

Productivity Gap and Restructuring
Mapping the Technology Structure of Branch Plants and Technology Integration
of CEECs

by

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Introduction

The project analyses determinants of productivity gaps between the average productivity levels of the EU-15 and a selection of most advanced Central East European Economies (such as Czech and Slovak Republic, Estonia, Hungary, Poland and Slovenia).

The *objective* is the generation of a unique knowledge base on the various determinants of lower levels of economic development in accession countries. Determinants assessed comprise of three groups: patterns of domestic and international specialisation at the macro-level, technological sophistication of production at a mezzo level, and firm-specific determinants at the micro-level of individual enterprises field work. This newly generated body of comparative knowledge will be compiled with a view on an effective management of the accession process, and strategies. (See Stephan, 2003, on the project homepage)

The project will assess the weight and role played by a variety of determinants of the productivity gap between selected accession countries and the EU. It is based on the following assumptions:

- Technological catch-up in general and sizeable potentials for a closure of the gap in levels of productivity between the average of the EU and individual CEECs (the 'productivity gap') in particular are the main conditions for further integration and intensified competition to lead up to a dynamic process of catch-up development.
- The ten year integration process until today significantly determined the conditions of, or future prospects for catch-up development in accession countries: emerging structures give rise to effects via a tendency of self-reinforcement of conditions and determinants resulted by investment into physical and human capital.

- Structures in branch specialisation and foreign trade, as well as FDI and R&D regimes, as they emerged during the integration process until today, not only help to explain contemporary productivity levels. More importantly, existing patterns are a reflection of past investment projects and established technological capabilities: it is therefore safe to assume that future investment and business decisions will in some proximity adhere to existing structures. This assumption is obviously targeted at economies where the period of most intense structural change as adjustment to integration is over. This can be assumed for our selections of countries.
- Technology change in CEE might not be a sufficient self-governing process. In particular, the transfer of technology from West to East is restricted by absorptive capacities; indigenous R&D is restricted by intensifying competition, by the size of home markets, and by the structural composition of industries.

The *method* of construction and integration of new sets of data and indicators of comparative nature at the wider European level comprises of field studies, including questionnaires, a matched pair panel and structured interviews, quantitative empirical analysis and literature assessment. Interpretation and analysis of data is assisted by the usual empirical and econometric methods, including partial equilibrium models, data envelopment analysis, regression models, and average and variance analysis.

Expected results: The unique sets of data to be generated in this project will enable us not only to understand much better the relevant factors which generate and which may reduce productivity gaps between individual CEECs and the EU, but also the restricting factors for a complete closure of the gap.

This will allow us to develop new approaches to enlargement policies that will take into account the need to address the individual sources of productivity gaps next to the institutional integration *per se*.

This paper summarises research results of WP4 subproject: *Mapping the Technology Structure of Branch Plants and Technology Integration of CEECs*. Each of the five country studies presented an overview (I. part) about economic development, changing conditions for, and results of FDI as a mechanism of productivity growth in Estonia, Poland, Slovakia, Slovenia, and in Hungary at a comparative way. The second part presents the descriptive analyses of the answers of FIEs (subsidiaries of foreign firms) on a two-page structured questionnaire and first results of regression analysis to determine which factors are significant overall these subsidiaries in the five countries. Three team members (Slavo Radosevic, Boris Majcen and Matija

Rojec) already edited a paper (www.iwh-halle.de/projects/productivity-gap.htm) summarising descriptive results of comparative analysis, with the aim to find similarities among the sample firms. Here, *we will focus on differences rather than similarities by summarising the main features of economic development and changing conditions, and of FDI-inflows by countries* (I. part). The second part, based on fieldwork results, generating a large database on altogether of 458 foreign subsidiaries, will summarize the determinants of *subsidiary's autonomy*, the role of parent firm *in different business functions, market-orientation, and structural differences*. We focus on *the links to the magnitude of changes*, what role the FDI had in *productivity growth, sales-, exports-, technology, and quality improvement* by structural differences in each country to understand the different results and prospects.

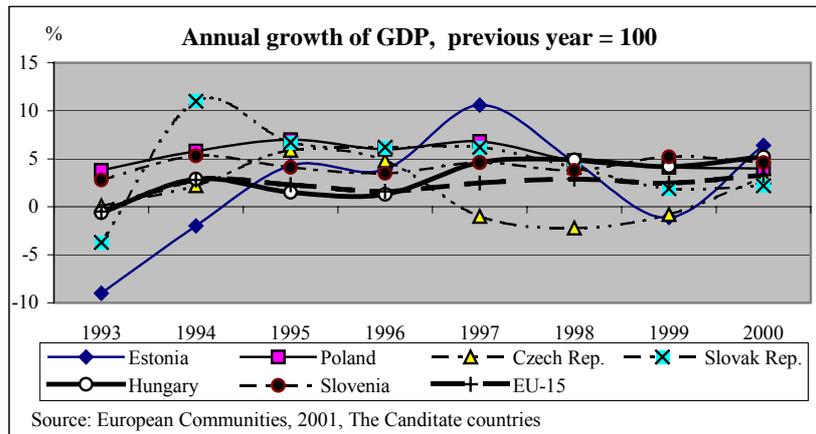
I. Country overview of inward FDI as a mechanism of productivity growth

I.1. Economic development, productivity, and restructuring

The next chart illustrates the economic development in six accession countries. (We have comparable data only since 2003, because of the disintegration of Czechoslovakia, and of timing data harmonisation.) It is

visible, that the economic development in the six countries was quite different in time according to the deepness of transitional crises and time-intensity of recovery from it.

Chart 1.

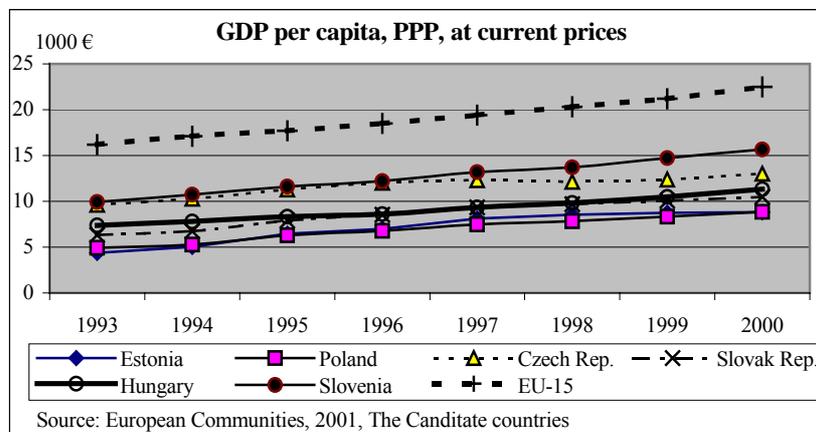


The Estonian and Slovakian economy grew at the fastest rate in the average of seven years, but from the worst starting level. The Hungarian GDP grew at the same dynamic as the EU average up to 1996, while since then it has accelerated and over passed the average rate of the EU-15. The Czech economy followed an opposite trend: its higher rate of

growth of first part in 90s has been replaced by a strong decline since 1996.

The main aim (and hope) of the newly accessing countries is to speed up their income convergence by the EU integration. The *relative level of standard of living* (GDP per capita) already increased in each of these countries in the pre-accession period.

Chart 2.



In spite of the fact, that the accession countries in Central East Europe could narrow the gap to the EU-15, they still exhibit significantly lower levels of economic development in comparison to the average of contemporary EU member states. "Even the most advanced transition economies barely reach the level of *per capita income* of Greece, only Slovenia already compares with Portugal." (Stephan, 2003.)

Past development of per capita income level, however, was 'helped' almost in all countries by a decrease in population (except Slovakia), and the speed of convergence slowed down in the second part of last decade almost in all countries (except Hungary and Slovenia). The improving trend even turned back in the Czech and Slovak Republic (since 1996-1997), in Estonia, in 1999-2000.

Table 1. Development of GDP per capita in selected CEECs in comparison to average EU-15, 1993-2000

EU-15 = 100	1993	1994	1995	1996	1997	1998	1999	2000
Estonia	27.0	29.6	36.6	37.9	41.8	42.0	41.3	39.0
Poland	30.4	31.0	35.6	36.6	38.5	38.6	39.3	39.4
Slovak Republic	39.0	39.6	44.8	46.1	48.0	47.8	47.6	46.8
Hungary	45.5	45.7	47.1	46.5	48.0	48.4	49.5	50.4
Czech Republic	59.2	60.2	63.8	64.9	63.2	59.9	58.4	57.9
Slovenia	61.2	62.8	65.6	65.9	67.9	67.6	69.4	69.8

Note: in % of average EU-15, PPP-corrected market exchange rates. Peak of convergence is in bold letter.

Source: EUROSTAT (CRONOS), WIIW database, National Statistical Offices of EU accession states and EU member states, J. Stephan's calculations. www.iwh-halle.de/projects/productivity-gap.htm

Table 2 illustrates the growth of *labour productivity* by countries. The fastest increase can be registered in Estonia, where the starting level was the lowest, and, since 1997, it has surpassed the Polish level.

Labour productivity in Slovakia also converged fast to the Hungarian and Czech level. Slovenia had the highest starting level, and increased it further continuously.

Table 2. National labour productivity levels in 1000 EUR per employee, PPP

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2001/1993
	In 1000 €									%
Estonia	8.5	9.5	12.9	14.3	16.1	17.3	19.7	22.1	24.1	284.4
Poland	12.2	12.6	14.0	14.7	15.8	16.6	17.7	19.7	21.2	173.6
Slovak Republic	15.2	15.7	18.2	18.9	21.0	21.5	23.6	24.9	26.1	171.2
Hungary	17.5	19.1	20.3	21.1	23.0	23.6	24.4	26.0	27.5	156.7
Czech Republic	19.1	19.9	21.7	22.7	23.9	24.0	25.1	26.7	27.8	145.5
Slovenia	21.2	22.6	24.1	25.7	28.4	29.3	30.5	32.3	34.3	161.9

Note: Sum of VA in all sectors (without taxes, subsidies and FISIM) per total employment (not accounted for intensity of use).

Source: the same as in the previous table.

One of the important factors of labour productivity increase was the fall of *employment rate* to the whole population in the second part of last decade with the exception of Hungary. In spite of the

shrinking population and slightly increasing employment level, however, the employment rate was the lowest in Hungary even at the end of last decade.

Each of the accession countries could narrow the gap to the EU-15, but in the second part of last decade, this development was "helped" by the fact, that *labour productivity* improvement in the EU slowed down. (The relative level of the EU average to the American one, if this latter is taken 100%, felt from 79,5% to 73 between 1995-2001.)

Table 3. National labour productivity level of selected CEECs in % of average EU

In percentage of EU-15	1995	1999	2000	2001
Estonia	31.7	47.0	52.0	54.5
Poland	34.3	42.3	46.3	48.0
Slovak Republic	44.6	56.3	58.6	58.8
Hungary	49.7	58.2	61.1	62.1
Czech Republic	53.2	59.8	62.7	62.8
Slovenia	59.1	72.9	76.9	77.3
EU-15 in % of USA level	79.5	n.d.	73.5	73.0

Note and source: the same as in the previous table and OECD, 2001.

By 2000, the national labour productivity in each sample country surpassed the lowest Portugal level, each of them (except Poland) had higher level than half of the EU-average, and the Slovenian productivity reached the Spanish level of 75%.

Industrial productivity level demonstrates a much higher gap to the EU-average (Table 4.) than the national productivity level. In general, CEEC's industries today still exhibit

sizeable gaps in industrial labour productivities, achieving no more than 35-60% of the average EU-15 level. Productivity growth in CEECs by far outpaced that of the average EU-15, but even those above-average rates would be associated with still several decades for productivity convergence. (For how long, see J. Stephan's paper, 2003.)

