not available for other candidate countries), and assuming that a similar correspondence between UVR and PPPCAP96 exists for other candidate countries as well, one can assume that productivity levels expressed at PPPCAP96 are probably closer to reality – at least for manufacturing industry as a whole. Hungary's productivity leadership (40% of the Austrian level in 1999) among the candidate countries is confirmed, Slovenia's productivity is surprisingly low. Another interesting finding are large productivity gaps among the candidate countries: Bulgarian and Romanian labour productivity was just one fourth of the Hungarian level (about 10% of the Austrian level).

Wages are also low in all candidate countries, and this is true for all sectors of the economy. Even in a 'high-wage' candidate country such as Slovenia, the average gross wage (EUR 900 per month in 1999) was only some 40% of either the Austrian or German level (at current exchange rates).[18] Czech, Hungarian or Polish average wages range from EUR 300 to 400 per month (15-18% of either the Austrian or German level) and wages are even much lower in the remaining candidate countries (slightly more than EUR 100 in Bulgaria and Romania).[19] Wages in manufacturing industry do not differ too much from national averages, but one can again distinguish three groups of countries (apart from Slovenia – see Table 4): the Czech Republic, Hungary and Poland with an average nominal gross wage of about EUR 300 per month, followed by Estonia, Slovakia, Latvia and Lithuania (EUR 200-250) and, finally, Bulgaria and Romania with just EUR 100 per month. Domestic purchasing power of wages has been higher than of nominal wages converted at exchange rates – up to three times in the case of Bulgaria – since the level of prices in the candidate countries has been much lower than in the EU.[20] Currency

[17] Purchasing power parities were adopted from the ECP 1996 – see Eurostat-OECD (1999).

[18] See Havlik et al. (2001). Indeed, Slovenia is the only candidate country where actual wages are higher than estimated equilibrium wages – see EBRD (2000), p. 62.

[19] Gaps in total wage costs are roughly similar since direct wage costs in the candidate countries account for about the same share of total labour costs as in the EU (around 70-75% of total labour costs) – see Eurostat (2001), Havlik (2000) and Havlik et al. (2001).

[20] Judging by the difference between the current exchange rate and purchasing power parity (PPP), all candidate countries have undervalued currencies and in this sense also 'competitive' exchange rates. However, the real currency appreciation has been eroding wage competitiveness and the growth of nominal wages (in euro terms) has been quite high recently (see also Havlik et al., 2001). Nominal wage increases in the Baltic states, resulting mainly from currency appreciation (around 40% per year – see Table 4), are hardly sustainable.

Table 3

Labour productivity in manufacturing industry, 1999

Manufacturing = 100

		Czech Republic	Slovak Republic	Hungary	Poland	Slovenia	Romania	Bulgaria	Estonia	Latvia	Lithuania
									1998		1998
	Manufacturing total, productivity in ECU (at PPP96 for GDP)	72416	63106	105774	76480	69053	40620	38225	45648	39924	45505
	Austria 1998 = 100	45.5	39.6	66.4	48.0	43.4	25.5	24.0	28.7	25.1	28.6
	Manufacturing total, productivity in ECU (at PPPCAP96)	49077	41280	67232	58064	59996	17386	15992	24294	24069	22926
	Austria 1998 = 100	30.2	25.4	41.3	35.7	36.9	10.7	9.8	14.9	14.8	14.1
	Manufacturing total = 100										
DA	Food products; beverages and tobacco	141.5	132.9	87.5	123.1	175.3	203.2	147.2	146.9	148.4 [1)]	122.6 [1)]
DB	Textiles and textile products	38.4	24.5	21.8	38.5	45.5	28.5	33.4	64.4	56.8	50.5
DC	Leather and leather products	31.4	32.0	19.6	44.9	44.2	50.1	36.0	62.5	28.6	61.4
DD	Wood and wood products	46.0	24.0	39.3	83.8	54.5	57.2	60.1	98.3	94.8	40.3
DE	Pulp, paper & paper products; publishing & printing	143.3	141.3	87.2	147.5	86.8	82.3	93.5	108.0	107.2	82.4
DF	Coke, refined petroleum products & nuclear fuel	903.1	765.8	194.1	420.1	180.9	476.1	805.0	.	.	1496.1
DG	Chemicals, chemical products and man-made fibres	217.4	171.9	109.0	140.1	217.9	139.3	146.0	125.2	90.4	260.4
DH	Rubber and plastic products	97.6	104.2	82.4	119.0	96.5	91.6	83.1	125.0	118.0	70.9
DI	Other non-metallic mineral products	80.6	77.9	60.7	87.4	110.5	85.3	89.4	127.5	98.5	58.8
DJ	Basic metals and fabricated metal products	78.9	108.0	74.6	96.3	77.1	141.9	211.3	107.8	93.2 [2)]	44.3
DK	Machinery and equipment n.e.c.	67.2	53.1	51.6	64.4	82.0	35.5	55.7	52.5	36.1	40.4
DL	Electrical and optical equipment	115.5	59.1	209.1	118.1	81.1	128.7	66.6	89.7	63.0 [3)]	109.2
DM	Manufacture of transport equipment	156.5	347.5	292.2	149.8	259.1	129.9	64.8	102.9	72.4	68.7
DN	Manufacturing n.e.c.	64.3	40.7	29.4	69.1	91.5	64.0	51.3	48.4 [4)]	70.4	58.0
	Others									240.8 [5)]	
	Standard deviation	213.25	189.60	77.49	89.85	64.48	108.75	190.83	30.29	31.79	368.24

Notes: 1) Without ISIC 16: Tobacco products. - 2) Without ISIC 27: Basic metals. - 3) Without ISIC 30: Office, accounting and computing machinery and ISIC 33: Medical, precision and optical instruments, watches and clocks. - 4) DF+DN. - 5) ISIC groups 16, 23, 27, 30 and 33.

Sources: WIIW estimates based on national statistics, OECD, EUROSTAT and UNIDO.

