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The Impact of Foreign Direct Investment on the Knowledge Base of Central and Eastern European Countries

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Founded in 1963 by two prominent Austrians living in exile – the sociologist Paul F. Lazarsfeld and the economist Oskar Morgenstern – with the financial support from the Ford Foundation, the Austrian Federal Ministry of Education, and the City of Vienna, the Institute for Advanced Studies (IHS) is the first institution for postgraduate education and research in economics and the social sciences in Austria. The **Political Science Series** presents research done at the Department of Political Science and aims to share "work in progress" before formal publication. It includes papers by the Department's teaching and research staff, visiting professors, graduate students, visiting fellows, and invited participants in seminars, workshops, and conferences. As usual, authors bear full responsibility for the content of their contributions.

Das Institut für Höhere Studien (IHS) wurde im Jahr 1963 von zwei prominenten Exilösterreichern – dem Soziologen Paul F. Lazarsfeld und dem Ökonomen Oskar Morgenstern – mit Hilfe der Ford-Stiftung, des Österreichischen Bundesministeriums für Unterricht und der Stadt Wien gegründet und ist somit die erste nachuniversitäre Lehr- und Forschungsstätte für die Sozial- und Wirtschafts-wissenschaften in Österreich. Die **Reihe Politikwissenschaft** bietet Einblick in die Forschungsarbeit der Abteilung für Politikwissenschaft und verfolgt das Ziel, abteilungsinterne Diskussionsbeiträge einer breiteren fachinternen Öffentlichkeit zugänglich zu machen. Die inhaltliche Verantwortung für die veröffentlichten Beiträge liegt bei den Autoren und Autorinnen. Gastbeiträge werden als solche gekennzeichnet.

Abstract

The interdisciplinary FDI-CEEC project was an international cooperative effort between the Institute for Advanced Studies and the Austrian East and Southeast European Institute with four partner institutes in the Czech Republic, Slovakia, Hungary and Slovenia. We have analysed the effects of foreign direct investment on the knowledge bases of the four respective Central and East European countries (CEECs). Amongst other things we have concentrated on the inclusion of CEEC firms into national and international production networks. Moreover, we have looked into human resource development and the effects of the changing industrial structures on the research institutions.

Zusammenfassung

Das vorliegende interdisziplinäre Kooperationsprojekt des Institutes für Höhere Studien und des Österreichischen Ost- und Südosteuropainstitutes mit vier Partnerinstituten in Tschechien, der Slowakei, Ungarn und Slowenien analysiert die Auswirkungen der ausländischen Direktinvestitionen auf die Wissensbasen der vier Mittel- und Osteuropäischen Länder (MOEL). Untersucht wurden dabei unter anderem die Einbindung der MOEL-Unternehmen in nationale und internationale Produktionsnetzwerke, aber auch die Ausbildung der Arbeitnehmer durch die Unternehmen und die Auswirkungen der geänderten Industriestrukturen auf die Forschungsinstitutionen.

Keywords

Foreign direct investment, knowledge base, transnational corporations, production networks, national innovation systems, science and technology, Czech Republic, Hungary, Slovakia, Slovenia

Schlagwörter

Ausländische Direktinvestitionen, Wissensbasis, Transnationale Konzerne, Produktionsnetzwerke, Nationale Innovationssysteme, Wissenschaft und Technologie, Tschechien, Ungarn, Slowakei, Slowenien

Contents

Foreword

Foreign direct investment (in the following FDI) has been at the centre of a lively debate since a number of years (Dunning 1993, UNCTAD 1998, Niosi 1999, Patel / Vega 1999). An especially interesting issue within this discussion questions, whether FDI affects the recipient country's technological level, and, more generally speaking, its knowledge base positively (Dyker 1998, 1999; Archibugi / Iammarino 1999; Zukowska-Gagelmann 1999). The significance of this question lies in the specific importance of the knowledge base for the successful long-term development of economies.

International production networks are increasingly linking the European Economic Area with Central and Eastern European Countries (in the following CEEC), mainly via FDI (e.g. Zysman / Schwartz 1998). While the gains for both sides of the co-operation (higher flexibility and capacity at lower costs with concomitant income gains) clearly seem to outweigh the losses (potentially higher unemployment rates in the European Economic Area, less control of CEEC governments over their national economies), the effects of FDI on the knowledge base of CEECs are less clear. Therefore, the discussion between those favouring and those refusing FDI in CEECs on grounds of its effects on the knowledge base is still undecided (Meyer-Krahmer / Reger 1997, Djankov / Hoekman 1998, Zukowska-Gagelmann 1999). The different positions in this discussion can be summarised as follows:

The argument of those questioning the learning effects caused by FDI goes, that FDI caused some learning effects of the CEEC economies through advanced methods of management and other standard practices of market economies. These effects, however, rarely extended to the science & technology (S&T) base of these countries. The foreign dominated enterprises neither are involved in research and development (R&D) in the CEECs nor are they in contact with CEE research and development institutions. Because of this lack of communication – not only in the area of R&D – a "janus-shaped economy"[1] emerged, in which CEE institutions hardly learn from the foreign enterprises, although the largest part of export activities and economic growth took place in the frame of the foreign dominated enterprises (Madi 1990; Hungarian Central Statistical Office 1996; Dyker 1997, 1998; Djankov / Hoekman 1998; Zukowska-Gagelmann 1999).