Table 4. Levels and growth of industrial labour productivity in selected countries
in PPP €, in % of EU-15, and in average GDP-deflated growth rates per anno, in %

	1993	2000	1993	2000	1996/1993	2000/1996	2000/1993
	GVA/employment, €		EU-15 = 100%		Annual rate of growth, %		
Estonia	7 500	17 700	16.5	34.2	-3.7	12.3	5.2
Slovak Republic	11 700	22 700	25.8	43.9	15.4	2.7	7.3
Poland	13 300	23 000	29.3	44.5	4.0	7.3	5.8
Czech Republic	15 800	26 500	34.8	51.3	9.2	2.0	4.9
Hungary	15 800	26 700	34.8	51.6	6.4	4.9	5.4
Slovenia	17 100	30 300	37.7	58.6	6.6	6.5	6.4
EU-15	45 400	51 700	100.0	100.0	2.5	1.4	1.9

Note: PPP, €, sum of VA in all sectors (without taxes, subsidies and FISIM) per total employment (not accounted for intensity of use) = 100.

Sources: EUROSTAT, OECD, WIIW, National Statistical Offices, Johannes Stephan's calculations.

The differences between national and industrial productivity levels are associated with fast *restructuring* in all countries. According to the *employment distribution by economic sectors* (Table 5.), the share of

agriculture felt fast (except Poland), industry also, but at a smaller rate (except Estonia), and service sectors grew rapidly in all sample countries. *Manufacturing* could keep their weight in Hungary and increased in Estonia.

The most industrialized country is still the Czech Republic, and next, Slovenia. The largest its share, however, the highest is the fall: from 37% to 29% in Slovenia, from 31% to 30% in Czech Republic, from 27% to 26% in Slovakia. Poland remained the less industrialised country, where manufacturing still shrunk further from 20% to 17.6%. Hun-

gary had the largest *service sector* already in 1993 (57%), and services had reached almost 60% by 2000, as Estonia (with 59% of all employees). In the Czech, Slovakian, and Slovenian economy, more than half (54-55-56%) of the employees worked in service sectors in 2000.

Table 5. Structural changes of employment by sectors and countries

Employment distribution in %	Estonia		Poland		Czech Republic		Slovakia		Hungary		Slovenia	
	1993	2000	1993	2000	1993	1999	1993	2000	1993	2000	1993	2000
A+B	16.6	7.4	26.7	28.5	6.9	5.1	10.6	6.7	9.1	6.5	7.6	5.7
C+D+E	25.6	26.5	24.7	20.7	35.3	33.0	30.7	29.3	28.4	26.8	39.3	31.6
Out of it: D	21.4	22.6	20.2	17.6	31.2	30.0	26.8	25.7	24.5	24.2	36.6	29.4
F	7.4	7.0	6.0	5.4	9.3	7.7	8.9	8.0	5.4	7.0	5.4	7.9
Services (G-O)	50.8	59.1	42.7	45.5	48.5	54.1	49.8	55.9	57.1	59.7	47.7	54.9
Total (A-O)	100	100	100	100	100	100	100	100	100	100	100	100

Note: A+B=agriculture, fishing; C+D+E industries, F=construction, G-O=services; the author's calculation.

Economic restructuring by *gross value added* (GVA) by sectors reveals some differences.

Table 6. Structural changes of Gross Value Added by sectors and countries

Distribution of GVA In % of total	Estonia		Poland		Czech Republic		Slovakia		Hungary		Slovenia	
	1993	1999	1993	2000	1993	1999	1993	2000	1993	1999	1993	2000
A+B	11.0	6.7	7.0	3.8	5.2	3.9	4.9	4.5	6.7	4.9	5.1	3.2
C+D+E	24.5	21.1	30.1	26.6	32.5	31.8	32.0	28.9	26.6	27.7	33.4	31.4
Out of industry: D	19.0	16.5	22.0	20.6	25.8	26.3	20.6	24.0	22.0	23.5	29.5	27.2
F	6.6	6.0	8.9	8.3	7.1	7.4	4.9	5.2	5.3	4.7	4.7	6.0
Services (F-O)	57.9	66.2	54.0	61.3	55.2	56.8	58.2	61.3	61.4	62.8	56.8	59.3
Total (A-O)	100	100	100	100	100	100	100	100	100	100	100	100

Note: PPP, €, sum of VA in all sectors (without taxes, subsidies and FISIM) per total employment (not accounted for intensity of use) = 100.

Source is the same as at table 4.

By gross value added, agriculture felt fast everywhere, even in Poland, also industry, except in Hungary, where manufacturing contributed to the GVA by 22% in 1993, and by 23.5% in 2000. Manufacturing grew also in the Czech Republic, but the highest increase happened in Slovakia (from 21% to 24%). Service sectors reached the highest share in Estonia (66%), in Hungary (63%),

but grew at the fastest rate in Poland (from 54% to 61%).

A detailed analysis of productivity-gap by sectors in the selected CEECs, J. Stephan's calculation proved that structural differences (by employment) from the EU average explained 28% of the productivity gap in the case of Slovakia, 20% in Hungary, Poland, and Slovenia. This effect can hardly be found in Estonia and in the Czech Republic.

Table 7. Percentage share of sectors in the productivity gap to the EU-15 average

1999	Estonia	Poland	Czech Republic	Slovakia	Hungary	Slovenia
A+B	8.2	40.6	2.0	8.4	4.7	1.9
C+D+E	31.9	23.5	39.2	38.1	34.5	51.5
F	7.3	3.0	6.3	10.1	7.1	7.4
G+H+I	19.7	12.2	20.3	14.4	20.6	20.1
J+K	7.0	5.8	11.5	0.0	1.0	6.4
L-O	25.9	14.8	20.7	29.2	32.1	12.7

Note: sectoral productivity differences by employment shares in the total productivity gap. G+H+I = services to households, J+K = business services, L-O other non-profit public services

Source: J. Stephan (2001)

In all countries, the structural effects in productivity gap decreased, but remained large enough to maintain the problem, that these countries need long time to catch up with the EU average. Further restructuring and productivity improvement are needed in

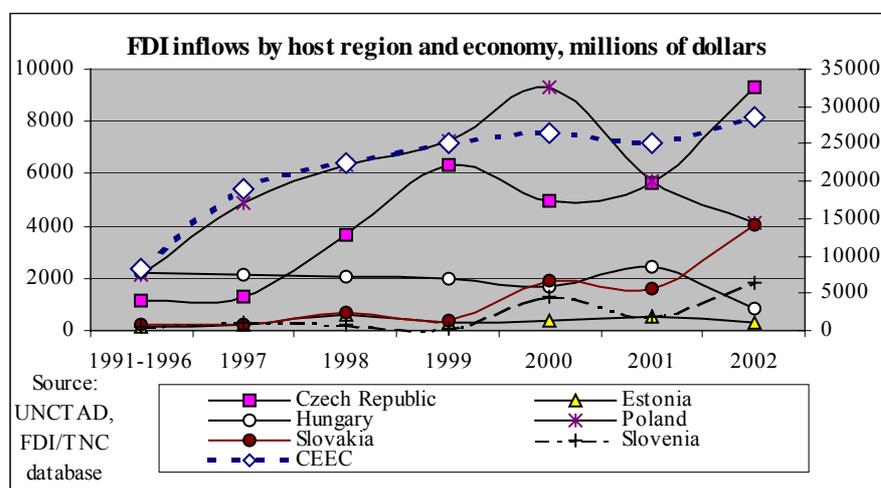
industry (C+D+E) of each sample country to close the productivity gap to the EU, but in the case of Hungary, Slovakia, and Estonia, efficiency improvement of the public sectors (L-O) will be inevitable, too, to speed up the convergence. (Stephan, 2001)

I.2. The role of FDI and Industrial structure by technology content

Foreign direct investment helped the fast restructuring and economic development in

all CEECs, but the Chart 3 illustrates large differences among them in time.

Chart 3.



Hungary attracted first a large amount of FDI, and could keep a stable amount (of two billion USD) of inward FDI-inflows every year in the whole decade, up to 2002. *Poland* as the largest economy attracted the largest and fast increasing FDI up to 2000, but a severe fall has followed it since then. As the

real privatisation-process started later, FDI-inflow in the *Czech Republic* had started to increase year-by-year only since 1997, and still grew fast in 2001-2002, as in *Slovakia* and *Slovenia* since 1999.

The FDI stock to GDP reached the highest rate in Estonia, second in the Czech

Republic. Even Slovakia has a higher rank now, than Hungary, which was the only country of the sample, where FDI/GDP ratio felt seriously in 2002. The cumulated stock

of FDI in Poland remained relatively (after Slovenia) the lowest, compared to the total GDP. (Table 8.)

Table 8. Catching up – inward FDI stock as a percentage of GDP
in selected CEECs, 1995-2002

Percentage	1995	2000	2001	2002
Estonia	14.4	51.5	57.2	65.9
Czech Republic	14.1	42.1	47.4	54.8
Slovakia	4.4	23.6	30.4	43.2
Hungary	26.7	42.5	45.4	38.2
Poland	6.2	21.7	22.4	23.9
Slovenia	9.4	15.5	16.4	23.1

Source: UNCTAD, FDI/TNC database (WIR, 2003)

Sample countries are actually at a rather different stage concerning the importance of FDI in their economy. (Sources of the data below are the country studies.)

- FIEs (subsidiaries of foreign firms) in *Slovenia*, still in 2001, accounted only for 15% of total assets and 12% of employees of the Slovenian non-financial corporate sector. They realized 20% of sales, 22% of operating profit, and 31% of total exports. In manufacturing, the number of FIEs to all firms reached less than 5%, but FIEs employed 17% of manufacturing labour-force, had 22% of fixed assets, and produced 26% of sales, and 34% in exports.
- *Poland* took a medium stage: the number of FIEs in the whole economy grew fast between 1993-2001 (from 15814 to 44477), employing 310 thousand persons in 1993, and almost one million (966 thousand) in 2001 (8.4% of total employment, except agriculture). FIEs share in exports grew from 16% to 53%, and reached 61% in total imports by 2001. Output share of the FIEs increased from 12.4% (1994) to 34%, and in investment from 3.3% to 30.4%.
- *Hungary* has a different position: the number of FIEs in total economy grew

from 12363 (1992) to 20943 (2000)¹, but relative to the all firms, it has not increased any more, since 1996. FIEs owned 45% of assets, invested 62% of investment, realised 47% of sales, and 71% of exports (of double accounting firms), and employed 29% of all employment, already in 1996. Between 1996-2000, FIEs increased their share further in total assets to 64%, in sales to 54%, and in exports to 83% (of double accounting firms, and 77% of total exports). They employed one-third of all employees (32%) and paid 47% of wages and salaries. 2000 was the first year, when indigenous firms invested relatively more than the FIEs (the investment share of FIEs felt from 71% of the previous year to 61%).

- In *Estonia*, FDI, also, played a very important role in economic restructuring and creating good starting base for the convergence toward the EU. The number of FIEs² was 3066 at the end of last decade. FDI to the gross fixed capital formation accelerated in the second part of last decade: from 24% (as annual average be-

¹ Double accounting firms, the total number of all FIEs was 26645 (HSO)

² In Estonia, only the majority foreign owned firms, with more than 20 employees are registered as FIEs.

tween 1991-1996) to 31% (in 1997-2001). In 2002, however, FDI inflow relative to the GFCF fell to 17%, as in Poland (see table 9. below) (and certainly in Hungary, but we have no data yet for it).

- FDI importance in respect to gross fixed capital formation has accelerated in each sample country in the second part of last decade, except Hungary, where it was the highest in the first part of last decade.