Table 4

Monthly gross wages in manufacturing industry, 1999

		Czech Republic	Slovak Republic	Hungary	Poland	Slovenia	Romania	Bulgaria	Estonia	Latvia	Lithuania
									1998		1998
	Manufacturing total (in ECU, at exchange rate)	332.3	242.7	302.0	315.0	744.3	105.1	104.8	258.9	219.8	200.2
	Average growth rate 1993-99	14.9	11.0	6.2	10.9	8.8	0.2 [1)]	9.7 [2)]	39.6 [3)]	38.0	41.7 [3)]
	Manufacturing total (in ECU, at PPP)	824.2	699.6	691.4	679.5	1129.8	402.1	351.5	589.7	505.7	471.3
	Average growth rate 1993-99 (real, CPI)	4.7	3.0	1.4	3.9	4.2	-6.6 [4)]	-2.4 [2)]	6.0 [3)]	3.6	-5.3 [9)]
	Manufacturing total = 100										
DA	Food products; beverages and tobacco	96.3	96.3	95.6	93.2	115.1	95.6	103.0	108.2	110.2 [6)]	110.7 [6)]
DB	Textiles and textile products	69.9	68.4	62.3	64.9	72.8	71.8	67.1	83.3	92.5	86.9
DC	Leather and leather products	67.5	72.1	60.7	68.5	76.2	69.3	65.5	84.5	64.2	80.2
DD	Wood and wood products	83.6	74.9	60.5	80.7	85.0	71.3	70.6	94.9	87.6	76.0
DE	Pulp, paper & paper products; publishing & printing	118.0	124.4	112.2	131.2	123.0	113.3	102.0	167.9	140.4	130.3
DF	Coke, refined petroleum products & nuclear fuel	146.9	157.9	202.2	186.7	112.8	247.1	243.6	96.0 [5)]	.	.
DG	Chemicals, chemical products and man-made fibres	123.2	118.6	159.9	139.2	151.0	128.0	139.9	.	95.6	147.5
DH	Rubber and plastic products	106.3	119.9	100.3	103.2	103.1	108.7	92.0	95.3	80.3	101.0
DI	Other non-metallic mineral products	108.1	110.7	108.9	104.9	101.7	110.0	109.5	126.9	91.2	109.1
DJ	Basic metals and fabricated metal products	105.1	112.4	97.1	107.7	99.6	128.9	178.9	109.9	86.1 [7)]	97.6
DK	Machinery and equipment n.e.c.	102.6	102.0	103.0	103.9	97.1	106.9	95.4	101.6	94.9	93.7
DL	Electrical and optical equipment	100.9	99.6	108.6	117.6	103.0	111.0	92.2	110.7	93.4 [8)]	113.2
DM	Transport equipment	121.3	119.8	129.3	116.5	104.8	124.4	100.0	122.1	89.5	125.0
DN	Manufacturing n.e.c.	80.7	89.8	69.8	80.1	86.3	74.6	68.2	91.8	83.9	88.8
	Standard deviation	21.05	23.24	38.10	30.55	19.32	42.90	47.57	21.64	16.90	20.02

Note: 1) 1996-1999. Average growth rate 1993-99 for net wages: 9.2%. - 2) 1997-99. - 3) 1993-98. - 4) 1996-99. Average growth rate 1993-99 for real net wages: -2.7%. - 5) DF+DG. - 6) Without ISIC 16: Tobacco products. - 7) Without ISIC 27: Basic metals. - 8) Without ISIC 30: Office, accounting and computing machinery and ISIC 33: Medical, precision and optical instruments, watches and clocks. - 9) 1993-97.

Sources: WIIW estimates based on national statistics, OECD, EUROSTAT and UNIDO.

appreciation and considerable inflation differentials vis-à-vis the EU explain also a large part of the difference between the real and nominal wage growth (Table 4). In several candidate countries the latter has recently been much higher than productivity gains, implying a gradual *deterioration of the international wage cost competitiveness* of manufacturing industry in nearly all candidate countries (except Hungary and possibly also Poland).

A cross-industry comparison of relative wages in manufacturing branches shows that wages in food, textiles, leather, wood and other manufacturing industries are usually lower than the manufacturing industry average, whereas in pulp and paper, chemicals, non-metallic mineral products, electrical, optical and transport equipment branches the wages are higher than average (coke and petroleum are specifically high wage industries). Wage differentiation is fairly high in Bulgaria, Romania and Hungary, but relatively low in Slovenia, the Czech and Slovak Republics and in the Baltic states. Besides, the relative wage level seem to be positively associated with the varying sectoral productivity performance: 'successful' branches with better productivity performance can afford to pay higher wages. Productivity dispersion is much higher than wage dispersion – see standard deviations in Tables 3 and 4.

An inspection of annual changes of ULCs by manufacturing industry branch during the last decade reveals a few characteristic development patterns. At the beginning of transition (1990-1992), ULCs dropped across the board: huge nominal devaluations – leading to a sizeable reduction of wages in foreign currency – were the crucial factor at that time (the Czech Republic and Slovakia, later on also Bulgaria and Romania, are prime examples). After the initial transition shock had been overcome around 1993-1994, ULCs increased in nearly all branches and all candidate countries (Poland and Slovenia were two major exceptions) as production ceased falling, but employment remained relatively high and the growth of wages was accentuated by currency appreciation. Later on, one can observe a tendency towards either slower ULC growth or even ULC decline as productivity was strongly growing whereas wage increases were moderate. Cost improvements during this later period are clearly visible in many candidate countries (except Bulgaria and the Baltic states), especially in electrical and optical equipment (DL) and transport equipment (DM) industries, and in nearly all branches of Hungarian manufacturing industry.

Box 2

Unit labour costs (ULC) are defined as the ratio of wage costs (W: gross wages, including indirect wage costs, in EUR at current exchange rates) and labour productivity levels (LP). LP is defined as output (OUT) per employed person (EMP).

$$ULC = W / LP = W / (OUT / EMP) \quad (1)$$

In a dynamic perspective, competitiveness can improve, that is, ULCs will decline (assuming constant capital intensity) if nominal wages are growing less than labour productivity. Moreover, in the context of international competitiveness, wage costs' growth can be curbed by 'competitive devaluation' (currency appreciation has the opposite effect).[21] We can thus analyse ULC changes also by looking at the contribution of its main components:

$$dULC = dW – dLP = dW – dOUT + dEMP \quad (2)$$

The decomposition of ULCs shows that an increase in wage costs (either by real wage growth or due to currency appreciation) naturally leads to higher ULCs; rising employment may also contribute to ULC growth. On the other hand, ULCs can improve (that is, decline) either through wage or employment cuts, as well as through rising output. Figure 12 shows the ULC decomposition for the manufacturing industry in the four more advanced CEECs.

All three components of ULCs (four, if one would consider also the exchange rate) display varying growth patterns and large fluctuations across time, individual candidate countries and each of the manufacturing industry branches. The development of ULCs and of their main components in the transport equipment industry (DM) is illustrative in this respect (Figure B2a). The Czech ULCs, for example, dropped initially (1990-1991) due to huge wage cuts (partly resulting from devaluation) and employment adjustments. Thereafter, ULCs grew fast as wages recovered (until 1994). Since then, ULCs have declined largely because real output grew more than nominal wages while employment hardly changed at all. Except for 1990-1991, wages were growing rapidly while output growth pushed ULCs down only after 1994. An increase of ULCs in 1999 resulted from rising wages while the output fall was not compensated by the reduction of employment. In Hungary, on the other hand, strong ULC improvements in transport equipment industry continued at remarkable speed already from 1993. Growing output has been a major driving force of these cost improvements, more than compensating for the recent growth of both wages and employment. In leather and leather products manufacturing (DC, as a prime example of the loser, though not very important branch – see Figure B2b), the Czech ULCs have been continuously and rapidly growing since 1992 (until 1999). After initial adjustment (devaluation), wages have been growing while output has declined and employment was not adjusted accordingly. Obviously, this hopelessly inefficient branch still awaits more restructuring which may have started only in 1999. Similar, though less pronounced development features may be observed in Slovenia as well.