The counter-argument is that FDI directly leads to learning effects in the CEE economies: These are identifiable on the one hand in the conception of models of best practice in differing domains of production, customer care, account management or general management. On the other hand the foreign dominated enterprises (FDEs) increasingly engage into R&D in CEE. Above that the level of interaction of foreign enterprises with

[1] For the question of this duality of CEEC economies c.f. also Hunya 2000a.

institutions of CEE innovation systems is rising (Inzelt 1994, Stankovsky 1996, Zysman / Schwartz 1998, UNCTAD 1998).

Following from these conflicting views the goal of this research project may be expressed in one basic, open and generally stated question: Has FDI a measurable impact on the scientific and technological competencies of CEECs, here seen as the core area of the knowledge base of a national innovation system?

In order to analyse the impact of FDI on the knowledge base of CEECs the Institute for Advanced Studies in co-operation with the Austrian Institute of East- and South-East European Studies, the Faculty of Humanistic Studies, Charles University (Prague), the Innovation Research Centre (Budapest), the Institute for Forecasting of the Slovak Academy of Sciences (Bratislava) and the Institute for Economic Research (Ljublijana) carried out a small-number study in the Czech Republic, Hungary, Slovenia and Slovakia.

We want to thank our colleagues for their methodological as well as empirical contributions to the project.

Karel Müller	CZ	Country case study, case studies: Pragodata, Hella-Behr, Bosch-Diesel, Vertex
Annamaria Inzelt	H	Contribution to country case study
Róbert Becsky	H	Case study: Knorr-Bremse
Zsuzsa Daczó	H	Case study: Ericsson
Noémi Gál	H	Case study: Ericsson
Zsusza König	H	Case study: Ceva-Phylaxia Veterinary
Peter Stanovnik	SI	Country case study
Maja Bucar	SI	Case studies: Danfoss, Iskratel, IBM
Stefan Zajac	SK	Country case study, case studies: Volkswagen, Siemens, OMV

We also want to thank Andreas Pribersky from the Austrian Institute of East- and South-East European Studies for his valuable contributions to project management. Finally we want to express our gratitude to the Austrian National Bank for their generosity to support this research project (Project No. 8070).

After an introduction into the subject of the paper we will present a short overview on FDI penetration in the selected CEEC countries. This section will be followed by the comparative analysis of the company case studies and the conclusive part of the paper. The annex comprises inter alia of tables summarizing the main findings of each case study.

1. Introduction

Why is FDI important for the economic development of recipient countries?

FDI has taken on an increasingly important role in development plans of developed and developing countries (c.f. UNCTAD 1996). The main question in this context with regards to FDI recipient countries has always been whether and in which way they can profit from FDI. Often, the answers to this question deal with the effects of FDI on tax revenue and employment figures. Yet, another important part of the question addresses less the short, but rather the long-term effects, e.g. the competencies a national economy might acquire or not via FDI. The question of benefits for recipient countries then changes quickly to: do institutions and persons in FDI receiving countries learn from foreign investors?

Why is a country's knowledge base important for its economic development?

Generally speaking, the development of political, economic and social institutions depends on the quality of the knowledge base of a society. Moreover, in a time of increasing competitive global pressures between continental, national and regional economies it is necessary to have a knowledge base in S&T, which orients itself on models of "best practice" (Gibbons, Limoges, Nowotny et al 1994; OECD 1996, 1998) so as to arrive at the "learning economy" (Lundvall / Borras 1999).

What is the Knowledge Base?

Within this project we defined knowledge base as a variety of competencies acquired by a person, an institution or a system.[2] These competencies are directed at the fulfilment of specific professional purposes and consist of codified[3] and tacit components[4]. These competencies include not only technical but also social components, which are necessary for the organisation of the work process. The part of the knowledge base most important for this study is formed by science and technology, which are understood as the main engines of the innovation process (Freeman 1982, Nelson / Winter 1982). Thus, our research focussed on two questions: the effect of FDI on (1) human capital and the knowledge base at company level and (2) on the national knowledge base.

The notion of "national systems of innovation" is one of the current standard concepts to conceptualise the innovation ability of national economies. Freeman proposed an early

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[2] Compare with de la Viesca's definition of human capital: "Human capital can be defined as the abilities, knowledge and skills people acquire through education, training (managerial and organizational) and experience." (de la Viesca 1999: 17).

[3] e.g. blueprints, books, computer soft ware

[4] e.g. skills, and in general knowledge often acquired through training on the job

definition of national systems of innovation as a *"network of institutions in the public and the private sectors whose activities and interactions initiate, import, modify and diffuse new technologies"* (Freeman 1987). The concept became prevalent among innovation studies during the 1990s and proved its flexibility in a number of contexts (e.g. Lundvall 1992, Nelson 1993, OECD 1998). A national innovation system comprises two main elements, the structure of the production system and the institutional set-up. The production structure within the industrial system describes the vertical and horizontal linkages within the industrial system. The institutional set-up of a national innovation system includes formal institutions (organisations such as R&D infrastructure in universities / extra-university, government institutions) as well as informal institutions (rules, norms, traditions, laws). We will use this concept as a framework of reference to analyse the interactions between foreign dominated firms (FDE) and the institutions of the CEECs.

What is Foreign Direct Investment (FDI)?

For our research we defined foreign direct investment (FDI) as non-indigenous investments in a specific corporation exceeding the limit of 10% equity stake. Forms of foreign investment include "*direct investment in wholly owned companies, joint ventures, technology transfer, licensing agreements and other forms of inter-company alliances"* (UNIDO 1994: 1). In our research we concentrated on companies with substantially higher foreign assets. In these, as we called them, "foreign dominated enterprises" (FDEs) foreigners control an enterprise's operations.