Table 9. Inward FDI flows as a percentage of gross fixed capital formation

GFCF = 100	1991-1996	1997-2001	2002
	Annual average, %		%
Hungary	26.8	18.3	..
Estonia	23.9	30.5	16.8
Poland	10.1	17.4	11.4
Czech Republic	9.6	28.3	59.1
Slovakia	4.4	15.2	56.9
Slovenia	4.0	5.6	37.1
CEEC	5.8	14.9	17.2

Source: UNCTAD, FDI/TNC database (WIR, 2003)

The distribution of FDI by the main economic activities also differed by countries.

Manufacturing and trade were the focus of foreign investors at the early stage of FDI-inflows in Hungary and in Estonia (as now in Slovakia, and Slovenia). Timing of large privatisation also influenced much the structure of FDI inflows by years.

- In *Hungary*, FDI ratio to the assets by sectors reached 21% in manufacturing (D), and 15% in trade (G) already in 1992, and had increased fast (to 51% and 36%, respectively) by 1996. Since then its dynamics had slowed down: FDI/assets ratio grew only to 58% in manufacturing, and to 56% in trade, while business services and especially financial activities had become the most attractive sectors for FDI by 2000. FDI ratio to the assets grew from 21% to 58% in business services (K), and from 44% to 89% (!) in financial intermediates (J) between 1996-2000.

- Changing FDI distribution by sectors showed a similar trend in *Estonia*, as in *Hungary*. During the first years of transition, the structure of inward FDI was rather stable. *Manufacturing* industry was the major recipient followed by the *wholesale and retail sales sectors*. These two sectors of economy covered nearly 70% of the FDI inflow in 1994-1995. Since 1996, the importance of manufacturing industry as the target of FDI has decreased and *financial sector* together with *transportation and communication industries* became more attractive to foreign investors. Changes in the structure of FDI inflows are reflecting the dynamics of privatisation programme of the Estonian government. After 1996, there were no large privatisation projects in industry, while some infrastructure and transport enterprises attracted large investment, as two leading commercial banks (involving Swedish and Finish investments in 1998 and 2002).

Table 10 illustrates the structure of FDI stock by economic sectors in the sample countries.

Table 10. Stock of FDI by activities

	Activity, sector	Estonia 2002	Hungary 2000	Slovakia 2002	Slovenia 2001	Poland* 1998
A+B	Agriculture, hunting, fishing	0.6	0.6	0		
C	Mining	0.3	0.3	0.7		69.6
D	Manufacturing	18.7	19.0	41.7	38.5	
E	Electricity, gas and water supply	2.5	5.0	0.2		5.3
F	Construction	2.4	0.6	0.6		
G	Wholesale, retail trade	13.4	8.6	12.9	13.9	
H	Hotels, restaurants	1.3	1.0	0.6		
I	Transport, storage, communication	22.6	4.2	13.2		
J	Finance	27.4	36.6	26.5	27.8	17.6
K	Real estate, renting and business activities	9.6	23.5	3.2	11.1	
L-O	Non-profit public services	1.1	0.6	0.3		
	Total	100	100	100	100	100

Note: For Poland, the source is the Polish Agency for Foreign Investment, trade includes real estate also, services attracted 25% of FDI in 1998, but it included construction, too.

Source: the country studies under the project

Table 11. FIEs share in manufacturing, 2000

FIE to the all manufacturing firms, %	Hungary	Estonia	Slovenia*	Poland*
Number of firms	17.1	9.8	4.8	1.2
Fixed assets	75.6	37.2	21.8	13.4
Sales	73.7	34.3	26.2	21.1
Exports	88.5	44.9	33.8	50.9
Employment	49.3	27.3	16.5	21.0

Notes: * 2001.

Sources: Country studies.

The growing FDI helped the *productivity improvement in manufacturing* industry of each sample country as the differences of the main economic indicators between foreign (FIE) and domestic (DE) firm groups prove it. Performance gap between the two groups

had narrowed somewhat by the end of the decade, but it remained large enough proving the advantageous positions of FIE group. The largest performance differences, however, still exists in the Hungarian manufacturing, while the smallest featured Slovenia.

Table 12. Performance differences between the foreign (FIE) and domestic firms (DE)

FIES in % of the DEs, 2000	Hungary	Estonia	Slovenia*
Sales per employees	2.9	1.3	
Value Added per employees	4.0	1.5	1.2
Wages	1.6	1.3	
Capital/labour ratios	3.2	1.7	1.5
Exports/sales ratios	2.8	2.2	1.4

Note and sources: the same as at the previous tables

- In *Estonia*, foreign penetration in manufacturing industry as a whole was featured by 10% of FIEs to all (by number of firms), 49% in fixed assets, 27% in employment, 34% in sales, and 45% in

exports in 2000. The difference in productivity between the FIE and DE groups *by net sales per employee* was almost two times (1.85) in 1996, but had reduced to 1.26 times by 2000. Domestic enterprises

were able more than double (2.07 times) their productivity, while productivity in FIEs grew only 1.41 times. Using *value added per employee*, results show an opposite trend: in 1996, the difference was 1.41 times higher in favour of FIEs, and 1.45 times in 2000. FIEs' productivity grew faster than that of the DE group average. The ratio of wage levels also increased a little (FIEs paid 1.27 times higher wages in 1996, than DEs, and 1.28 times higher in 2000). Convergence can be registered in unit labour cost (from 0.69 to 0.92), and in capital/labour ratio (from 3.39 to 1.65), while difference in export-orientation was still high (in FIEs 2.33 times higher in 1996, and 2.17 times higher in 2000).

- In *Hungary*, there are some similarities with the Estonian trend, as DE group could increase their profitability more than the FIEs between 1996-2000 (the growth of profit after taxation in DE group was 5 times, while in FIEs just 2.4). *Productivity* differences between the two groups were higher and increasing by *net sales per employee* (2.6 times in 1996, and 2.9 times in 2000), while according to the ratio of *value added per employee*, it decreased from 5.9 times to 4 times. Difference in wage levels was also higher, than in Estonia, but it converged somewhat in time from 1.8 to 1.6. Similar trend was found in capital/labour ratio: it decreased from 3.9 to 3.2, while the export ratio (export per employee) was high and increased further (from 5.5 to 7.9 times).
- Differences between the FIEs and DEs groups were the lowest in *Slovenia*: ratio of value added productivity in manufacturing was only 1.2 in 2001. The ratio of assets per employee was 1.5, while difference in export-orientation (export/sales) was only 1.44. (FIEs exported 72 %, and DEs 50% of their sales. Comparing to the Hungarian rates, where FIEs exported 60% of their sales, and domestic

firms only 22% in 2000, it is clear, that both FIEs and DEs were much more export-oriented in the Slovenian manufacturing industry than in Hungary.).

- In *Poland*: the overall productivity (revenue per employee) in the economy grew faster, than in the FIEs groups (annual average growth rate between 1996-2000 was 124,5 in total, and 123.1% in the FIEs group). The ratio of productivity differences between FIEs and DEs increased up to 1996, but since then domestic firms narrowed the gap: FIEs ratio against DEs decreased from two-times to 1.5 times. Export-orientation of FIEs was also (2.6 times) higher than that of the DEs, in 2000.
- For *Slovakia*, the country study reports only statistical office data for FDI share to total investment in industrial production, which was 22.2% in 2001. Estimation on productivity differences and export shares of FIEs based on the sample results: FIEs share in exports decreased from 37% (1994) to 31% (2000), and increased only in 2001 (to 36%). Productivity gap (by employment) was estimated 2.9 times higher in favour of the FIE group, and by value added per employee the rate was only 1.6 times in FIEs compared to the whole industry. According to the value added to sales (profitability) index, the FIEs had lower than average results (0.8).

Productivity differences and development depend much on structural changes inside the manufacturing industries: as the prospect of the catch up of individual accession countries is also determined by the shift from declining activities (firms) to dynamic ones (from low value added activities to high value added industries). Analysing path specialisation and changing industrial structure by technology intensity revealed that *each of the sample countries attracted FDI first in labour-intensive low-technology production. A shift toward the more sophisticated activities could be registered in all sample countries,*

and it was led mainly by the FIEs, while DEs remained more traditionally specialised. In spite of the progress, however, even in the most advanced countries, the FIEs group itself is still dominated by the less (low- and medium low) technology intensive industries (at least, according to the number of firms and employees). (See next tables).

Table 13/a. Structure of FIEs according to technological level of manufacturing industries based on the use of technology (OECD and WIIW classification)

	Estonia, 2000 WIIW	Hungary 2000 OECD	Poland 2001 WIIW	Slovakia 2001 WIIW	Slovenia 2001 OECD
Distribution of number of all FIEs in manufacturing					
High technology production		8.6			14.6
Medium-high technology production	13.9	19.8	27.6	30.2	23.8
Medium-low technology production	21.0	25.8	30.0	32.6	33.1
Low technology production	65.1	45.8	42.5	37.2	28.5
Total D (no of FIEs)	100 (402)	100 (3743)	100 (4417)	100 (258)	100 (302)
Distribution of FIEs by fixed assets					
High technology production		14.8			12.3
Medium-high technology production	12.1	34.7	37.7	21.4	35.5
Medium-low technology production	30.1	29.4	25.4	55.3	25.2
Low technology production	57.7	21.0	36.9	23.3	27.0
Total D (fixed assets of FIEs)	100	100	100	100	100
Distribution of FIEs by sales					
High technology production		20.3			8.6
Medium-high technology production	18.5	35.0	34.3		50.4
Medium-low technology production	22.5	23.2	16.4		21.0
Low technology production	59.0	21.6	49.2		20.0
Total D (sales of FIEs)	100	100	100		100
Distribution of FIEs by exports					
High technology production		26.4			8.3
Medium-high technology production	24.4	47.9	53.3		55.5
Medium-low technology production	20.5	13.5	16.2		21.5
Low technology production	55.1	12.2	30.5		14.6
Total D (exports of FIEs)	100	100	100		100
Distribution of FIEs by employment					
High technology production		15.8			10.9
Medium-high technology production	25.4	29.5	42.6		37.6
Medium-low technology production	13.8	21.2	20.8		26.3
Low technology production	60.7	33.4	42.6		25.1
Total D (employment of FIEs)	100	100	100		100

Sources: for Hungary and Slovenia are the tax reports of double-entry accounting firms. For Slovakia: it is an estimation based on the sample firms, except the distribution of fixed assets of FIEs, for what the source was the Statistical Office. (See the country reports.)

The OECD classification of manufacturing industries includes four groups: *High technology industries*: Aircraft and Spacecraft (3530); Pharmaceuticals (2423); Office, Accounting and Computing machinery (30); Radio, television and communication equipment (32); medical, precision and optical instruments (33). *Medium-high technology industries*: Electrical machinery and apparatus (31); Motor vehicles, trailers and semi-trailers (34); Chemicals excluding pharmaceuticals (24 excl. 2423); Railroad equipment and transport equipment (352+359); Machinery and equipment (29). *Medium-low technology industries*: Coke, refined petroleum products and nuclear fuel (23); Rubber and plastic products (25); Other non-metallic mineral products (26); Basic metals (27); Fabricated metal products, except machinery and equipment (28); Building and repairing of ships and boats (351). *Low technology industries*: Food products, beverages and tobacco (15+16); textiles, textile products, leather, and footwear (17+18+19); Wood, pulp, paper, paper products, printing and publishing (20+21+22); Manufacturing n. e. c., and recycling (36+37).

The WIIW classification cannot separate the high and the medium high technology industries (the Aircraft and Spacecraft, Pharmaceuticals, and building and repairing of ships and boats and the different engineering sub-sectors).