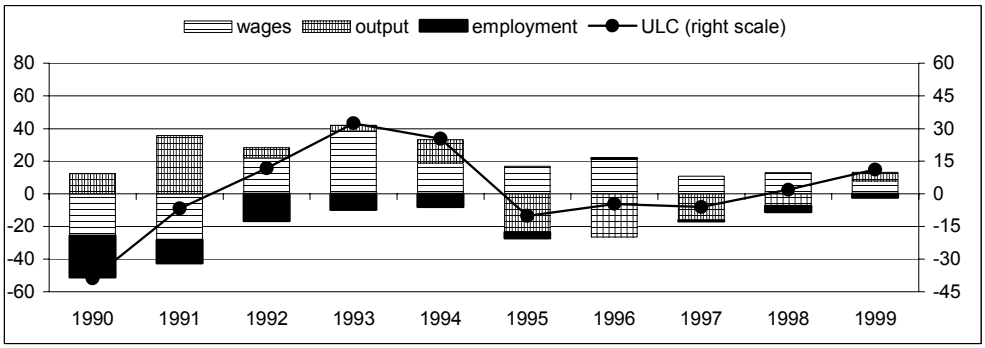
[21] Since the exchange rate changes affect all branches uniformly (at least as far as wage developments are concerned) we do not show this effect separately. The wage data refer to wages in international currency (euro), converted with current exchange rate.

Figure B2a

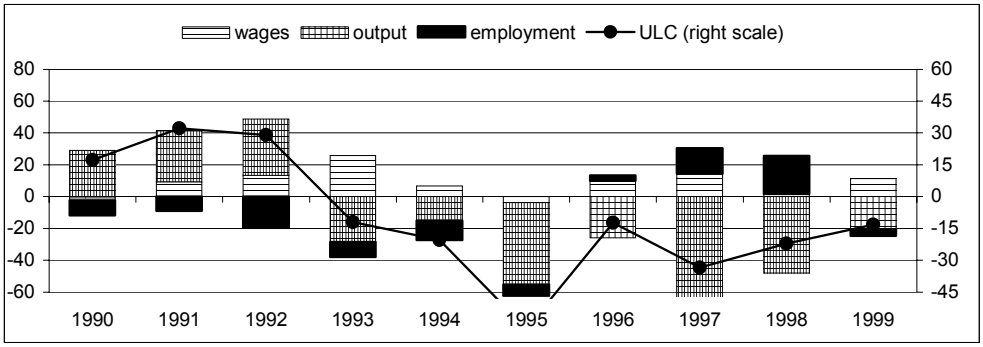
Transport equipment ULCs

annual changes in percent and its components

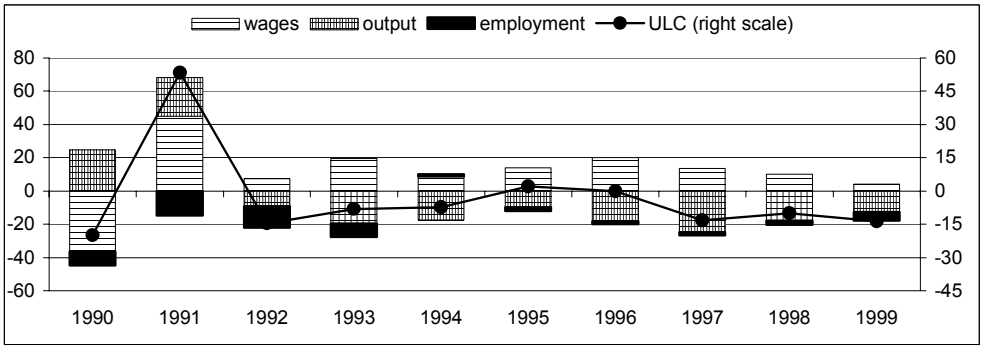
Czech Republic



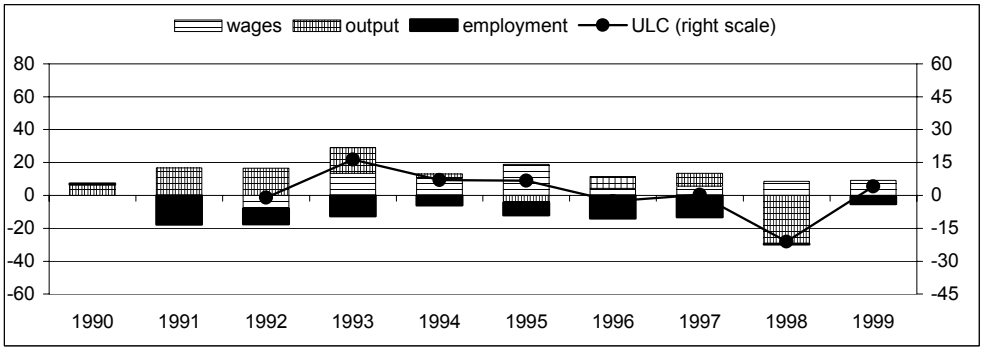
Hungary



Poland



Slovenia



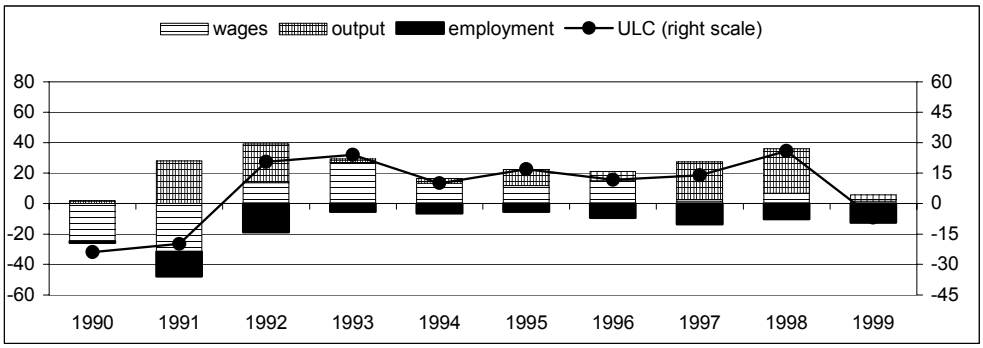
Source: WIIW Industrial Database.