Why are Trans-national corporations important for technology transfer?

Trans-national corporations play an important role in co-ordinating production chains and shaping a new geo-economy (for example Dunning 1993, Ohmae 1995, Zysman / Schwartz 1998). These corporations could be characterised as the drivers of globalisation and a complex of trans-national networks. A trans-national corporation could be defined as *"firm which has the power to co-ordinate and control operations in more than one country, even if it does not own them"* (Dicken 1998, 8). Since the rise of large international corporations in the 19th century the larger part of civilian R&D has been created by and in these firms. This situation did not change since the major engagement of nation-states in R&D in the wake of World War II. Indeed, over the last three decades governments increasingly have channelled money into firms for R&D purposes.

Which impact can FDI have on a company's knowledge base?

Learning processes in FDEs can lead to product, process and organisational innovations as well as to potentially fruitful knowledge, not directly leading to immediate innovations. Many authors describe technology transfer as element of FDI (Dunning 1993, Niosi 1999 and others in the volume). However, in the case of CEECs some authors (e.g. Dyker 1999)

considered the transfer of managerial knowledge and skills as more frequent and important than technology transfer in its most narrow and accepted definition as a transfer of directly product and process oriented knowledge such as machinery and software.

Whatever the role of FDI for technology in this more narrow sense, human capital has been found to be an important reason for the engagement of a firm into a foreign market via FDI (for a synthesis of related studies see Lankes / Venables 1996) as well as a factor frequently enhanced by such an investment. In the beginning of this virtuous circle often the human capital available in one country attracts FDI. Foreign investors subsequently invest into, and improve human capital by training (Dunning 1993). This mechanism, however, has most recently been put into question due to one of the paradox effects of globalisation, such as the necessity of a highly flexible response to production problems, which at times seems to prevent an improvement of human capital other than through learning by doing (Hack 1998).

By which means does FDI influence the national knowledge base?

Knowledge potentially spills over from FDEs to other actors of the national innovation system and vice versa: Firms, universities and non-university research institutes can be partners of FDEs in knowledge exchange and learning. However, one would expect that the learning effects become smaller with increasing distances between the economic and research system – at least they should become indirect learning effects. For analytical purposes the interactions between FDEs and other actors from the economic and/or research system can be classified along the dimensions "locality" and the "role", the FDE is playing in a particular interaction (c.f. Table 1).

Table 1: FDE-interactions by role and locality

Role of FDE	**Locality of Interaction**	
	Domestic	**International**
Customer	Integration in national production networks and markets	Integration in international production networks and markets
Supplier	Integration in national production networks and markets	Integration in international production networks and markets
R&D Partner	R&D co-operation with domestic public sector (university and non-university) and private research.	R&D co-operation with foreign public sector (university and non-university) and private research.
Employer	Staff mobility between FDE, domestic firms and public sector research	Staff mobility between FDE, foreign firms and foreign public sector research

Differences of locality refer to the fact that contacts might involve domestic or international actors. FDEs can play different roles in these interactions. They can communicate with other actors as customers, suppliers and co-operation partners. As employers FDE play a role in staff mobility between FDEs and other private firms and public sector research respectively (and vice versa). Staff mobility forms an indirect contact mechanism between FDEs and the national innovation system. In all these different forms of interaction knowledge can spill over from one actor to another. However, it is not only the quantity of contacts[5], which is decisive for the potential knowledge spill over but also the quality of these interactions[6].

An important question within the context of the exchange between FDE and the national innovation system refers to the notion of a "Janus-shaped economy". This term tries to capture the existence of a divided national economy: One part of such an economy comprises firms and research centres, which are integrated in international networks and markets utilising modern production technologies and management methods. The other part of such an economy, however, consists of firms and research institutions, isolated from international research and production networks as well as markets. Their financial situation and infrastructure may be worse than before 1989 (c.f. Hunya 2000b).

1.1 Research questions

The key questions of research can be summarised in the following questions: What foreign dominated enterprises (variable 1), from which investing country (variable 2), have in which business sector (variable 3), of which Central and East European country (variable 4), what kind of specific contacts (variable 5), with which institutions (variable 6), and with what effects (variable 7)? The core of the question is variable 5: the interaction between the foreign dominated enterprises and the CEEC-institutions, with all other variables relating to this variable. In more detail, we asked the following questions within the project:

- In which way was the FDE included into the investors' international manufacturing activities (part of production networks vs. transplants)?

- What were the effects of FDI at company level? (e.g. learning effects, network access, technological upgrading, improvement of human capital, new technical and/or soft skills)?

- What contribution was made to the recipient company (e.g. financial assets, know-how, tangible technology and equipment, integration into research networks and/or marketing activities)?

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[5] e.g. number of domestic suppliers, size of contracts
[6] e.g. significance of a domestic subcontractor or R&D co-operation partner for the production process

- What were the effects of FDI for the knowledge base at a national level?

- Do the case studies give evidence to the notion of a “Janus-shaped economy”?

1.2 Methodology

The primary methodology of this project was a case study approach. Case studies of FDEs were based on expert interviews with managers and data from the companies. Each research group from the participating countries carried out at least three case studies of FDEs. The case studies were conducted during winter and spring 1999/2000. In order to generate homogeneous data for cross country comparison, the country reports as well as the company case studies were composed according to guidelines. One criteria for case study selection was origin of the foreign investments. To reduce the cultural gap between investor and recipient firm we “preferred” companies with foreign investors from EU-member states. Another selection criteria was the economic branch. Case studies from each country should include companies from two branches with a very high FDI-penetration, i.e. automotive and IT-Telecom. Researchers in each country were free to choose another branch or sector for their third case study. Besides the case study approach further methodologies applied in research were the analysis of national and international literature and selected statistical data.