Table 13/b. demonstrates clearly, how important role FDI had in upgrading the technological structure: *the more sophisticated the activities, the higher is the share of FIEs, especially in exports, sales and capital endowment.* This is the most explicit for *Hungary*, where FDI arrived at the earliest time. For *Slovakia*, the country study reports only statistical office data for FDI share to total investment in industrial production, but on the bases of estimation the author stated, that "Despite the fact, that FDI influenced the value added improvement and technological upgrading, value added per

employee was only slightly more positive in the FIEs group than the economic average. The low ratio of value added of sales, and thus also low economic efficiency demonstrate that the main orientation of foreign investors in an early stage of development is focused on the most important comparative advantage of Slovakia – cheap, technically educated and skilled labour force. This tendency is continuing, and only in some branches, sophistication of production is mildly increasing." (*Sabol* – at all, 2003.)

Table 13/b. The importance of FIEs by technological level
(OECD and WIIW classification)*

Manufacturing	All FIEs in % of ALL FIRMS				
	No. of firms	Fixed assets	Sales	Exports	Employment
Hungary, 2000, NACE Rev. 1 OECD					
High technology industries	18.4	81.1	89.9	96.8	69.7
Medium-high tech. industries	20.8	86.6	83.7	93.1	60.9
Medium-low tech. industries	18.0	77.6	70.3	78.1	47.1
Low technology industries	15.2	58.5	56.2	71.6	38.6
Total D	17.1	75.6	73.7	88.5	49.3
Slovenia, 2001, NACE Rev. 1 OECD					
High technology industries		22.5	21.4	23.7	19.1
Medium-high tech. industries		31.5	44.2	49.1	25.3
Medium-low tech. industries		20.2	23.5	30.4	18.0
Low technology industries		16.1	14.4	19.1	9.9
Total D	4.8	21.8	26.2	33.8	16.5
Estonia, 2000, WIIW					
High technology industries	13.9	33.8	43.0	56.1	41.3
Medium-high tech. industries					
Medium-low tech. industries	10.6	54.1	35.7	44.2	22.6
Low technology industries	8.6	32.5	31.8	41.4	24.9
Total D	9.8	37.2	34.3	44.9	27.3
Poland, 2001, WIIW					
High technology industries	1.9	14.8	25.8	59.8	30.0
Medium-high tech. industries					
Medium-low tech. industries	1.5	9.5	13.1	37.4	19.2
Low technology industries	0.9	16.6	22.9	47.7	17.3
Total D	1.2	13.4	21.1	50.9	21.0

* Notes and sources are the same as at the previous table.

Summing up the statements of the country studies about the *motives of foreign investors*, and host country's *regulations* to attract them, more similarities than differences, can be found. Each of the sample countries had

(more or less) the same comparative advantages: the relatively cheap, but well educated labour force, knowledge on companies (under decades of OPT), and geographical proximity to the main investors.

Differences can be found in *market size* (Poland), *in the rank of the main investors* by geographical origin (Scandinavians in Estonia, French investors in Poland; German, Dutch and Austrians in Slovenia, Slovakia, and Hungary; American and Japanese investors' higher activity in Hungary), and, also, *in timing and sequencing legislation and economic restructuring and stabilisation*.

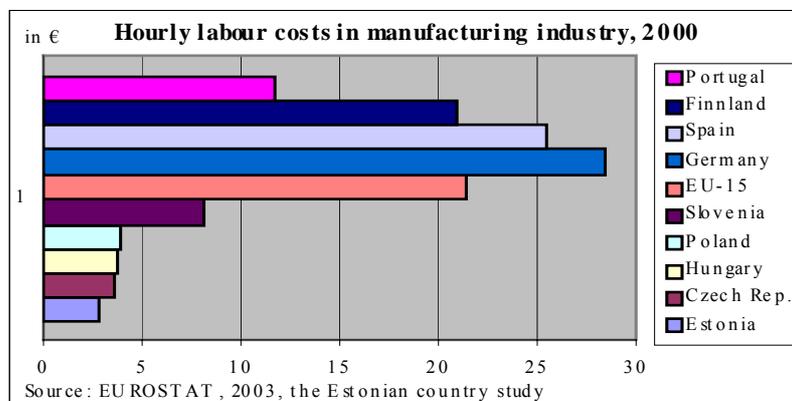
The main motives for investment in each country were first *market-seeking* (home and neighbouring markets, prospect for EU integration), and next, *efficiency seeking* (mainly relatively low labour costs, and in Poland, and Slovakia, raw materials, too), combined with (global and/or regional) strategy. Only the Slovenian study mentioned the importance of recognized *trademarks* (however, this was an unspoken motive for investment to food industry almost in all sample countries).

The volume of FDI in time, across sample countries, depended much on *timing of legislation* (the most important laws for creating safety legal conditions for FDI, such as the Foreign Trade Act, and the Company Law in Hungary in 1988-1989, or in Slovenia, just in 1999), and on *sequencing of privatisation* projects. (Several barriers on FDI were abolished in Slovakia just recently, while in Estonia, Hungary, Poland, at early of 90s.)

The most important basic conditions, however, everywhere, every time, are the *political and economic stabilisation (transparency and prospects*, as the peaceful and fast transition in Hungary promised at early 90s, and economic stabilisation in 1995 facilitated, or the recent consolidation of political and economic situation in Slovakia). Clear regulations and special incentives to investors could attract more (or lack of them deter) FDI in competition with those the neighbouring countries offer. (Disturbance in political and economic transparency seems to be an important factor in recent decline in Hungary to attract FDI).

Differences in regulations (and in possible future incentives), however, are next to be eliminated by the full membership, and comparative advantages of relatively low labour costs are fast eroding in each of these economies (especially to the non-member neighbouring and developing countries). To the EU average, however, each of the candidate countries has space to catch up with the hourly labour costs even if we consider the level of productivity gap. The proportion of hourly labour costs compared to the EU-15, even in Slovenia was only 38% in 2000, the Polish, Hungarian and Czech levels were 17-18%, and in Estonia, it hardly surpassed 13%. While in Portugal, it was higher than half of the EU average. (See chart 4.)

Chart 4.



II. Result of the field work

II.1. Concepts and objectives of the field work

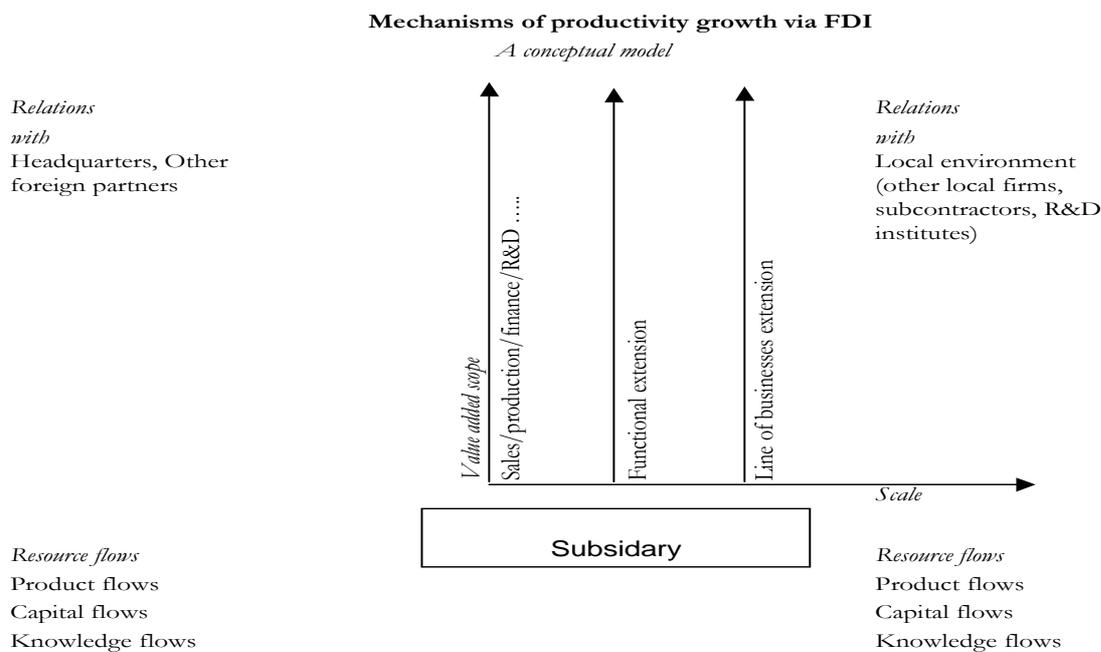
The fieldwork under WP4 "Mapping the Technology Structure of Branch Plants and Technology Integration of CEEC-s" aimed to understand the contribution of FDI to growth and productivity of host countries by analysing technological positions of FDI subsidiaries. The methods of this fieldwork let us overcome the limits of aggregate economic approach as well as weaknesses of case studies by generating large database at mezzo level to undertake econometric analysis, but also maintaining advantages of having information collected at the firm level. (Radosevic at all, 2003)

International literature proved that MNCs are differentiated network of subsidiaries in which subsidiary is controlled through different mechanism according to its role in MNC. Heterogeneity of subsidiaries role in MNCs led to understand that subsidiaries operate as 'quasi firms', while MNCs can be

treated as 'inter-organisational network'. We are concerned with the productivity effects on host economy via upgrading of local subsidiaries. The large sample enables us to generate insights on countries and sectoral differences regarding the position of subsidiaries and their relationship to other organisations.

To understand the way, how local subsidiaries can upgrade their position and integrating into MNC network, the next figure illustrates the main concept. The several dimensions of upgrading and integrating of subsidiaries can be analysed in terms of introduction of new functions (scope) as well as expansion of the existing functions (scale). Subsidiary can grow without expanding or changing mandate but this is increase in scale (horizontal axis), not in scope of activity (vertical axis).

Figure 1



Source: Slavo Radosevic (*ibidem*)

II.2. The main features of the sample

A two pages questionnaire was sent to foreign subsidiaries (FIEs) in the five accession countries in 2001 (and to improve the response rate in 2002). Out of the 2203 FIEs from Estonia, Hungary, Poland, Slovakia, and Slovenia, 458 answered. The response rate was the highest in Slovenia (34.4%), followed by Slovakia (30.2%) and Estonia (30.0%), while in Poland and Hungary only 18.8 and 11% respectively. (In the Hungarian case, the most important FIEs were not willing to participate in the survey.

This reluctance resulted that Hungarian sample FIEs were less export-oriented, and weaker in capital and sales than the whole population of manufacturing FIEs. Distribution of sample FIE-s by industries, however, fits well to that of the all and the all FIE-s, as the correlation coefficients proved.)

Sample size seems to be very small compared to total manufacturing industry in each country, especially by number of answering firms, and mainly in Poland and Hungary.

Table 2.1 Share of sample FIEs in all manufacturing companies, by country
percentage, all firms = 100

SAMPLE FIEs to all	Estonia	Hungary	Poland	Slovenia
Number	1.2	0.4	0.04	1.2
Fixed assets	-	6.2	-	11.2
Sales	15.5	5.4	0.66	16.3
Exports	-	5.2	3.19	21.7
Employment	14.5	3.9	6.18	8.4

Source: WP4 database

Poland, however, dominates the whole third of all answers, and by number of sample: the Polish FIEs gave more than one- employment, represent 70% of the whole.

Table 2.2. Distribution of sample FIEs by countries and technology level
percentage, the whole sample = 100

Distribution	Percentage of no of sample FIEs						Percentage of employment				
	Estonia	Hungary	Poland	Slovakia	Slovenia	Total	Estonia	Hungary	Poland	Slovenia	Total
High and medium high technology	3.6	18.9	42.0	14.8	20.7	100	3.2	18.2	65.7	12.8	100
Medium low	11.1	14.8	37.8	17.0	19.3	100	2.5	6.0	86.8	4.6	100
Low technology Industries	24.8	23.9	26.5	15.4	9.4	100	29.9	24.8	37.4	7.9	100
Total	11.9	19.0	36.3	15.7	17.1	100	7.8	13.7	70.3	8.1	100

Notes: the same as at the table 13;

Source: the same as at the previous table

Distribution of sample FIEs by technology intensity of sectors differs much less by countries, than the structure of all FIEs of the

countries (see table 13/a). It fits the best in the Estonian case, and the least in Poland.