Figure B2b

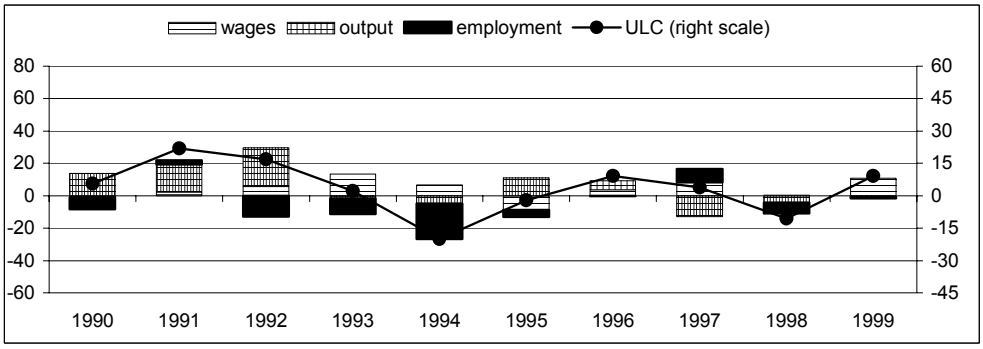
Leather and leather products ULCs

annual changes in percent and its components

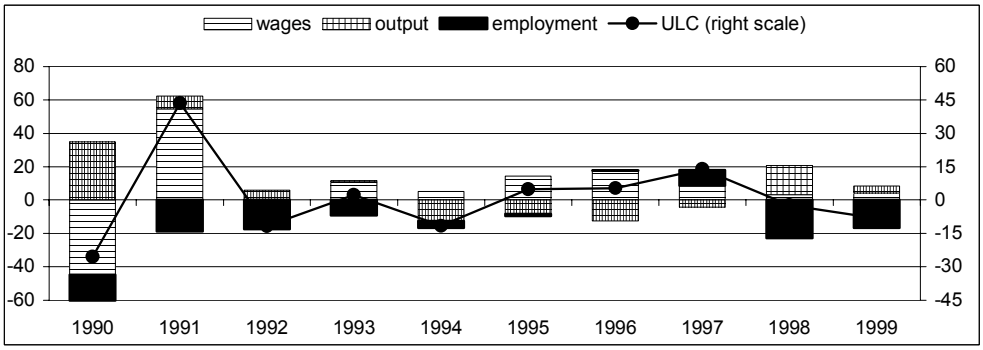
Czech Republic



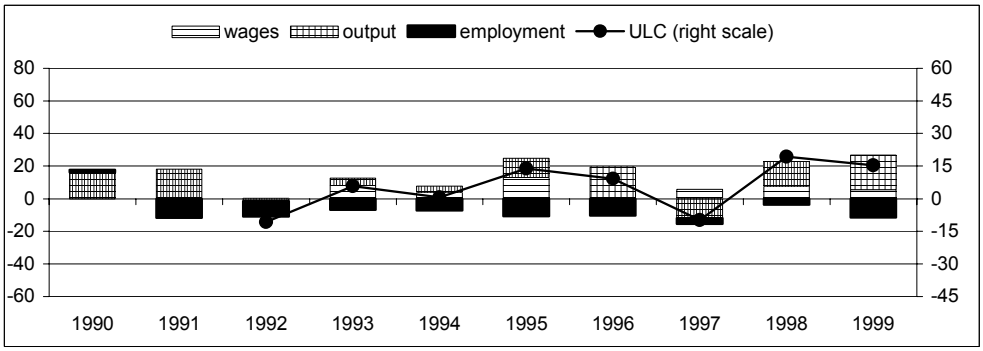
Hungary



Poland



Slovenia

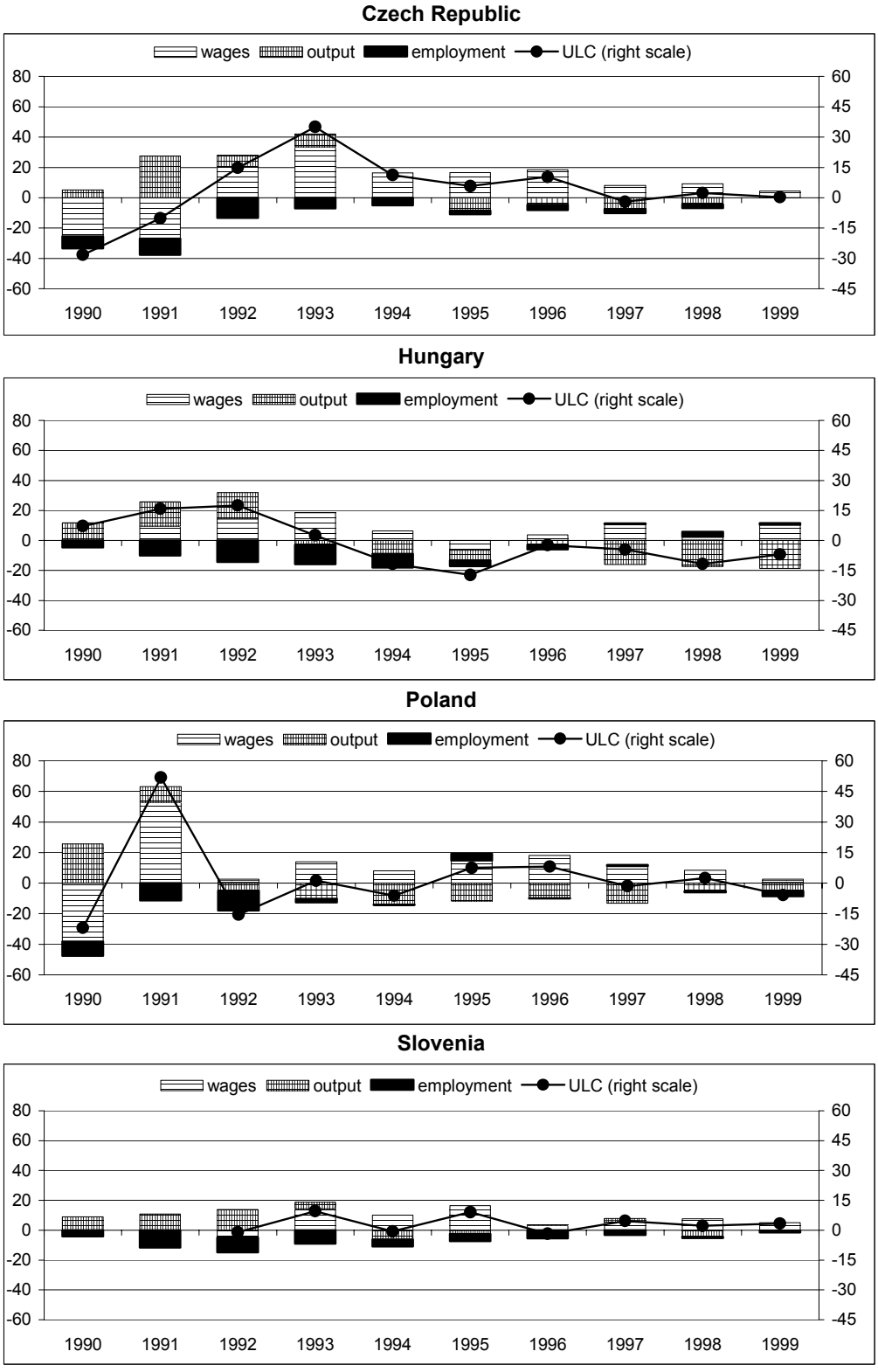


Source: WIIW Industrial Database.

Figure 12

Manufacturing industry ULCs

annual changes in percent and its components



Source: WIIW Industrial Database.

Sectoral differences in ULC levels are caused mostly by varying labour productivity, as wages display less pronounced variations (see standard deviations of productivity and wages in Tables 3 and 4 above). Productivity differences, in turn, may partly result from different capital intensity of individual industries.[22] A comparison across manufacturing industry branches, within each candidate country, shows not only large differences in ULCs (especially in Slovakia, Hungary and Romania – see standard deviations in Table 5), but also that the productivity winner branches tend to have lower (or at least not too high) ULCs than the manufacturing industry average. On the other hand, ULCs in most of the productivity loser branches are considerably higher than the manufacturing industry average (Table 5). This is largely because the former show relatively high productivity gains while the corresponding productivity losses of losers have not been accompanied by appropriate wage adjustments (despite below-average wage increases in most loser industries).

The winner branches have thus managed not only to keep but even to *increase their comparative cost advantages*, despite (or perhaps because of) the fact that they offer above-average wages. On the other hand, the loser branches have high ULCs despite offering low wages, especially due to their low productivity. The main competitive advantage of – so far only few – branches that restructured successfully in some candidate countries seems to be in productivity catching up faster than wages. In these cases, ULC gaps vis-à-vis the present EU member states have been increasing and the candidate countries' competitiveness has strongly improved.