2. Country Descriptions

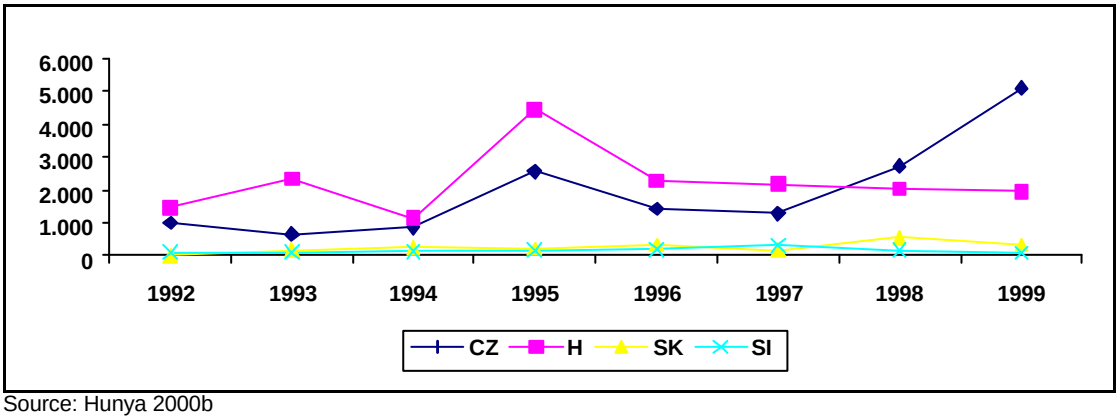
For our research we selected the Czech Republic, Hungary, Slovakia and Slovenia as a country sample because they are among the economically highest developed CEECs. Moreover, they share a common historical, cultural, political and economic heritage, a fact which facilitates comparison. At the same time, the four countries differ in size, GDP as well as penetration by and structure of FDI (c.f. Table 2, Figure 3). Furthermore the four countries differ in their policies towards the restructuring of their economies, privatisation and the legal framework relevant for FDI.

Table 2: Overview of Czech Republic; H, SK and Slovenia by selected Indicators 1999

Indicators	CZ	H	SK	SI
Population in million	10,3	10,5	5,4	2,0
Nominal GDP (billion USD) [1]	53,5	48,9	18,6	19,6
GDP per capita PPP (USD) [1]	13.374	11.346	10.418	15.633
FDI flow (Mio USD) [2]	5.108	1.944	330	83
FDI Inflow per capita USD [2]	497	194	61	42
FDI stock (billon USD) [2]	17.000	19.276	2.000	3.000
FDI stock per capita [2]	1.653	1.919	371	1.511

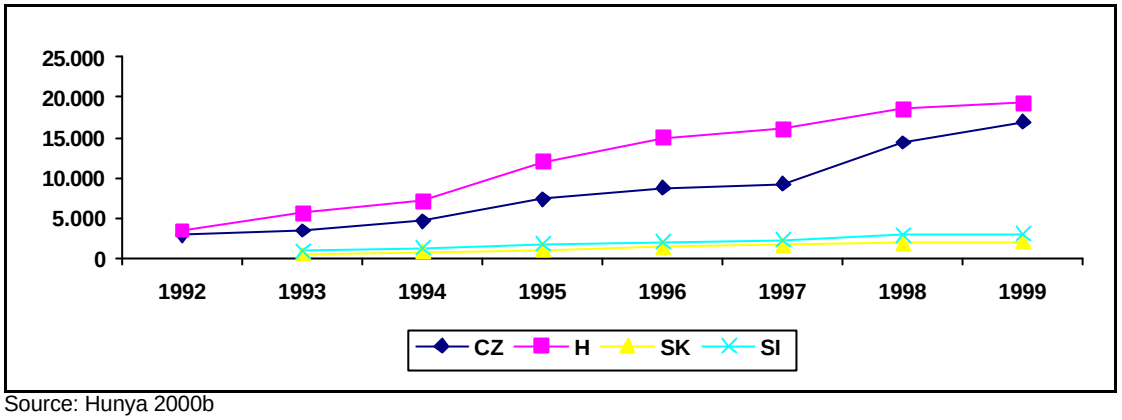
1 Source: Business Central Europe, Key Data 1990–1999
2 Source: Hunya 2000b

Figure 1: FDI Flows 1992-1999 (year end)



Source: Hunya 2000b

Figure 2: FDI Stock 1992–1999 (year end)



Source: Hunya 2000b

The Czech Republic is the second largest country of the four by population. It has the highest nominal GDP and its GDP per capita comes second after Slovenia. In 1999 it had the highest FDI inflow among in total and per capita and its FDI stock comes second after Hungary in total and per capita.

Hungary is the country of the four selected CEECs with the largest population. However, its nominal GDP comes only second after the Czech Republic and its GDP per capita only third after the Czech Republic and Slovenia. Hungary is the country among the four selected CEECs with the highest FDI stock in total and per capita. However, this leading position is contested by the Czech Republic, which shows a particular dynamic growth of FDI stock in recent years (c.f. Figure 1 and 2).

Slovakia with its population of 5 million is among the small of the country sample. Its nominal GDP as well as its GDP per capita is lowest in comparison with the other selected CEECs. Slovakia is also the country of the four CEECs with the lowest FDI stock in total as well as per capita. Measured by FDI inflow Slovakia comes third in total and per capita.