According to the number of sample firms, the more sophisticated activities (the high and

medium high technology industries) are over represented in each sample (except Estonia and the most in Poland). The over dominance of high and medium high technology

industries *by employment* exists only in the case of Slovenia. (Compare next table 13 to table 13/a.)

Table 2.3. Distribution of each sample by countries and technology level
percentage, number of sample FIEs, and employment by country = 100

Distribution	Percentage of no of sample FIEs						Percentage of employment					
	WIIW	Estonia	Hungary	Poland	Slovakia	Slovenia	Total	Estonia	Hungary	Poland	Slovenia	Total
High and medium high technology		12	40	46	38	49	40	14	46	33	55	35
Medium low		30	25	33	35	36	32	15	21	58	27	47
Low technology		58	35	20	27	15	28	71	33	10	18	19
Total % (number of FIEs)		100 (50)	100 (85)	100 (153)	100 (78)	100 (72)	100 (438)	100	100	100	100	100

Source: WP4 database, the author's calculation

Note: Some of the answering firms could not be found in the country's database

Sample distribution according to sales- and export-structures by technology intensity is more similar to the structure of all manufacturing FIEs in each country. FIEs in the higher technology industries, however, over dominate the samples (except again the Estonian one).

By sales structure, FIEs in medium-high technology industries have much higher share in the Slovenian sample than in the all Slovenian manufacturing FIEs (the difference is 11%), as also in the Hungary (with a difference of 13%). The under-weighted high tech FIEs in the Hungarian sample, however, compensate this distortion (by a difference of 12%).

By the export-structure, the high and medium-high technology industries are over represented in the Polish sample (66%, compared to the 53% of all FIEs). The Slovenian sample includes much more export-oriented FIEs in the medium-high technology industries, while low-tech firms are under weighted (6% instead of 15% of all FIEs in exports). The opposite distortion featured the Hungarian sample, where high tech firms had only 14% in the exports of the sample, contrary to their 26% share in total manufacturing exports of FIEs, while low technology firms had 14% export share in the sample, but only 12% in all. (Compare the table 13/a to the next.)

Table 2.4. Distribution of each sample by countries and technology level
percentage, sales, and exports of the sample by country = 100

Distribution	Percentage of sales of sample FIEs				Percentage of exports			
	WIIW, OECD	Estonia	Hungary	Poland	Slovenia	Hungary	Poland	Slovenia
High technology industries			8.3		8.5	13.6		7.7
Medium-high technology		14.7	48.3	32.5	61.5	55.9	66.4	66.5
Medium-low technology		31.3	17.6	54.5	18.9	16.3	27.2	19.5
Low technology industries		53.9	25.8	13.0	11.1	14.2	6.4	6.3
Total		100	100	100	100	100	100	100

Notes are the same as at the table 13.

Source: the same as the previous table

By *age of the sample firms as FIEs*, Hungarian and Estonian sample FIEs were older than the average (69% of both sample FIEs were established before 1995), while in the Polish, Slovenian and Slovakian sample, more than half of them (54, 57, and 59% respectively) have been established as FIEs since then.

By *foreign equity shares*, each sample includes predominantly majority foreign owned FIEs, and 57% as average of the whole sample were 100% foreign owned with the highest rate in the Slovakian, Estonian and Hungarian samples (69%, 67%, and 64% respectively). While in the Polish sample only half of them, and in the

Slovenian one only 42% of the sample FIEs were 100% foreign-owned.

By *type of product*, interestingly enough, Slovenian and Slovakian sample FIEs produced mainly intermediary goods (50, and 44%), while the Polish, Estonian, and Hungarian FIEs specialised much more on final products (54, 48, and 40% of all), or both final and intermediary good (40, 46, 38% respectively).

These differences by countries in the structure of sample FIEs partially explain the heterogeneity in the answers to some of the questions. This is why some links are statistically significant by countries, but not in the whole sample, or vice versa.

II.3. Descriptive analysis

Autonomy of subsidiaries

For determining the *links between individual business functions* according to '*who undertakes them*', Spearman's rank correlation coefficients were calculated (for Hungary and Slovenia). Coefficients were highly significant and positive in both samples (except 'accounting and finance' in the Slovenian one).

- In Hungary, the strongest (> 0.7) link emerged between 'product-development' and 'process engineering'; Variable of 'who determines the product prices' highly correlates with market related functions (such as market research, distribution of sales, after sale services, advertisement, marketing), and it links to 'strategic management', too. 'Accounting and finance' relates only to 'operational management', while the only (almost) independent variable is 'investment finance'.
- In Slovenia, 'determining product price' links strongly to 'market research' and 'advertisement', as advertisement correlates highly with 'distribution of sales', 'after sales services', and 'marketing', too.

While 'strategic management and planning' links just weakly to the other variables, the strongest (higher than 0.66) coefficient appeared only between 'strategic management' and 'market research'.

As one could expect, subsidiaries in each sample country have the *highest autonomy in everyday operation*: especially in 'accounting and financial operations', next in 'supply & logistics', 'operational management', and 'after sale services'. In *market-oriented functions* (such as advertisement, marketing, market research, determining product price), and even in '*investment*' functions, parent firms have higher role, but still mainly the FIEs undertake them. While '*product development*', '*strategic management and planning*' represent the other end of the scale: foreign owners have relatively the highest role in these fields, mainly together with the FIE's management.

The autonomy index was calculated, as 0 = only FIE, 0.33 = mainly FIE, 0.66 = mainly foreign parent, 1 = only foreign parent. The nearer the indicator to 0 the higher is the autonomy of FIEs themselves and vice versa.

- *The average autonomy index* (weighted average of the whole sample) was the highest (0.145) in 'accounting and finance', 0.25 in 'operational functions', 0.33 in 'marketing' functions, 0.35 in 'process engineering', 0.39 in 'investment finance', while in 'product development' and 'strategic management' the indexes were about 0.5. (See the detailed tables in the country papers, and in *Radosevic et al.*, 2003.)
- The highest autonomy as average could be found in the *Slovenian sample* in each

business function (except market oriented functions, in which *Poland* had the highest autonomy index of 0.25). While the *Slovakian sample FIEs* were the most dependent on parent firm in all decisions (except operational management). *Hungarian sample firms* had the highest overall autonomy (after Slovenians), especially in 'investment finance' of 0.3, and in 'strategic management' of 0.47, too.

Firm characteristics and level of autonomy

It is evident, that the equity share of FDI links significantly³ to the control of business functions: FIEs themselves control only or mainly almost all business functions, but the higher (especially 100%) the share of foreign owners, the higher are their role in the main functions, too.

- In Hungary, the highest and statistically significant differences are in 'strategic management', 'product development', and 'determining product prices'. Differences are also significant in market related functions and operational management. Equity share relates much less to 'investment finance', 'supply & logistic', and 'process engineering', while 'accounting and finance' are controlled mainly by the FIEs in each group.
- In *Slovenia*, the highest and significant differences by equity share appear in '*investment finance*' (opposite to the Hungarian results), in '*market research*', '*advertisement*', '*strategic management*', and '*product development*'. Differences by mean ranks exist also in other functions, too, but they are not or just weakly significant.

- *Slovakian sample FIEs* produced some similar, but less or not significant links to the ownership pattern: the highest differences by mean ranks between minority and majority foreign owned firm groups exist in '*operational management*', next in '*strategy*' and '*product development*', but less in 'price formation', 'supply & logistics', and 'investment finance'.
- In *Poland*, majority foreign owned FIEs have also less room in 'strategy', or 'operational management', and 'market related functions', than in the minority foreign owned group, but significant differences exist only in 'product development', 'process engineering' and 'price formation'.
- The *Estonian sample FIEs* show smaller and statistically less significant differences by equity shares in all functions, even in strategy formation.

There are differences among the sample countries according to the links between *firm-size* and the FIEs autonomy level, and also in the role of parent firm by *type of product*, or by *life-time of the firms* (as FIEs):

- Slovak FIEs had clear and significant relationships according to firm size: the largest the firm, the highest the foreign parent's role in 'sales distribution', 'after-sale service', 'marketing', and also (but

³ Attila Béres's calculations, Jonckheere-Terpstra (J-T) tests

less significant) in 'strategy', 'operational management', 'price formation', 'supply & logistics' and even in 'investment finance', too. In the Slovakian sample, however, the younger the FIE the higher is the role of parent firm almost in all business functions (except product development, market research, and sales), but this is only weekly significant in accounting and finance of operations. According to the type of products, parent firm has higher role in FIEs producing 'intermediate product' in 'product development', 'supply & logistics', but it determines more the 'strategy' of the FIEs producing 'final product'.

- In *Slovenia*, the *firm size*, also, is positively and statistically significantly correlated with higher involvement of foreign parent companies in 'advertisement', 'marketing', and 'operational management' (*the larger the firm, the higher the role of the parent firm*). Foreign parent firms with longer involvement in FIEs have significantly higher control in 'investment finance' and 'market research functions', while *type of product* is not relevant in this respect.
- The opposite links featured the Estonian sample. Firm size significantly determined the role of parent firm, especially in 'product development', but here, the smaller the firm, the higher was the role of foreign owner. By lifetime of FIEs, parent firms are involved more in the older FIEs, even in 'accounting and finance', but not in 'market related or operational functions'.
- In *Poland*, parent firms have higher role in small firms, too, except some market related functions (such as 'sales distribution', 'advertisement', 'marketing', 'market research'). But parent firms determine more the 'strategy', 'product development', and 'process engineering' in the younger FIEs, but not 'investment finance', or 'market research', and 'marketing'. This link is significant only (at a 0.05-0.10 level) in accounting and finance, as FIEs autonomy differs significantly in 'operational management' by type of products.
- In Hungary, firm size does not count too much, such as the type of product, or the lifetime of FIEs.

Market structure

Autonomy of the FIEs, also, links to market orientation.

- In the whole sample, FIEs exported more than half (52%) of their sales. The most export-oriented FIEs were in the Slovenian (73%), Slovakian (64%), and Estonian samples (60%). Hungarian sample FIEs exported only 52% of their sales as the total average, while the Polish FIEs were much more local market oriented (63%).

The share of foreign owner in sales (evidently) links to the role of foreign owner in business functions: the higher the share of 'sales to foreign owner', the higher is the role of parent firm in business functions: especially in 'strategic management', 'product

development', and market related functions (such as 'price formation', 'marketing', 'market research', etc.)

- These are clearly and significantly registered in the *Hungarian and Slovenian samples*, and true for Estonia, also, where the links are highly significant in 'product development', 'determining product prices', and in all 'market related and operational functions', but not in 'strategy' or 'investment finance'. In the *Slovakian sample*, same links exist, but they are highly significant only in 'price formation', 'investment finance', and 'market related functions', but not in 'operational management' or 'strategy'. The Polish sample has similar features.

Exports to other foreign buyers' show an opposite but not significant link, in almost all business functions.

- Except, the Slovakian sample FIEs have significantly higher autonomy in decision-making (in 'product development', 'process engineering', 'prices', and even in 'accounting and finance'), if they sell higher proportion of 'sales to other foreign buyers'. In the Polish sample, this is true only for 'price formation' and 'marketing'.

By 'the share of domestic buyers' (by J-T test), links are highly significant to most business functions: the higher the share of local market, the higher is the role of FIEs themselves.