Tables 6a and 6b contain two sets of crude estimates that provide broad ranges for a cross-country ULC level comparison. The first data set results from national productivity figures converted into a common currency unit with 1996 purchasing power parities for the whole GDP (PPP96, again using Austria as a benchmark – see Table 5). As shown above, this conversion leads to higher productivity estimates and therefore to lower relative ULC levels for the candidate countries. The second data set uses as a conversion factor PPP for gross fixed capital formation in 1996 (PPPCAP96). This conversion leads to lower productivity estimates for the candidate countries and therefore to higher relative ULC estimates. Given the above-discussed (see Box 1) close correspondence of the latter productivity estimates to the theoretically superior UVR-based productivity data (which are not available for all candidate countries), and assuming that a similar correspondence exists for other candidate countries as well, one can assume that ULC figures from Table 6b are probably closer to reality – at least for the manufacturing industry as a whole.

[22] We have to disregard capital productivity due to the lack of reliable data on the capital stock (we shall briefly return to this issue in chapter 4 below).

Table 5

Unit labour costs (ULC) in manufacturing industry, 1999

Manufacturing = 100

		Czech Republic	Slovak Republic	Hungary	Poland	Slovenia	Romania	Bulgaria	Estonia 1998	Latvia	Lithuania 1998
	Manufacturing total = 100										
DA	Food products; beverages and tobacco	68.1	72.5	109.2	75.7	65.7	46.7	70.0	73.6	74.3 [1)]	90.3 [1)]
DB	Textiles and textile products	181.9	279.3	285.8	168.7	159.9	273.6	200.7	129.3	162.8	172.0
DC	Leather and leather products	214.8	225.3	309.8	152.5	172.2	144.3	182.0	135.2	224.5	130.5
DD	Wood and wood products	181.5	312.5	154.1	96.3	155.8	127.3	117.4	96.6	92.4	188.9
DE	Pulp, paper & paper products; publishing & printing	82.3	88.0	128.7	89.0	141.7	128.5	109.0	155.4	130.9	158.1
DF	Coke, refined petroleum products & nuclear fuel	16.3	20.6	104.2	44.4	62.4	36.8	30.3	.	.	.
DG	Chemicals, chemical products and man-made fibres	56.7	69.0	146.8	99.3	69.3	101.3	95.9	.	105.7	56.7
DH	Rubber and plastic products	108.9	115.0	121.7	86.7	106.8	117.1	110.7	76.3	68.1	142.4
DI	Other non-metallic mineral products	134.2	142.2	179.3	120.1	92.1	127.3	122.6	99.5	92.6	185.3
DJ	Basic metals and fabricated metal products	133.1	104.1	130.2	111.9	129.1	81.9	84.7	101.9	92.4 [2)]	220.3
DK	Machinery and equipment n.e.c.	152.8	192.2	199.4	161.5	118.4	314.9	171.2	193.7	263.1	232.1
DL	Electrical and optical equipment	87.4	168.5	51.9	99.6	127.1	88.5	138.5	123.5	148.1 [3)]	103.7
DM	Manufacture of transport equipment	77.5	34.5	44.3	77.7	40.4	89.8	154.2	118.7	123.6	182.0
DN	Manufacturing n.e.c.	125.5	220.5	237.1	115.8	94.3	123.5	133.0	.	119.1	152.9
	Standard deviation	53.27	86.83	75.75	33.63	39.19	74.32	44.03	33.50	55.45	48.48

1) Without ISIC 16: Tobacco products. - 2) Without ISIC 27: Basic metals. - 3) Without ISIC 30: Office, accounting and computing machinery and ISIC 33: Medical, precision and optical instruments, watches and clocks.

Sources: WIIW estimates based on national statistics, OECD, EUROSTAT and UNIDO.

Table 6a

International comparison of ULCs in manufacturing industry

(1999, PPP96 for GDP, Austria 1998 = 100)

		Bulgaria	Czech Republic	Estonia 1998	Hungary	Latvia	Lithunania 1998	Poland	Romania	Slovak Republic	Slovenia
D	Manufacturing total	18.0	30.1	37.2	18.7	36.1	28.8	27.0	18.3	25.2	70.6
DA	Food products; beverages and tobacco	16.4	26.6	35.6	26.6	34.9	33.9	26.6	11.1	23.8	60.4
DB	Textiles and textile products	30.4	46.1	40.5	45.0	49.5	41.8	38.4	42.2	59.3	95.2
DC	Leather and leather products	34.4	68.0	52.9	61.0	85.3	39.6	43.4	27.8	59.8	128.1
DD	Wood and wood products	22.9	59.2	38.9	31.3	36.2	59.1	28.2	25.3	85.5	119.4
DE	Pulp, paper & paper products; publishing & printing	20.1	25.3	59.1	24.6	48.3	46.7	24.6	24.1	22.7	102.5
DF	Coke, refined petroleum products & nuclear fuel	23.7	21.4	.	85.1	.	.	52.4	29.4	22.7	192.4
DG	Chemicals, chemical products and man-made fibres	20.0	19.8	.	31.8	44.2	18.9	31.1	21.5	20.2	56.8
DH	Rubber and plastic products	16.8	27.6	23.9	19.2	20.7	34.7	19.8	18.1	24.5	63.7
DI	Other non-metallic mineral products	17.2	31.6	29.0	26.3	26.1	41.8	25.4	18.2	28.1	50.9
DJ	Basic metals and fabricated metal products	13.3	34.9	33.1	21.3	29.1	55.4	26.4	13.1	22.9	79.6
DK	Machinery and equipment n.e.c.	23.1	34.5	54.1	28.0	71.3	50.3	32.7	43.3	36.4	62.8
DL	Electrical and optical equipment	22.4	23.6	41.2	8.7	48.0	26.9	24.2	14.6	38.2	80.7
DM	Transport equipment	37.6	31.6	59.9	11.3	60.6	71.3	28.5	22.3	11.8	38.8
DN	Manufacturing n.e.c.	20.1	31.7	.	37.3	36.1	37.1	26.3	19.0	46.8	56.0

Table 6b

International comparison of ULCs in manufacturing industry

(1999, PPP96 for gross fixed capital formation, Austria 1998 = 100)

		Bulgaria	Czech Republic	Estonia 1998	Hungary	Latvia	Lithunania 1998	Poland	Romania	Slovak Republic	Slovenia
D	Manufacturing total	43.9	45.3	71.3	30.1	61.1	58.4	36.3	43.7	39.3	83.0
DA	Food products; beverages and tobacco	40.0	40.2	68.4	42.8	59.1	68.7	35.8	26.6	37.1	71.0
DB	Textiles and textile products	74.1	69.4	77.7	72.4	83.8	84.6	51.6	100.7	92.6	111.9
DC	Leather and leather products	84.1	102.6	101.6	98.1	144.6	80.3	58.3	66.4	93.4	150.6
DD	Wood and wood products	55.8	89.3	74.7	50.3	61.3	119.7	37.9	60.3	133.4	140.3
DE	Pulp, paper & paper products; publishing & printing	49.0	38.2	113.4	39.6	81.9	94.5	33.1	57.5	35.5	120.5
DF	Coke, refined petroleum products & nuclear fuel	58.0	32.2	.	136.8	.	.	70.5	70.2	35.4	226.2
DG	Chemicals, chemical products and man-made fibres	48.8	29.8	.	51.2	74.9	38.4	41.8	51.3	31.5	66.7
DH	Rubber and plastic products	41.0	41.7	45.9	30.9	35.1	70.2	26.6	43.2	38.2	74.9
DI	Other non-metallic mineral products	42.1	47.6	55.5	42.2	44.3	84.7	34.2	43.5	43.8	59.9
DJ	Basic metals and fabricated metal products	32.4	52.7	63.4	34.2	49.3	112.3	35.5	31.2	35.7	93.6
DK	Machinery and equipment n.e.c.	56.4	52.0	103.7	45.1	120.8	101.8	44.1	103.4	56.8	73.9
DL	Electrical and optical equipment	54.6	35.6	79.1	14.0	81.4	54.4	32.5	34.8	59.6	94.9
DM	Transport equipment	91.9	47.7	115.0	18.1	102.6	144.4	38.4	53.3	18.4	45.6
DN	Manufacturing n.e.c.	49.1	47.8	.	60.0	61.2	75.1	35.4	45.4	73.0	65.8

Sources: WIIW estimates based on national statistics, OECD, EUROSTAT and UNIDO.