Slovenia is the smallest of the country sample. However, its nominal GDP is higher than that of Slovakia and it is the country of the sample with the highest GDP per capita. Slovenia comes third with its FDI stock (total as well as per capita) and fourth with its FDI inflow (total as well as per capita).

The country sample also differs in the penetration of the manufacturing sector by FDI measured by the share of FDEs on export sales, investments, equity capital, sales and employment. Measured by all these indicators Hungary is the country with the deepest FDI penetration followed by the Czech Republic, Slovenia and Slovakia (c.f. Table 3).

Table 3: Share of FDEs in main indicators of manufacturing companies 1998 in %

Indicators	CZ	H	SK [1]	SI
Export sales	47,0	85,9	n.a.	32,9
Investments	41,6	78,7	24,7	24,3
Equity capital	27,9	72,2	19,4	21,6
Sales	31,5	70,0	21,6	24,4
Employment	19,6	44,9	13,0	13,1

Source: Hunya 2000b
1 Data for 1996 Source: Hunya 2000b

The four countries also differed in the regulative framework of – and the investment policy environment for FDI. The investment policy environment depends on a combination of macro-economic and commercial policies. Those policies that are especially interesting to foreign investors are entry requirements, incentives, foreign exchange and funding policy, access to visas and work permits, land ownership laws, access and availability of physical infrastructure and reparation and expropriation rights. Investment promotion strategies involve the organized use of a range of promotional activities to increase the level of investment in a country. Most strategies use three sets of activities: activities to enhance the image of a country (image building), activities to generate an increased flow of investors (investment generation) and activities to help investors (investor servicing). The four countries of the sample also differ in the speed and form of changing the regulative environment for FDI (e.g. privatization, tax incentives, investor servicing but also general political and economic stability, c.f. Raines / Brown 1999, Hunya 2000a). However, a detailed analysis on FDI policy approaches and their impact on FDI and the knowledge base in CEECs was beyond the scope of the research project.

3. Comparative Analysis

3.1 Firm-Characteristics

The research teams from the four CEEC countries conducted a total of 13 case studies between October 1999 and March 2000 (4 Czech Republic, 3 Slovenia, 3 Slovakia, 3 Hungary, c.f. Table 4).

The companies studied were active in various sectors and branches. According to the selection criteria most of them were from the manufacturing sector and active in machinery for household appliances, telecom and a number of various suppliers for automotive industry, glass fibres, plastic products, machinery and pharmaceuticals. The companies from the service sectors were active in computer and software business as well as in transport and retail. The analysed firms differed in their size: two firms employed less than 100 people, four between 100 and 500, two between 501 and 1000, three between 1.001 and 1.500 and two companies employed more than 1.501 people.

Most of the firms studied were German-owned. Second in foreign ownership was France, followed by Austria and Denmark, Sweden and USA. In most cases foreign ownership was 100%. In three cases the firm had a domestic minority partner and only in one company had a domestic majority partner. It is interesting to notice, that four firms started as joint venture between foreign and domestic partner, but ended up with 100% foreign ownership. Two firms were acquisitions, two were green field investments, two were investment into existing firms and one firm was established as a subsidiary. FDI in these firms started between 1990 and 1998.

3.2 Impact on technology

One important form of technology transfer is to make new equipment and processes available to the FDE. Most companies studied received new and state of the art manufacturing machinery or software. In some cases FDI was connected with a replacement – sometimes complete – of outdated machinery (Danfoss, Slovenia; Knorr-Bremse, Hungary) or – in cases of green field investment with – the installation of completely new machinery (Hella-Behr, Czech Republic; OMV, Slovakia). One firm installed machinery, which was dismounted from an overseas production site (Ceva-Phylaxia, Hungary). In some cases interview partners mentioned, that the company got access to advanced software (IBM, Slovenia), Pragodata, Czech Republic) or free of charge licenses of processes and products (Bosch-Diesel, Czech Republic; Ericsson, Hungary). Only Vertex Litomysl (Czech Republic) did no invest into new machinery, since it was already an advanced competitor on the market. Technology transfer is furthermore realised by involvement of the FDE into the international network of the parent company. All FDEs studied got access to R&D and technology, available in these internal networks.

Table 4: Overview of case studies

	Country	Year	Branches	No Employees	Foreign asset	Investment type	Ownership structure
Danfoss Crnomelj	SI	1992	Compressors for household appliances	1.200	DK	Acquisition	100% foreign
Iskratel Ltd.	SI	1989	Telecom	1.040	D	Initially joint venture	48% foreign 52% domestic
IBM, Ljubljana	SI	1992	Computer, Service	170	USA	Establishment of a subsidiary company	100% foreign
Prago-Data	CZ	1996	Software	157	F	Investment into existing firm	51% foreign 49% domestic
Hella-Behr	CZ	1997	Supplier automotive industry (fabricated metal products)	86	D	Joint venture of two foreign firms, green field investment	100% foreign
Bosch Diesel	CZ	1991	Supplier automotive industry (engines and turbines)	1.100	D	100% subsidiary. Initially joint venture	100% foreign
Vertex Litomysl	CZ	1998	Glass fibres, plastic products	1.600	F	Acquisition	99% foreign
Volkswagen Slovakia	SK	1991	Supplier for automotive industry	157	D	100% subsidiary. Initially joint venture	100% foreign
Siemens (several firms)	SK	1993	Machinery electric, software business	7.096	D, A		50%–100% foreign
OMV Slovakia	SK	1991	Transport, storage, retail	78	A	100% subsidiary. Initially joint venture	100% foreign
Ceva Phylaxia Venterinary Biologicals Co. Ltd.	H	1991	Pharmaceuticals	280	F	100% subsidiary. Initially investment into existing firm	100% foreign
Knorr Bremse	H	1990	Supplier automotive industry (air breaks)	624	D	100% subsidiary. Initially joint venture.	100% foreign
Ericsson	H	1991	Telecommunications	600	S	Green field investment	100% foreign