- The level of significance is high in the Hungarian sample in 'strategy', in 'product development', 'process engineering', 'price formation', and in all 'market related functions', but lower in 'supply & logistics', 'operational management', and 'investment', and no link to 'accounting and finance operations'. In Estonia, highly significant links exist only in 'market related functions' and 'price formation'. In the most local market oriented

Polish sample, these links are highly significant only in 'determining product prices', and in most of the 'market related functions', and in 'strategy'.

Market structure by inputs also reveals links to the level of dependence on parent firms: FIEs, exporting more to the parent firms, regularly import more from them.

- In the overall sample as (weighted) average, 28% of supply originated from the parent firm, and only the Polish FIEs have smaller proportion (18%). Locally purchased inputs, however, surprisingly are the highest in the Hungarian sample (45% of all), next in Slovenia (41%), and Poland (40.5%).

Links of the sample FIEs to the other domestic subsidiaries of the parent firms are rare.

- In the total sample average, it is 3.3% in sales, and 7.2% in inputs. The highest are in Poland (4.5%) and in Estonia (4.4%) in sales, but more frequent in purchasing structure: because of the high (23%) share in the Slovakian sample.

Industrial structure by technology intensity

For the whole sample, *there are no statistically significant links between FIEs autonomy across industrial branches by technology intensity*. This is mainly due to important differences by countries in industrial and market structure, and to the heterogeneity of firms even in the same sub-branches.

The pattern of decision-making and control, however, is to be changed much by grouping the sample FIEs according to technology intensity in some countries.

- In the *Hungarian sample*, the role of foreign owners is more important in high technology industrial branches than in the other industries, especially in 'product

development', 'strategic management', and 'market related functions', but not in 'investment', or 'operational management'. (Table 25) *There are no significant links by technology intensity in the other branches*. Parent firm has higher role in 'product development', 'marketing', even in 'operational management' in *medium-low technology industries*, and also, in *low-tech industries* than in the medium-high technology branches, which might be due to *the high propensity of OPT links* in the medium-low, and in the low-technology industries. J-T tests have found significant differences by technology only for 'investment finance', and

slightly significant links to 'product development' and 'market research'.

Table 2.5. Autonomy of FIEs by business functions and by technology intensity
(mean values)

Business functions	Hungary					Slovenia				
	Average	Technology intensity			Low	Average	Technology intensity			Low
		High	Medium high	low			High	Medium high	low	
Accounting and finance	0.13	0.10	0.09	0.17	0.13	0.08	0.17	0.10	0.04	0.12
Operational management	0.21	0.20	0.15	0.27	0.22	0.11	0.25	0.12	0.07	0.12
Supply and logistics	0.24	0.30	0.14	0.33	0.22	0.20	0.42	0.17	0.17	0.27
After sale services	0.27	0.47	0.31	0.25	0.20	0.31	0.58	0.36	0.22	0.30
Investment finance	0.31	0.27	0.19	0.30	0.39	0.27	0.33	0.26	0.24	0.33
Distribution of sales	0.33	0.57	0.25	0.38	0.26	0.32	0.59	0.33	0.24	0.39
Determining product price	0.34	0.57	0.20	0.36	0.32	0.32	0.50	0.27	0.23	0.55
Advertisement	0.34	0.57	0.31	0.35	0.28	0.33	0.67	0.33	0.27	0.36
Marketing	0.35	0.60	0.30	0.35	0.31	0.40	0.58	0.37	0.38	0.49
Market research	0.38	0.63	0.30	0.42	0.32	0.46	0.50	0.44	0.44	0.58
Process engineering	0.40	0.47	0.33	0.41	0.41	0.28	0.50	0.28	0.24	0.30
Strategic management	0.47	0.60	0.31	0.53	0.47	0.40	0.42	0.38	0.39	0.49
Product development	0.49	0.73	0.39	0.56	0.44	0.45	0.58	0.44	0.41	0.61
Total average	0.33	0.47	0.25	0.36	0.30	0.30	0.47	0.30	0.26	0.38

Notes: Average is calculated in a way that answers "by FIE only" are weighted by 0.0; "mainly by FIE" = 0.33; "mainly by foreign owner" = 0.66, "only by foreign owner" = 1.0. The higher the average, the more is a particular business function undertaken by foreign owners.

- In the *Slovenian* sample: as average of all business functions, parent firm has also much higher role in high tech firms than in the others. In 'strategic management', however, an opposite pattern appears than in Hungary: FIEs had higher autonomy in deciding the strategy of high tech firms, while the lower the technological level, the higher is the role of parent firm. Mainly parent firm undertakes 'product development', 'market research', and 'price setting', and has higher role in 'marketing' also, in the *low-tech industries*. Opposite to the Hungarian sample, Slovenian FIEs have higher autonomy in medium-low, than in medium-high tech branches, especially in 'market related functions', and even in 'product development', 'process engineering', 'determining product price', or 'investment finance'.
- In the *Slovakian* sample: parent firm has also much higher role in high tech firms than in the others. In 'strategic management', however, an opposite pattern appears than in Hungary: FIEs had higher autonomy in deciding the strategy of high tech firms, while the lower the technological level, the higher is the role of parent firm. Mainly parent firm undertakes 'product development', 'market research', and 'price setting', and has higher role in 'marketing' also, in the *low-tech industries*. Opposite to the Hungarian sample, Slovakian FIEs have higher autonomy in medium-low, than in medium-high tech branches, especially in 'market related functions', and even in 'product development', 'process engineering', 'determining product price', or 'investment finance'.
- In the *Slovenian* sample: as average of all business functions, parent firm has also much higher role in high tech firms than in the others. In 'strategic management', however, an opposite pattern appears than in Hungary: FIEs had higher autonomy in deciding the strategy of high tech firms, while the lower the technological level, the higher is the role of parent firm. Mainly parent firm undertakes 'product development', 'market research', and 'price setting', and has higher role in 'marketing' also, in the *low-tech industries*. Opposite to the Hungarian sample, Slovenian FIEs have higher autonomy in medium-low, than in medium-high tech branches, especially in 'market related functions', and even in 'product development', 'process engineering', 'determining product price', or 'investment finance'.
- In the *Polish* sample, mostly parent firm undertakes the business functions in the medium-high technology industries and less in the high-tech activities. Except, parent firm has higher role in 'strategy' in high-tech industries than in the others, similarly to the total sample. Statistically significant links, however, appear only in 'price-formation', and 'marketing'. (Some cells remained 'white', because of lack of computer memory to calculate the level of significance.)
- In *Slovakia*, the foreign parent firm has surprisingly the highest role in the low-technology industries almost in all func-

tions, except 'investment', 'sales distribution', and 'strategy', where parent firm has the highest role in the high-tech branches. Parent firm has the highest role in 'market related functions' in the medium-high tech FIEs, but all of these links are *weekly or non significant*, except 'supply & logistic'.

These differences by countries, and heterogeneity of FIEs in each sub-sector, partially explain, why the overall sample does not produce statistically significant links among autonomy in different business functions, and industrial structures by technology intensity. Export-orientation links to industrial struc-

Sources of competition

Competitiveness is the key issue for estimate the role and importance of FDI, but as a complex area, it can be analysed only with difficulties. In the sample, however, the answers on the question '*which area of competitiveness is important?*' help us to position the sample FIEs in the MNC network.

Variables of different *source of competition* (such as '*quality control assistance*', '*patents, licenses, and R&D*', '*people and training*' or '*management*') do not reveal any significant links to the question '*who undertake each of the business functions*'.

- Statistically significant links appear only in the Polish and Slovakian samples, where 'patents, licenses, and R&D' are considered significantly more important in relation with 'process engineering'.
- *Rank correlation coefficients* calculated for the *Hungarian sample* show significant positive links between variables, but only the '*importance of management*' relates stronger than 0.5 to the issue of '*people and training*'. Coefficients for *Slovenian sample* also prove that "competitiveness is a complex phenomenon, depending on the overall business setting"; that means, "improvement and competitiveness in quality control spill over to management and training." Cor-

relation between 'management' and 'training' is the highest (>0.67), and 'people and training', also links (>0.57) to 'patent, licenses, and R&D'.

but it can be proved only at a more detailed level. Analyses by two letter NACE classification of sectors (*Radosevic-et al*, 2003) let identify some sectors in the overall sample (such as DB, textile and textile products, DC, leather and leather product, and DM, transport equipment), which are significantly more export oriented, and FIEs export mainly to the foreign owners. While FIEs in food, beverages and tobacco (DA), paper, publishing and printing (DE), and in non-metal mineral products (DI), are significantly more local-market oriented. FIEs in the first group of sectors have regularly less autonomy, than in the second.

relation between 'management' and 'training' is the highest (>0.67), and 'people and training', also links (>0.57) to 'patent, licenses, and R&D'.

In the whole sample, the most important area of competitiveness is '*quality control assistance*', next '*management*', and '*human resources*', while '*patent, licences, and R&D*' is considered *only* as '*important*'.

The scale is 0 = not important, 0.25 = less important, 0.50 = important, 0.75 = very important, and 1 = extremely important.

- '*Quality control assistance*' as a source of competitiveness got an average index of 0.84, with a little difference by countries (it ranges from 0.80 in Estonia to 0.89 in Hungary). FIEs themselves had the highest competence in this field (total average is 0.82, 0.9 in Hungary, and 0.77 in Estonia). Foreign parent companies, however, have also important role (the higher in Slovakia, 0.72, and Poland, 0.70, medium index of 0.6 in Hungary, and the lowest in Estonia, 0.51, and in Slovenia, 0.47). Foreign and domestic buyers and at a smaller extend suppliers had influence on quality, too, while the other subsidies or local institutions did not count too much.
- '*Management*' is considered *very important* in each sample (as average of 0.78,

ranging from 0.765, in Estonia, to 0.79, in Poland). FIEs themselves have the highest competence: the highest in Hungary (0.81), the lowest in Slovakia (0.76), but management relies on the parent firm, too: the most in Slovakia (0.73), in Hungary, and Poland (both with an index of 0.61). While foreign owner has much less importance in management of the Slovenian and the Estonian samples (0.47, 0.51, respectively).

- The importance of *'people and training'* is considered *important/very important* (the average index is 0.698, the highest in Estonia 0.79 and the smallest in Hungary 0.68). Parent firm has also role in this field, too, but the least in Hungary (0.37) while in Slovenia, it is much more (0.62) important. (In the other samples, around 0.55).
- While *'patent, licenses, and R&D'* is just *'important'* (0.53 as average in the total sample). The Polish and Slovenian FIEs gave higher rank (both 0.58), while it is a *meaningful negative aspect*, that *'patent, licenses, and R&D'* are indicated by the majority of the Hungarian FIEs as *not or less important* (0.42). This must be due to the fact, that, this field relies more (0.48) on the *foreign owner's activity than their own* (0.40). *Parent firm has higher competence in this field than FIE itself in each sample country*: the lowest in Estonia and Hungary (0.44, and 0.48), and the highest in Slovenia (0.63), Slovakia, and Poland (both with mark of 0.6).

Financial sources

Answers on the question of the *'importance of various finance of FIEs'* clearly proved that local FIEs rely actually the most on *'retained earnings'*, and only next on *'parent firm'*. *'Domestic banks'* (except Hungary) or any other sources of finance are much less, or little important.

- Importance of *retained earnings* as total average marked with 0.69, and it is the

These findings prove that local subsidiaries in CEECs are mainly production units rather than real firms in the MNCs network. The seemingly contradictory results in the Hungarian sample between the relative (low) importance of *R&D'* and the relatively low role of parent firm in it, must relate to the fact, that Hungarian FIEs mainly produce products which are not belong to the first stage of product life-cycle.

For the Hungarian sample, we tested differences in the *importance of different sources of competitiveness* by grouping the FIEs according to *technology intensity*.