But even when using the upper boundary range for ULCs (Table 6b), the cost gaps – that is, candidate countries' cost advantages in manufacturing industry – vis-à-vis Western Europe (here represented by Austria) are in most cases quite large: nearly 20% in Slovenia and more than 50% in the Czech Republic, 60% in Poland and even 70% in Hungary. Nevertheless, some branches – such as textiles, leather, wood – face clear cost problems and may well have higher ULCs than in Western Europe. As shown above, the candidate countries' wage gaps are much bigger than productivity gaps and this is valid especially for the more advanced CEECs and for the more successful (and more sophisticated) manufacturing branches: Hungary's ULCs in electrical, optical and transport equipment industries were less than one fifth of the Austrian level – see Table 6b. An important finding of this analysis is that branches that *restructure successfully* have been enjoying not only better productivity performance, but *also increasing cost advantages* as the wage growth has been lagging behind.

4 Investment and the role of FDI

Investment has been one of the key prerequisites for maintaining and improving competitiveness. This has been even more true for the candidate countries which inherited from the past largely an obsolete capital stock that frequently turned out to be not viable in the conditions of a market economy. [23] And contrary to frequently held opinions, there is some recent evidence that transition economies lag behind advanced market economies also in terms of the quality of their workforce.[24] The modernization of existing assets and their active restructuring, and the training of human resources require extensive efforts and huge financial resources that are generally scarce in the candidate countries. That is why foreign investment, especially foreign direct investment (FDI), has been playing such a prominent role in upgrading both human and capital resources.

Investment ratios (shares of gross fixed capital formation in GDP) not only vary across individual candidate countries, but have been fluctuating over time as well. The Czech Republic and Slovakia reported extremely high investment ratios during most of the last decade (at times over 30% of GDP). These ratios have recently declined somewhat, but are still quite high (26.8% and 30.8%, respectively, in 1999 – see Table 7). Hungary, Poland, Slovenia and the Baltic states have more stable and growing investment ratios, ranging between 23% and 26% of GDP. Investment ratios in Bulgaria and Romania have recently dropped below 20% of GDP. The estimated real volume of investment more than doubled in Poland during the last decade whereas it grew by nearly 70% in Slovenia and 30% in Hungary (see Havlik et al., 2001). Contrary to the high investment ratios in the Czech and Slovak Republics, these countries' investment volumes have hardly changed during the last decade (investment dropped by half in Bulgaria and Romania). These developments are closely correlated with the respective changes in GDP and industrial production during the period.

As far as manufacturing industry is concerned, it recently accounted for 20% (in the Czech Republic and Bulgaria) to nearly 30% (Hungary, Slovenia and Romania) of all investment in tangible assets. This corresponds roughly to the shares of manufacturing industry in total value added and employment (see Figures 1 and 2); only in the Czech Republic were manufacturing investment shares slightly lower, indicating a deterioration in the relative age structure of the capital stock.

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[23] Due to valuation and other conceptual and statistical problems there are no reliable data on candidate countries' capital stocks.

[24] Despite achievements in formal education, skills – especially at the level of managerial and other skilled employment – required in a market economy are deficient; see EBRD (2000), chapter 6.

Table 7

Gross fixed capital formation (GFCF) in % of GDP, share of manufacturing industry in total gross fixed investment

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bulgaria	GFCF in % of GDP	21.3	18.2	16.2	13.0	13.8	15.3	13.6	10.8	13.2	15.9
	share of manufacturing [1)]	48.4	56.1	51.4	45.9	36.7	30.5	21.8	19.8	27.1	21.4
Czech Republic	GFCF in % of GDP	25.3	24.1	27.9	28.4	28.7	32.0	31.8	30.8	28.3	26.8
	share of manufacturing	.	.	26.7	27.2	27.5	21.8	20.1	22.2	20.4	.
Hungary	GFCF in % of GDP	19.3	20.9	19.9	18.9	20.1	20.0	21.4	22.2	23.6	23.8
	share of manufacturing	.	21.3	24.8	20.4	19.3	22.1	23.4	23.2	25.7	28.7
Poland	GFCF in % of GDP	21.0	19.5	16.8	15.9	16.2	18.6	20.7	23.5	25.1	25.5
	share of manufacturing	.	23.9	22.7	20.1	24.8	24.9	26.2	25.5	25.8	22.5
Romania	GFCF in % of GDP	19.8	14.4	19.2	17.9	20.3	21.4	23.0	21.2	19.4	18.5
	share of manufacturing	21.0	24.6	25.0	23.6	16.0	23.0	28.0	29.8	29.5	30.3
Slovak Republic	GFCF in % of GDP	31.3	28.3	32.9	32.7	28.3	26.4	34.2	35.9	38.0	30.8
	share of manufacturing	.	.	31.8	30.0	21.4	21.3	20.2	19.9	21.9	.
Slovenia	GFCF in % of GDP	18.8	20.6	18.6	18.8	20.1	21.4	22.6	23.5	24.6	26.9
	share of manufacturing [1)]	31.2	39.0	37.5	34.0	34.2	19.2	17.7	19.3	27.3	.
Estonia	GFCF in % of GDP	.	19.5	20.9	23.9	26.4	25.6	26.7	27.9	29.7	25.1
	share of manufacturing	.	.	.	22.2	20.9	19.9	19.9	18.4	22.1	.
Latvia	GFCF in % of GDP	23.0	6.2	11.2	13.8	15.8	15.1	18.1	18.7	27.3	25.0
	share of manufacturing [2)]	26.9	23.0	22.0	23.0	20.2	16.6	15.1	16.0	14.9	16.2
Lithuania	GFCF in % of GDP	.	.	.	.	23.1	23.0	23.0	24.4	24.3	22.5
	share of manufacturing	.	.	.	.	.	17.4	18.1	18.8	15.8	18.9

1) Data before the break refer to industry total (mining + manufacturing + electricity) according to the old classification. - 2) 1990-1994 at constant prices 1994, 1995-1999 at constant prices 1999.

Source: WIIW database incorporating national statistics; Statistical Yearbooks of the Baltic States.