3.3 Impact on R&D within the FDE

Firms differed with respect to the existence of an R&D department as well as the length of its existence. Firstly, a number of firms had no R&D department, either due to the kind of their business (e.g. filling stations in the case of OMV, Slovakia) or because the enterprise was purely assembling oriented (Hella-Behr, Czech Republic). Secondly, some firms started without an R&D department, but succeeded in setting up such a facility in the course of time (Danfoss, Slovenia; Bosch Diesel, Slovakia; Knorr-Bremse, Hungary). Thirdly, there were firms, which have been always involved in R&D activities – either with or without an own R&D department (Iskratel, Slovenia; IBM, Slovenia; Pragodata, Czech Republic; Vertex, Czech Republic; VW and Siemens, Slovakia; Ceva-Phylaxia, Hungary; Ericsson, Hungary).

R&D departments had also different tasks and roles to play within the parent firms' R&D strategies. All firms studied were integrated in the R&D network of their parent companies, however, the strategic role of their R&D departments in relation to the entire group differed. Firstly, there were R&D departments of local importance. They were mostly small and worked exclusively on the adoption of products and processes developed somewhere else to local production (Danfoss, Slovenia; VW and Siemens, Slovakia). Danfoss, e.g., did not carry out substantial R&D, but, as all subsidiaries of the group, financed a centralised R&D department. It's small R&D unit in Slovenia focused on the development and monitoring of local production processes.

Secondly, there were R&D departments, which are important for particular regions. Some of these R&D units adapted R&D originating from the headquarters to local markets and needs (Iskratel and IBM, Slovenia). IBM had centralised basic R&D activities in dedicated research centres, which were financed from all its subsidiaries. R&D of IBM in Slovenia concentrated on the further development of applications for local circumstances and needs. For this purpose it used IBM hardware- and software tools. Iskratel in Slovenia, as another example, was involved in the country design of Siemens products.

Thirdly, there were R&D departments, which were of global importance for the entire group: One example for this are R&D departments, which are responsible for the further development of products that originate from their headquarters. The R&D department of Bosch Diesel (Czech Republic) was solely responsible within the entire group for the further development of two existing products. Furthermore, there are R&D departments, which perform original R&D for the entire group. Ericsson (Hungary) ran crucial R&D activities employing a R&D staff of 170 which accounts for a 30% of its total personnel. The R&D activities of the Hungarian subsidiary (radio access, network management) were two out of the total of 19 strategic research areas of Ericsson.

3.4 Integration into the domestic knowledge base

Most subsidiaries with an R&D-department of their own have also some sort of R&D co-operation, however, firms differ according to the partners of these co-operations.

Firstly, there were firms, which co-operated solely with their parent company and had no relationship to domestic public or private R&D (Danfoss, Slovenia; Bosch Diesel, Czech Republic; VW, Slovakia).

Secondly there are those firms with close co-operations to domestic public or private R&D (Iskratel and IBM, Slovenia; Pragodata, Czech Republic; Ceva-Phylaxia, Knorr Bremse and Ericsson, Hungary). Iskratel (Slovenia) received from and provided research results to Siemens. It had close ties with university researchers. IBM (Slovenia) had close contacts with global IBM R&D units. It co-operated with many smaller IT software companies and institutes and increasingly also with the two domestic universities. Pragodata (Czech Republic) had weak relations to universities and government agencies, however, two information sources were crucial in the development of expertise in the firm: contacts to foreign experts and contacts to domestic customers. The firm had co-operative agreements with some other firms dealing in the respective market segment. Key components were taken over from foreign and domestic partners and completed as final products and services to the customer, demand driven product development. Ceva-Phylaxia (Hungary) had research collaborations with a number of domestic universities and research centres as well as with domestic enterprises dealing with animal health. It also co-operated with French research institutes. Knorr-Bremse (Hungary) had from the beginning several co-operative arrangements with Technical University Budapest (contract research, teaching, recruitment). Ericsson (Hungary) had a relationship with other regional centres and R&D divisions within the group as well as with competitors. The firm co-operated tightly with several domestic and foreign universities (works both ways: financing, contract-research, training of professionals for company recruitment). Ericsson acted as a bridge between foreign and domestic universities. However, R&D activities were not closely connected to local suppliers and customers. The findings of the case studies show, that companies differ in their co-operation activities with the domestic R&D-sector. While some firms lack co-operative links with the R&D sector in the country others invest into co-operation with the public and private research system and contribute in this way to know-ledge spill over into the national innovation system.

3.5 Impact on personnel and organisational culture

Which know-how was transferred, to whom and in which way?

All case studies reported some kind of training for domestic staff. Training courses were internal or external, held in the country or in the parent company. The training courses reported were short-, medium- or long term. In some companies special training courses involved only technical staff, in others only managers. In some firms foremen were also trained and in few firms the entire staff received special training. Training involved a wide range of issues e.g.: R&D, production, quality, engineering, logistics, environmental issues, new business practices, marketing strategies, organisation and administration, human resource management and foreign languages.