- *'Quality control assistance'* is the most *important irrespectively to the technology intensity* of the industries (0.88 in high-tech industries, and 0.91 in the medium high and medium low industries, while again 0.88 in low-tech industries). In the other field of competitiveness, there are some differences according to technology intensity: *in high-tech group, 'management' is considered more important* (0.85) than the sample average. *'Human capital' got much higher rank (0.80) than in any other groups, and even 'patent, licenses, and R&D' were considered as important factors (0.50) in the high-tech group*. Each factor got higher rank in *medium low-tech*, than in *medium high-tech* group, while *FIEs in low-tech branches estimated the importance of each element under the average*.

highest in Slovakia (0.80), and the smallest in Poland (0.61). Hungary (0.73), Slovenia (0.70), and Estonia (0.68) are in the middle.

- Financial dependence on parent firm is also important/very important: the average index is 0.62. The highest index was found in the Polish sample (0.67). *The importance of the foreign owner, as*

source of finance is the lowest in Hungary (0.53), and interestingly enough, *only followed the other domestic banks*

mark (0.63) (which are mostly foreign owned, too).

Upgrading of local subsidiaries

The role of parent firm in upgrading activities

The answers on the question '*who initiates the changes*' reveal also the degree of FIEs autonomy in the field of *functional upgrading* (organization and business functions), *product diversification* (number of business lines) and *sale upgrading* (sales and exports).

The indicator is calculated by weighting as 0 = only FIE, 0.33 = mainly FIE, 0.66 = mainly foreign parent firm, 1 = only foreign parent.

- The autonomy index of the total sample proves that mainly the FIEs give initiatives for changes in *business functions* (0.38), while parent firms have higher role in changes in *sales and exports* (0.43), and more in *product diversification* (0.48).
- In *functional upgrading* Hungarian FIEs had the highest autonomy (0.30), next Estonian FIEs (0.33). The Slovenian and Slovakian sample firms have average indexes, while parent firm has higher role in the Polish sample (the index is 0.44).

- Estonian FIEs had the highest autonomy (0.31) in *product-diversification*, next the Slovenian and Hungarian sample firms (0.43 and 0.46 respectively), while in Slovakia, mainly parent firm gives initiatives for changes in business lines (0.61).

Autonomy in *upgrading sales and exports* evidently relates to the level of export-orientation. Parent firm has certainly higher role in export decision in the highly export-oriented firms, while local market-oriented FIEs can initiate changes by themselves, or together with the parent firms on sales.

- At least, Polish FIEs have higher autonomy in these fields (0.39), than in the other upgrading activities, and higher than in the other samples, except Estonia (0.31). Slovakian sample firms depend again the most on parent firm decision (the index is 0.54), next Hungarian FIEs with an index of 0.46. Slovenian autonomy index for upgrading in sales and exports equals to the total sample average.

Magnitude of changes in sample FIEs: past upgrading

The question, whether FDI had improved productivity in the sample FIEs was in the focus of this analyses. Results of the estimation of sample FIEs on '*changes in sales*', in '*export-shares*', and '*improvement in the level of productivity*', '*technology*', and in the '*level of quality*' since the engagement of strategic foreign investors give some insight into the main effects of FDI.

The Spearman's rank correlation coefficients between magnitudes of changes in individual areas were calculated for the Hungarian and Slovenian samples, and in both cases, they

were *positive and significant*. It turned out that *productivity improvement regularly goes together with quality and technology improvement, while sales and export-orientation could grow without parallel technology or quality upgrading*.

- In both cases, the highest correlation coefficients were found between improvement of *productivity and quality* (0.7 in Hungary, and 0.71 in Slovenia), and next, between *productivity and technology* (0.64, and 0.69, respectively). The *magnitude of changes in sales relates to*

exports (0.53, 0.58), and *to the improvement of the productivity level* (0.51, 0.55) variables. In Hungary, however, there is no link between 'productivity improvement' and 'changes in export-share', opposite to the Slovenian case, where a week (0.51) correlation between 'productivity' and 'export variable' appears.

Results of the estimation of sample FIEs on the magnitude of changes for the whole sample demonstrate, that the level of productivity, technology, and quality improved the most across the sample countries, while sales and especially the export-shares grew at more modest rates, with large differences by countries.

The possible magnitude of changes is on the range from -1 = considerable reduction, -0.5 = reduction, 0 = no changes to +0.5 = increase, and +1 = considerable increase.

- *Productivity level* improved fast as sample average (0.56), the most in Hungary (0.61), next in Slovenia (0.57) and Estonia (0.56), while in Poland and Slovakia below the average (in both 0.54).
- *Quality level* improvement was the same (0.56, and in Estonia and Hungary); but the highest in Slovakia (0.6) and Poland (0.58), and the least in Slovenia (0.46).
- *Technology level improvement* had similar (0.55) indicator as total average, and it was the highest in Poland (0.58), next in Hungary and Estonia (0.56), while in Slovenia and Slovakia below the average (0.51).

The quite similar productivity, quality, and technology upgrading did not result the same improvement in performance of sample FIEs by countries. *Extension on scale* (sales and export increase) differs much by countries:

- *In sales*, the average indicator was 0.5. The highest increase happened in Estonia (0.69), next in Slovenia (0.61), and Hungary (0.59), while it was much below the average in Poland (0.46), and especially in Slovakia (0.21).

- The magnitude of *changes in export-share* was only 0.45 for the total sample, and it was less dynamic in each sample country than the output increase (except Slovakia). Slovakian and Slovenian sample FIEs raised their export-share the most (0.57), while Estonian and Hungarian FIEs experienced only a modest increase (0.46 and 0.39 respectively). The lowest indicator related to the Polish sample firms (0.35).

Differences of changes in performance by countries reveal the heterogeneity of FIEs and the complexity of economic conditions for development by countries. The highest productivity improvement of the Hungarian sample FIEs might be due to their longer lifetime, while the modest increase in export-shares in Hungary and Estonia might relate to their higher starting position, and due to the effects of the recent recession of the partner countries. (FIEs in food industry were strongly affected by Russian financial crises, and FIEs in clothing and electronic industries by the recent fall of demand in the EU and USA).

Firm characteristics linked rather differently to the magnitude of changes by countries:

- *Equity share* links significantly only in the *Slovenian sample*, the most to the magnitude of changes in *export-share* and the least to *productivity improvement*. In *Poland*, majority foreign owned firms had higher indicator for each variable, but a weekly significant link exists only to the magnitude of changes in export-share. In *Hungary*, regression analyses did not find any significant links between firm characteristics and firm development, except a weekly significant link between the magnitude of changes in value of sales and in productivity, which was higher in the majority foreign owned group. *Export variable*, however, in *Hungary had an opposite link to the ownership pattern*: minority foreign owned FIEs had higher means of magnitude of changes in export variable and in the

level of technology. The same finding featured the *Slovakian* FIEs, as minority foreign owned group in *Estonia* improved also more the technology, quality, and sales. J-T tests, however, did not found any statistically significant links.

- Firm size had some similarities across countries (except Hungary): the larger the FIEs the higher were the improvement in productivity, technology, and quality, and even in the export-share (but it was statistically significant only in Slovakia for all, in Slovenia for exports, productivity and technology, and in Poland for productivity and technology, and much weekly in Estonia for exports). The J-T test, for the Hungarian sample, did not find any significant links either, but mean ranks, again reveal opposite relations: the smallest FIEs improved the most the level of technology, the value of sales, and productivity.
- *Age of the FIEs as FIEs* revealed very different, statistically not significant links to the determinants of firm development across countries: clear (but not significant) links appeared only in *Hungary, and Slovenia: the older the FIEs the highest were the indicator in all fields. While in Estonia, Slovakia, and Poland younger FIEs registered higher improvement in exports and technology than the older ones.*

Regression analyses for *market structure and magnitude of changes* revealed some commune features by countries.

- By share of sales to foreign owners, there were some commune tendencies across countries. The higher the share of sales to foreign owners, the higher changes happened in the export-orientation of sample FIEs, but the links to the other variables are highly different. By mean values, the magnitude of changes were the highest in sales, productivity, quality, and even in technology of the FIEs exporting the majority of sales to the owners in Hungary, Estonia, and Slovenia, but not in Poland

or Slovakia. Statistically significant links appeared only in the Polish sample (for export variable) and in the Slovakian sample for export-, technology and productivity variables, but here, those FIEs experienced the highest improvement, which exported less than half of their sales to the parent firm. Links to the changes in export-orientation were weekly significant in Hungary and Slovenia.

- *As the share of sales to other foreign buyer* increased, the magnitude of changes in productivity, technology and quality clearly slowed down in Hungary (at 0.01-0.05 significance level). In Poland, the opposite tendency emerged: the more the FIEs sell to other foreign buyers, the higher the magnitude of changes in all fields, except sales. In Estonia, links to productivity and technology improvement had similar tendency as in Poland. Significant links exist only in Poland and Estonia to export variables.
- *By increasing share of domestic market,* quality, productivity, and (less) technology level also improved more in Hungary, but by the J-T tests, none of these links were significant. Sales increased significantly more as the share of local market increased in Poland, and evidently, the export variable decreased as domestic market-orientation increased. The same (but not significant) tendencies featured the Slovakian sample, but in both cases, the magnitude of productivity, quality and technology improvement decreased as domestic market share increased.

Magnitude of changes seems to correlate with foreign parent firm competence:

- In the *Slovenian sample,* productivity improvement was higher, if only/or mainly parent firm initiated *functional upgrading,* and changes in *sales and exports. Quality improvement* was also higher, if parent firm had higher competence in *market related functions.* The

higher the role of parent firms in *strategy*, the higher the magnitude of changes in *sales and productivity improvement*.

- In *Estonia*, significant link appeared between *quality improvement* and higher competence of foreign owner in *price formation*.
- While in *Poland*, *export-orientation* increased more, if parent firm had higher competence on *product differentiation*.
- In *Slovakia*, magnitude of changes in *exports, and productivity improvement* were higher as parent firm had higher role on *sales- and export decisions*. Export-share increased significantly in those FIEs where parent firm had higher role in most of the 'market related functions', and also 'productivity' and 'technology improvement' linked to the higher competence of parent firm in 'sales distribution', and 'after sale services'.
- In *Hungary*, there were no clear relations between magnitude of changes of the individual areas and the answers, '*who initiate the changes*'. By distribution of functions, however, some interesting feature emerged in the Hungarian case: the magnitude of changes in the level of *productivity was lower* in FIEs, where *only/mainly the parent firm decided on product price*, or also had higher role in *market related functions*. Improvement in *quality level* was also much *more modest*, if the competence of parent firm was *higher in market related functions and in strategy*.

Differences in determinants for development by *technology intensity* were also tested:

- In *Slovenia*, *magnitude of changes seems to decrease with the increase of FIEs technological intensity*. Average magnitude of changes for FIEs in high technology industries is 0.43, in medium-high technology industries 0.53, in medium-low technology industries 0.58, and in low-tech industries 0.582. In level of productivity, technology and quality

magnitude of changes consistently decrease with the increase of FIEs technological intensity, but the differences rather low: all changes are concentrated around +0.5.

- In *Hungary*, the highest productivity improvement (0.71) happened in *medium-low technology industries*, as all other variables also proved these FIEs as *the best performing group* (except output-performance which increased most in the medium high technology industries). *The relatively least increase of export-orientation was due mainly to FIEs in the low-tech industries* (0.22), while the level of productivity, technology, and quality improved the most (after the medium low-tech industries) here. The J-T test proved slightly significant links only to technology improvement.
- Some similarities could be found in the *Polish sample*, at least, technology improved significantly more in the medium low technology industries, but next in the medium high-tech branches, while sales and exports grew the most in the high-tech industries.
- Mean ranks demonstrate (but not significantly) that *Estonian FIEs* in the low (and next the medium low) technology industries produced the highest improvement in all fields.
- Upgrading activity did not change significantly by technology in the *Slovakian sample*.