Table 8

Gross investment in tangible goods,

average annual growth rates in %

		Czech Rep.	Hungary	Poland	Romania	Slovakia
NACE		1993-98	1995-98	1993-98	1993-98	1995-98
C+D+E	Industry total	5.8	10.9	13.8	0.9	14.7
D	Manufacturing total	6.7	14.4	21.8	7.7	17.2
DA	Food products; beverages and tobacco	1.8	-1.8	7.9	13.4	25.1
DB	Textiles and textile products	12.0	13.4	11.6	4.9	.
DC	Leather and leather products	-10.1	25.8	0.1	6.5	.
DD	Wood and wood products	18.3	24.3	38.6	20.0	.
DE	Pulp, paper & paper products; publishing & printing	10.2	14.0	24.5	34.1	.
DF	Coke, refined petroleum products & nuclear fuel	-11.0	3.3	29.4	7.2	82.4
DG	Chemicals, chemical products and man-made fibres	-3.6	17.5	20.2	-6.3	5.4
DH	Rubber and plastic products	9.3	41.3	28.7	1.3	.
DI	Other non-metallic mineral products	6.6	18.4	30.8	13.6	.
DJ	Basic metals and fabricated metal products	11.8	7.8	9.6	6.0	2.6
DK	Machinery and equipment n.e.c.	3.3	-3.4	13.0	-10.2	.
DL	Electrical and optical equipment	23.9	40.0	11.4	4.7	.
DM	Transport equipment	10.9	72.1	41.9	29.5	10.8
DN	Manufacturing n.e.c.	1.3	19.2	25.0	-3.2	.

Source: WIIW Databases.

Detailed data on investment by manufacturing industry branch are sporadic and only available for selected CEECs (Table 8). It is not surprising that the growth patterns by investment are broadly similar to those for productivity improvements (Table 2). There has been a very rapid increase in investment outlays in nearly all branches of Polish manufacturing (including mainstream sectors such as wood, coke and refined petroleum, rubber and other non-metallic minerals). Manufacturing investment in Hungary grew less rapidly (during 1995-1998), but branches such as rubber and plastics, electrical and optical equipment, and especially transport equipment, invested heavily during the second half of the 1990s.

There is broad agreement in the literature that FDI is playing an important role in restructuring and improving the competitiveness of manufacturing. A recent UNCTAD study has identified a strong relationship between inward FDI and manufactured exports performance for a number of both developed and developing countries.[25] The impact of FDI rises with the technology intensity of exports, especially in the case of developing countries: a 1% rise in FDI per capita leads to a 0.8% increase in high technology exports. In countries without strong national innovation systems and exports led by national enterprises (as is still the case in many CEECs), the question is how to cope with the pace of technical change and make inroads into markets held by more advanced countries (that is, to catch up). Moreover, when the evolution of dynamic comparative advantage is assisted by FDI there is a problem of sustainability and upgrading, especially as wages rise and cheaper competitors appear. Last but not least, the question of spill-overs between foreign-owned and domestic sectors has to be tackled in order to avoid that regionally isolated pockets of advancement develop while the rest of the economy falls behind.

Manufacturing industry has been an important target of FDI in most candidate countries, attracting nearly half of all inward FDI stock as of end-1999 (except for Estonia, Latvia and Lithuania; no data are available for Bulgaria and Romania; see Table 9). The sectoral distribution of FDI is highly uneven, reflecting not only the varying attractiveness of individual branches for foreign investors and their investment motives, but also the different privatization policies pursued by the individual candidate countries.[26] FDI inflows have been high in both domestically oriented food, beverages and tobacco industry (DA – especially in the Czech Republic, Hungary, Poland, Slovakia, Latvia and Lithuania) and other non-metallic minerals (DI), as well as in predominantly export-oriented branches such as electrical, optical (DL) and transport equipment (DM) industries. FDI penetration of the manufacturing industry (FDI stock per employee) is high in the Czech Republic, Hungary,

[25] See UN (1999), pp. 244-255.

[26] See Hunya (2000a).

Table 9

Foreign direct investment (FDI) stock in manufacturing industry, 1999

USD million

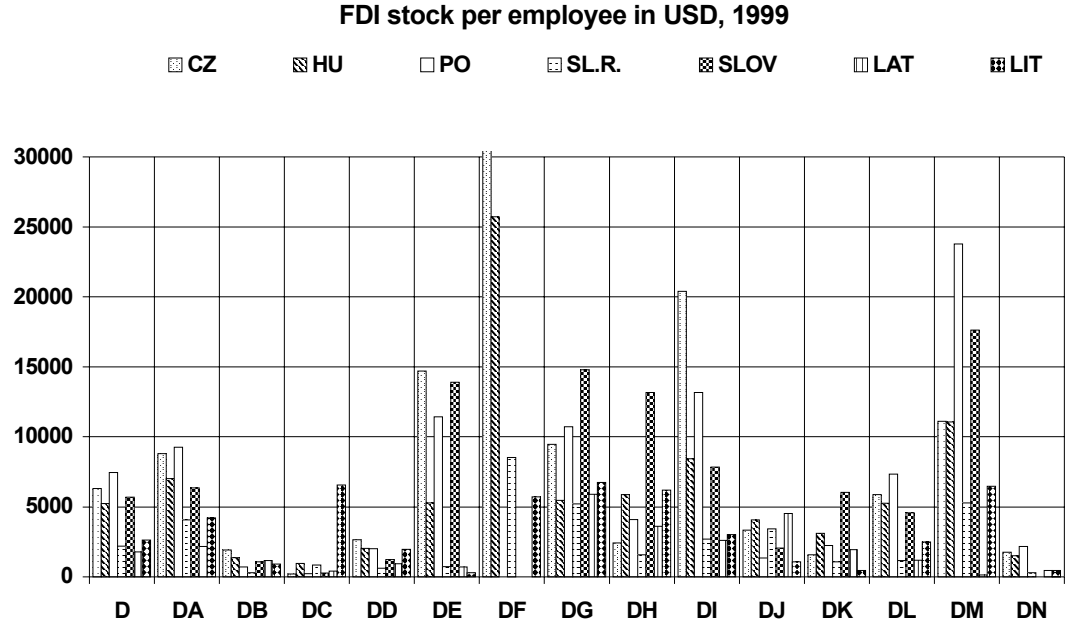
NACE	Activities	Czech Republic	Hungary	Poland	Slovak Republic	Slovenia	Estonia	Latvia	Lithuania
DA	Food products; beverages and tobacco	1125.6	910.5	4617.4	237.4	130.5	.	73.1	243.5
DB	Textiles and textile products	203.6	146.6	236.7	16.7	34.7	.	26.8	89.3
DC	Leather and leather products	4.1	23.0	10.9	14.6	2.0	.	0.7.	
DD	Wood and wood products	89.7	41.6	240.0	16.7	13.8	.	24.2	43.8
DE	Pulp, paper & paper products, publishing & printing	587.7	169.0	1383.8	18.5	195.0	.	6.6	3.6
DF	Coke, refined petroleum products & nuclear fuel	210.9	378.1	0.0	41.5	0.0	.	0.0	75.8
DG	Chemicals, chemical products and man-made fibres	398.0	203.2	1304.2	116.4	176.1	.	32.4	0.0
DH	Rubber and plastic products	104.2	176.8	451.3	24.3	143.6	.	5.6	24.2
DI	Other non-metallic mineral products	1467.8	263.8	2091.9	78.9	84.7	.	11.3	41.1
DJ	Basic metals and fabricated metal products	624.2	303.5	399.8	248.8	67.9	.	25.1	8.8
DK	Machinery and equipment n.e.c.	218.7	178.5	536.1	68.3	136.3	.	12.5	8.2
DL	Electrical and optical equipment	662.2	609.9	1269.5	63.2	115.0	.	5.4	56.0
DM	Transport equipment	989.5	440.5	4404.6	137.0	173.5	.	0.9	56.3
DN	Manufacturing n.e.c.	100.5	41.5	372.2	6.9	0.1	.	3.5	5.8
D	**Manufacturing**	**6786.7**	**3886.4**	**17318.4**	**1089.1**	**1273.2**	**556.4**	**228.3**	**656.3**
	FDI total	**17552.1**	**10393.4**	**38912.6**	**2199.1**	**2683.6**	**2441.4**	**1277.7**	**2063.0**

Remarks on manufacturing FDI coverage:
Czech Republic: equity capital, reinvested earnings, loans.
Hungary: nominal capital based on corporation-tax declarations.
Poland: equity capital, reinvested earnings gross; projects over USD 1 million capital based on PAIZ data.
Slovak Republic: equity capital, reinvested earnings - excluding banking sector.
Slovenia: equity capital, reinvested earnings, loans.
Estonia: equity capital, reinvested earnings, loans.
Latvia: equity capital of registered enterprises.
Lithuania: equity capital, reinvested earnings, loans.