Domestic staff was trained in various settings: Firstly, there was internal training *"at the production line"* in a *"learning by doing"* approach. This type of training could be systematically enhanced by internal mobility, as used in some enterprises. In some firms external firms were hired to train employees, e.g. in languages. A special case of know-how transfer was training by the parent company. Hella-Behr (Czech Republic) trained key workers in Spain for one year in production processes and management for one year in Spain and Germany. The headquarters of Bosch-Diesel in Germany served as a development centre for the entire group. After the completion of the development phase final production and further development was transferred to subsidiaries. To this end an implementing team of about 40 technicians, R&D employees and workers received training at the German headquarters for one month and subsequently trained the domestic staff.

Where does the management of the subsidiary come from?

The case studies show that subsidiaries are either solely run by domestic staff (Danfoss, Slovenia; Pragodata, Hella-Behr and Vertex, Czech Republic; Knorr-Bremse, Hungary) or with a few foreigners holding particular key positions (Iskratel, Slovenia; Bosch-Diesel, Czech Republic; VW, Siemens and OMV, Slovakia; Ceva-Phylaxia and Ericsson, Hungary).

Is there also a transfer of organisational culture from parent company to subsidiary?

A particular outcome of training and knowledge transfer was the diffusion of corporate cultures from parent company to subsidiary. IBM (Slovenia), for example, is the replication of IBM anywhere in the world according to organisational set-up, managerial style, business concept and culture. Also other case studies reported about the substantial influence of the parent company's management style (e.g. centralised/decentralised, hierarchic/flat, formal/informal) on the organisational culture of the subsidiary. The before mentioned dimensions of management styles are particularly important for the question whether and in which way the recipient company co-operates with domestic R&D-institutions. The case of

Siemens (Slovakia), where differences between "mental maps" of local staff and foreign managers caused conflicts, indicates that this transfer of organisational culture can involve frictions.

4. Summary and Conclusions

The limited number of case studies in our small number study does not allow for a definite answer to the question about the impact of FDI on the knowledge base of accession countries. Nevertheless it is possible to draw the following general conclusion: *FDI has far reaching and numerous effects in recipient countries on the firm, the regional as well as the national level.* With respect to the impact of FDI on the knowledge base of the CEECs (on the firm level) these effects are mixed blessing:

On the *firm level* the technologies applied are being upgraded by FDI. In most case studies the firms received new and state of the art manufacturing machinery or software. With one exception all case studies showed that the employees were exposed to a higher level of technology than before FDI. Firms differed in respect to the existence of an R&D department as well as the length of their existence (firms without R&D department; firms which stated without R&D department but subsequently got one; firms, which were always involved in R&D activities). All firms studied – even if they had now R&D departments of their own – were integrated in the R&D network of their parent company. However, the strategic role of their R&D departments in relation to the entire group differed remarkably. R&D-activities ranged from adaptation to local production over regional adaptation to R&D for the entire group. Another impact on firm level described in several case studies was the improvement of management methods.

FDI also improved training and qualifications of employees. All case studies reported some training of domestic staff. A particular outcome of training and knowledge transfer is the diffusion of corporate cultures from parent company to subsidiary. Some case studies reported of the substantial influence of the parent company's management style on the organisational culture of the subsidiary. The case studies showed that subsidiaries were either solely run by domestic staff or with a few foreigners holding particular key positions.

Another possible result of FDI is the establishment of new supplier networks. The case studies of VW (Slovakia) and Siemens (Slovakia) showed that FDE started to develop long-term co-operation links with their domestic suppliers. Yet another effect is the improvement of process or service quality (e.g. just-in-time delivery).

On a *regional level* the case study of VW (Slovakia) showed that FDI had a positive impact on employment and average wages.

On a *national level* FDI can influence the education and science system, the business sector and more widely the general society. Most subsidiaries with an R&D-department had some sort of R&D co-operation. However, they had different kinds of partners (parent, companies, public research institutes) and the intensity of co-operation with the domestic S&T-infrastructure varied. Several case studies described in detail the links between FDE and domestic academia. IBM (Slovenia) made some of its software freely available to academic circles and financed visits of researchers at IBM R&D units. Also Ericsson and Knorr-Bremse (Hungary) reported close links with domestic academia (contract research, recruitment, teaching). These co-operational agreements link higher education closer to industry (and vice versa) and thus contribute to knowledge production as well as dissemination. The Slovakian case studies reported an impact of FDI on the secondary education system.

FDI influences the business sector of a nation in many ways. Firstly, the cases of Iskratel (Slovenia) and Ericsson (Hungary) showed, that positive experiences of investors and recipient set an example, others can follow. Iskratel and IBM (Slovenia), illustrate that improvements in technology, management practice, human resources can spread to other firms. Important vehicles for change and knowledge transfer on a national level are production chains and the high demands on quality, which advanced customers put on their suppliers' products and services. One example for that is just-in-time delivery. The case of Bosch Diesel (Slovakia) indicates, that quality, sustainability, reliability and accountability were still problems to be solved by domestic suppliers. These high demands on production quality, managers were convinced, will spur suppliers' competitiveness and will prepare domestic suppliers for the entry into the world market.

Furthermore, there are effects of FDI, which influence the society more widely and go beyond the business- or research sector. First of all FDI can develop a market milieu in society, can change the communication culture and contribute to a multicultural environment. Finally some case studies reported positive effects of FDI on environmental management and the environmental situation (Siemens and OMV, Slovakia).