Differences in magnitude of changes according to the importance of *different sources of competition* also reveal some special characters of FIEs by countries.

- In *Hungary*, the 'improvement of productivity' significantly linked to the importance of 'patent, licenses, and R&D', and to 'management'. The J-T tests also proved links between 'sales variable' and 'the importance of people and training', and 'increasing export-orientation' and

- 'the importance of management', as highly significant.
- In the *Slovenian sample*, 'productivity' increased significantly more, if 'quality control' was considered as very important, and 'productivity' and 'quality improvement' significantly linked to 'the importance of people and training'.
- In *Poland*, 'export' and 'quality control' linked strongly together, and *quality* improvement was higher, if 'management' was considered extremely important.
- In *Estonia*, there were no significant links by the importance of different sources of competition, nor in the *Slovakian sample*.

Future upgrading: Changing mandate of FIEs

Prospects for future upgrading at value added scope (as figure 1 illustrated) can be estimated by the answers of sample FIEs on the question "which mandate (such as 'sales and exports', 'number of business functions undertaken independently', or 'number of business lines'), and how much they expect to extend in future?"

Indicators here are calculated by the weights: +1=increased mandate of FIE, 0=unchanged, -1=decreased mandate of FIE. The nearer the indicator to +1, the more the future mandate of FIE will increase and vice versa for -1.

- The highest increase is expected – as total sample average – in 'number of business lines' (product diversification, the indicator is 0.5), next in 'sales and exports', (0.4), and less in the 'number of business functions' (0.38).
- There are large differences by countries: the highest expansion is expected by the *Polish sample* FIEs in *product diversification* (number of business lines), where the indicator is 0.7, next in *Slovakia* (0.5), and *Slovenia* (0.47), and the same rank appears in extending mandate by *undertaking independently more number of business functions* (0.5, 0.45, and 0.32 respectively). While FIEs in *Estonia* and *Hungary* expect much less increase in their mandate in 'number of business lines' (0.395 and 0.24 respectively), and in 'number of business functions' (0.28 and 0.21). This must relate to the fact, that 'product diversification', and 'number of business functions' were already the largest in those sample where the lowest the expected increase. These differences between the Hungarian and Slovenian results, for instance, can be illustrated by the fact, that in the Hungarian sample, the 'number of business lines' were already much higher at the beginning and increased from 5.8 to 7.6, while in the Slovenian sample, the marks were only 2.2 and 4.4 respectively.
- According to the *future expansion in sales and exports*, sample FIEs expected their development differently: Slovenian sample FIEs expected the highest future increase (0.67), next *Slovakian* (0.47), and the smallest expansion is foreseen again, by the *Hungarian sample* firms (0.32). *Estonian* and *Hungarian* FIEs estimate, however, larger increase in this fields, than in the other mandates, but less than the sample average.

Conclusions

The five country studies demonstrated that economic development and productivity growth helped each of the countries to narrow the productivity gap to the EU in 90s, but still large differences exist among their

levels to the EU average and also among them. FDI-inflow had important role in each sample country in the catching up process, but its effects differed much by time, by ac-

tivities, and by timing and sequencing policy changes across countries.

Similarities among the sample countries can be summarised that FDI had important role in productivity and technology upgrading in each of them, but the level of importance of FDI, the speed of restructuring, the economic structure by activities, industrial structure by factor-intensity, and productivity level remained highly differentiated even at the end of last decade. Which is commune among these countries, that the gap between their relative levels of national labour productivity to the EU average and that of their industrial labour productivity is large in all cases. That means that further restructuring and productivity improvement are needed in industry of each sample countries to close the productivity gap to the EU. (In some countries, such as Hungary, Slovakia, Estonia, efficiency improvement in the public sectors is also inevitable for closing the gap to the EU).

The main motives for foreigners to invest in each of these countries were first market- and next efficiency seeking. The main comparative advantage is the relative cheap, but well educated labour force. This advantage is eroding fast compared to the neighbouring and developing countries, but the high differences between the industrial productivity level to the EU and that of the hourly labour costs in each of them still let large room for catch-up to the EU average income level.

Productivity differences and development depend much on structural changes inside the manufacturing industries: as the prospect for catch up of individual accession countries is also determined by the shift from declining activities (firms) to dynamic ones (from low value added activities to high value added industries). Analysing path specialisation and changing industrial structure by technology intensity revealed that *each of the sample countries attracted FDI first in labour-intensive low-technology production. A shift toward the more sophisticated activities could be registered in all sample countries, and it was led mainly by the FIEs, while domestic*

firms remained more traditionally specialised. In spite of the progress, however, *even in the most advanced countries, the FIEs group itself is still dominated by the less (low- and medium low) technology intensive industries* (at least, according to the number of firms and employees). It also turned out (where we had data), that *the more sophisticated the activities, the higher the share of FIEs, especially in exports, sales, and capital endowments* (the most clearly in Hungary and Estonia, the least in Slovenia).

Results of the fieldwork confirm the main findings of international theories and empirical evidences. FIEs (subsidiaries of MNCs) are highly differentiated according to their role in the MNCs network, and they operate as 'quasi firm' rather than a real one. The *contribution of FDI to growth and productivity on host countries by analysing technological positions of FIEs*, also, revealed more differences than similarities by countries.

Similarities in the pattern of *control/autonomy of FIEs* in different *business functions*, their position in the MNC network, and their relationship to other organisations in the selected countries across the whole sample are the followings. It is evident that FIEs have the highest autonomy in 'accounting and finance', and next in 'every day operations', while parent firm mainly together with the FIEs' management undertakes strategy and product development (frequently together with market oriented functions). Parent firm has higher role in export-oriented FIEs than in local market oriented ones, and higher when FIEs sell more proportion of their sales to parent firm. FIEs themselves control only or mainly almost all business functions, but the higher the share of foreign owner, the higher are their role in the main functions, too. Considering the *importance of different sources of competitions* and that of the *financial sources*, in each sample the most important area of competitiveness was 'quality control assistance', next 'management', and 'human resources', while 'patent, licences, and R&D' is considered only as 'important'. Retained earning turned out as

the most important financial sources of FIEs, and just next the parent firm (except Hungary, where domestic banks are more important than parent firm).

By analysing determinants, more differences than similarities appear by countries. As sample average, the Slovenian sample FIEs had the highest autonomy in all (except market oriented) business functions, next Hungarians, especially in investment finance and strategy, while Polish FIEs had higher autonomy in market related functions. Slovakian FIEs were the most dependent on the foreign owner (except operational management).

Firm characteristics relate differently to the autonomy level of FIEs, which is due to the fact, that many other factors have role in determining FIEs position in the MNC network: such as market-orientation, industries, stage of domestic financial institutions, etc. *Equity share* certainly links to the level of autonomy, but the high (and different) weights of 100% foreign owned FIEs (and few FIEs in the minority foreign owned group) make difficult to get statistically significant results at a more detailed manner. *Firm size, or lifetime* of FIEs as determinants, also, link differently to FIEs' autonomy level by countries. In the Hungarian sample, for instance, there were no clear tendencies, while the other samples demonstrated clear, significant but different links: in Slovakia, and Slovenia, the largest the FIEs the highest were the role of parent firm, while in Estonia, and Poland, foreign owner had higher role in small firms. Parent firm with longer involvement in FIEs controlled significantly more the business functions in Slovenia, and Estonia, while the opposite results emerged in the Slovakian sample.

The largest differences featured the sample FIEs by grouping them according to the *technology intensity* of industries, which highlights the importance of structural differences in the catching up process. In Hungary, the role of parent firm was clearly more important in high-technology industries than in the others, as in Estonia (but there, links were

not statistically significant). While in Slovenia, the opposite pattern featured the sample: FIEs management had higher role in deciding on the strategy of high-tech firms, while the lower the technological level the higher was the role of parent firm. In Slovakia, parent firm has the highest role in the low technology industries almost in all business functions.

Similarities across countries by *productivity effects on host economy via upgrading of local subsidiaries* are that productivity improvement regularly goes together with quality and technology improvement, while sales and export-orientation could grow without parallel technology or quality upgrading. *Productivity, technology and quality level improved much in each sample, while the magnitude of changes in value of sales and export-shares were much more modest, with large differences by countries.*

Firm characteristics linked rather differently to the magnitude of changes by countries: equity share, for instance, significantly determined the export variable in Slovenia, while in Hungary, the minority foreign owned FIEs had higher means of magnitude of changes in the export variable and in technology level. The same findings featured the Slovakian and Estonian samples considering technology and quality improvement. Larger FIEs improved more their productivity, technology and quality level, and even export-shares in most of the samples, while in Hungary, the smallest FIEs improved the most the level of technology, the value of sales, and productivity (but none of these links were statistically significant).

Regression analyses for market structure and magnitude of changes demonstrate also some commune tendencies across countries: the higher the share of *sales to parent firm*, the higher changes happened in *export-orientation*, but to the other variables, results were highly different. *Magnitude of changes* seems to correlate with *parent firm competence*. Regularly, productivity improvement and changes in sales and exports linked to

higher competence of parent firm, but in Estonia, this link was significant only between quality improvement and price formation. *In Hungary*, an opposite tendency was found: *productivity improvement was lower when (only or mainly) parent firm decided on product price, or controlled the market related functions and strategy. By technology intensity*, results were highly differentiates: magnitude of changes decreased as technology intensity of branches increased in the Slovenian sample. In Hungary (and also in Poland), the highest productivity improvement happened in the medium-low technology industries, while Estonian FIEs in low technology industries produced the highest improvement in all field. *The relatively modest increase in the Hungarian export-variable was due mainly to FIEs in low technology industries.*

Differences of changes in performance by countries reveal the heterogeneity of FIEs and the complexity of economic conditions for development by countries. The highest productivity improvement of the Hungarian sample FIEs, for instance, might be due to their longer life-time, while the modest increase in export-shares in Hungary and Estonia might relate to their higher starting position, and due, also to the effects of the recent recession. (FIEs in food industry were strongly affected by Russian financial crises, and FIEs in clothing and electronic industries by the recent fall of demand on world markets).

These differences by countries, and heterogeneity of FIEs in each sub-sector, and by determinants partially explain, why the overall sample does not produce statistically significant links among autonomy in different business functions, and industrial structures by technology intensity. Export-orientation links to industrial structure, but it is proved only in few sub sectors at a more detailed level (even this large sample of 458 FIEs is

not large enough to fill each cell with sufficient number of cases, if we break it down further).

Future expected upgrading seems to depend on the actual level of importance of FDI by countries. It seems to be obvious, that if foreign owners dominate one or several fields of the economy almost totally, prospects for future growth by new entrants or by extensions are lower, and dependence on outside economic changes will be higher, than in the cases where FDI still has lower importance.

For policy conclusions, this study highlights the problem of relatively high rate of labour-intensive activities even in the FIEs. This problem gains importance, as the main wishes of these countries to catch up with the EU income level, is to succeed. The fast increasing real wages independently on productivity growth in Hungary, in 2002, the erosion of export competitiveness in certain economic activities caused by the deep recession of partner countries and aggravated by the fast appreciation of HUF, certainly had role in the recent fall of annual FDI-inflow, and the slow-down in economic growth rate. The recent closures of some large Hungarian subsidiaries in labour-intensive industries, highlights already the discrepancy between comparative advantages of Hungary (discrepancy in factor endowments and prices, in the structure of wage-level and knowledge of the labour-force) and economic conditions for changing policies. Therefore, for future prospect of the country, the key policy issue is that how much the government could resist to the pressure of MNCs in policy decision and focus rather on the economic interest of the country. To close the gap between knowledge and labour market requirements would need new regulations to facilitate labour-force mobility (upgrading flexibility and knowledge, location), restructuring and developing the education system to help industrial restructuring.

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