Source: National banks and Foreign Investment Agencies.

Poland and – perhaps surprisingly – also in Slovenia. All candidate countries display similar patterns of an uneven distribution of FDI across branches (Figure 13).[27]

Figure 13



Note: See Annex for abbreviations of 2-digit NACE industries.

Source: WIIW Database.

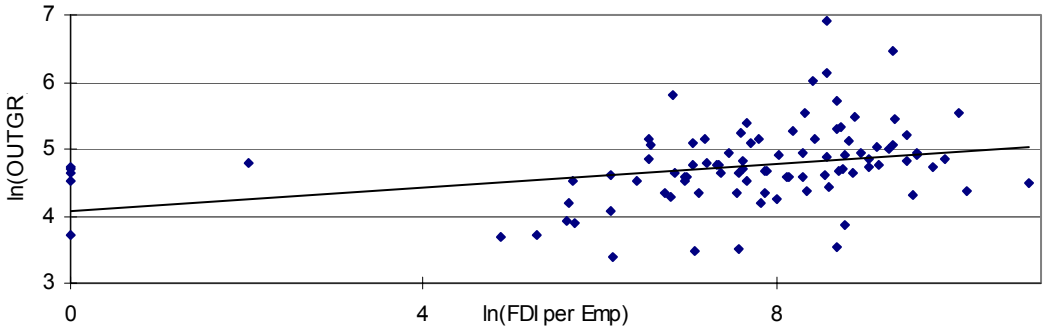
A number of recent studies have also analysed the impacts of FDI on CEE manufacturing. Barrel and Holland (2000) have found some evidence that FDI helps to speed up restructuring. Hunya (2000b) has demonstrated a clearly positive link between foreign penetration and various components of international competitiveness at both the aggregate and sectoral levels of manufacturing. We have investigated the branch-specific relationships between inward FDI stock per employee in 1999 (see Figure 13) and various performance indicators for selected candidate countries (one has to be aware of severe problems of FDI data comparability – see Table 9). After taking logarithms of individual variables and running simple log-linear regressions for a panel of seven candidate countries for which FDI data are available, we get statistically significant results suggesting a *positive impact of FDI branch penetration* on output, labour productivity and ULC improvements during the period 1993-1999 (with all parameters having the expected signs and being statistically significant). The best regression results were obtained for FDI penetration and improvements in labour productivity – see Box 3.

[27] Resmini (2000) analysed panel data for European FDI in CEECs and found sector-specific determinants of FDI already for the period 1991-1995.

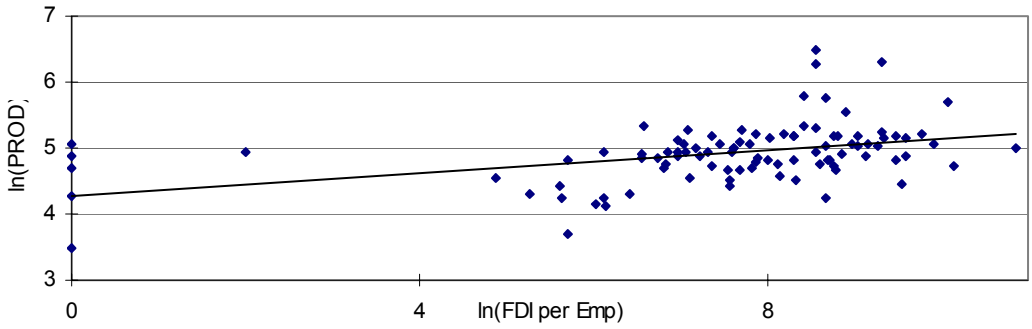
Box 3

Effects of FDI penetration on output, labour productivity and ULCs
Regression results

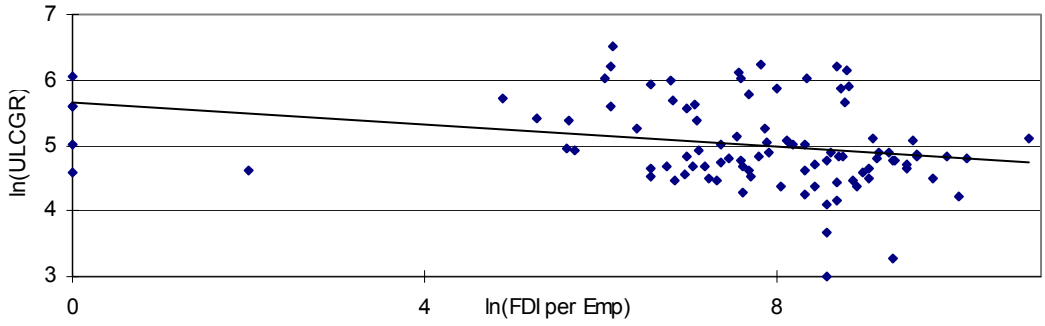
Model 1:
Output growth (1993-99) and FDI stock per employee (1999)
ln(OUTGR) = 4,083 + 0,087 * ln(FDI/Emp)
(0,219)*** (0,028)***
R2 = 0,301



Model 2:
Productivity growth (1993-99) and FDI stock per employee (1999)
ln(PROD) = 4,285 + 0,085 * ln(FDI/Emp)
(0,151)*** (0,019)***
R2 = 0,410



Model 3:
Unit Labour Cost (ULC) growth (1993-99) and FDI stock per employee (1999)
ln(ULCGR) = 5,670 - 0,087 * ln(FDI/Emp)
(0,237)*** (0,031)***
R2 = 0,281



Note: Standard errors in parentheses.
Source: Own calculations based on WIIW Industrial Database.

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ANNEX

2-digit NACE industries

(NACE – Nomenclature générale des activités économiques dans les communautés européennes, rev. 1):

D	Manufacturing total
DA	Food products; beverages and tobacco
DB	Textiles and textile products
DC	Leather and leather products
DD	Wood and wood products
DE	Pulp, paper & paper products; publishing & printing
DF	Coke, refined petroleum products & nuclear fuel
DG	Chemicals, chemical products and man-made fibres
DH	Rubber and plastic products
DI	Other non-metallic mineral products
DJ	Basic metals and fabricated metal products
DK	Machinery and equipment n.e.c.
DL	Electrical and optical equipment
DM	Transport equipment
DN	Manufacturing n.e.c.

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