However, it is a truism to state that in order to gain these effects it is necessary to establish the necessary links between FDE and the relevant domestic actors, which, as some case studies show, have not been established in a number of firms studied.

And indeed, a number of findings can be interpreted as indicators for the existence of a "janus-shaped economy", in which a number of firms – and all of the FDEs analysed in the course of this study are part of this group – is forward-looking with regards to the technology utilised, the training of the work-force and the management practices introduced. However, in such an economy the second face of Janus is looking backwards: in this CEE-capital dominated part of the economy technologies may be (out-)dated, the work-force may have had no continuous training and the management practices are likely to be not international best practice. This, in all CEECs large group of firms consists mostly of small and medium

sized enterprises such as typically found in the service sector and large non-privatised firms, often in the steel and mining sector.

These findings alone might be of less importance than to find an answer to the question if it will be possible to transfer the relative successes of the forward-looking part of the economies in CEE to the backward-looking part. Put differently, will spill-over in technologies, skills of shop-floor staff and management methods occur regularly enough so as to make a difference for the development of CEECs?

Whereas in general studies about FDI seem to be rather optimistic about such spill-over (Dunning 1993), most current studies about CEE seem to come to mixed results. Some indications for such spill-over have been found (Hunya 1999), yet a certain scepticism remains about the likelihood of such a spill-over to be a regularly reoccurring event (Djankov / Hoekman 1998), especially since FDEs in CEE do not seem to develop R&D capacities on a broader base (Dyker 1999, Biegelbauer 2000). Worse, several studies seem to indicate a negative impact of FDEs on the CEE firms based on indigenous capital. Two mechanisms seem to be at work: firstly, under increased competition the often technologically clearly advanced FDEs prevent spill-over and rather tend to eliminate their competitors (Zukowska-Gagelmann 1999) and, secondly, FDI tends to flow to these CEE enterprises, which from the outset on have been of higher productivity and profitability than their CEE competitors – and hence at best reinforce existing disparities, leading to a crowding out of relatively less competitive firms, but not to an enhancement of existing CEE firm capabilities through spill-over effects (Djankov / Hoekman 1998).

These findings are in line with the data of the study at hand, which indicate that FDI indeed is a mixed blessing when qualified after its longer-term effects on the knowledge bases of the CEECs. On the one side the FDEs clearly profit from the investments made. As has been stated, in the FDEs technology in all forms is updated, the workforce is trained and management methods modernised. Yet in most cases these investments into the knowledge base of the FDEs did either not or only in the last years lead to a development of R&D capacities. Although there seems to exist a trend towards the establishment of R&D facilities in FDEs (most notably, and transcending the case studies discussed here, this can be seen in Hungary, see Biegelbauer 2000), it is as of now unclear if this trend is substantial – at least it is a deviance of the trend visible in the first half of the 1990s when CEE R&D capacities were in most cases of FDI destroyed by the foreign investors.

On the other side, a number of FDEs had no or only very small ongoing cooperation activities with CEE-capital based firms and with other indigenous knowledge-producing institutions such as local universities. Again there are signs for a weak trend towards a closer cooperation of FDEs and indigenous firms and research institutions, but, again, as of now it is unclear if this trend is substantial.

What makes the questions after the forms of cooperation of FDEs with CEE innovation systems and the existence of a Janus-shaped economy so important is the question of the economic integration of CEE into the EU. If these singular incidents of the establishment of R&D capacities by foreign investors and of a closer cooperation of FDEs with CEE firms and research institutions should prove to become a trend, the CEECs can hope to be economically integrated into the EU rather quickly. If there should remain a divide between FDEs and CEE firms and institutions thus limiting spill-over effects, the CEE innovation systems will lose parts of their knowledge base. This, in turn will have the likely effect of a slower integration of this part of Europe into the EU, with all the economic and political ramifications of such a process.

Annex

Company Case Studies

Danfoss (Slovenia)

Kind of technology transfer	– Total replacement of old machinery with foreign machinery – Training of many engineers technical staff abroad (short and medium term) – no foreign but local management
Export share	– 90–95%
R&D	– At time of acquisition no R&D – Centralised R&D unit financed by all daughters – No substantial R&D is being developed. Small R&D unit focussed on development and monitoring of local production processes
Research Collaborations	– Co-operation with central R&D organisation
Management Knowledge	– Replication of organisation structure of Danfoss units of similar size – Heavy use of internet in intra- and internet (high use of internet in Slovenian comparison) – Higher workload (better/higher usage of working time – Continuous training of personnel (skilled, unskilled and managerial)
Knowledge base contribution	– Employees are exposed to much higher level of technology than previously. – Important contribution to knowledge base. Organisations set-up, managerial concept, human resource management have contributed to increased skills of labour force – Substantial contribution to the region.

ISKRATEL Ltd. (Slovenia)

Kind of technology transfer	– State of the art technology (licence for production)
Export share	– Not mentioned
R&D	– Measured by the amount of R&D services, Iskratel by 1995 became one of the strongest Siemens R&D units of Siemens – 400 persons enganged in services for Siemens – Country design = adapting software in Siemens switching systems to specific needs of individual customer countries – Assetts: cheap highly qualified engineers – 14% of turnover of Iskratel infested into R&D
Research Collaborations	– Siemens – Get research results from Siemens, provide their results to Siemens – Close ties with research institutions in at universities
Management Knowledge	– Introduction of new business practices management, information, marketing strategy and organisation, administration, human resource management. – Changes particularly felt in the beginning – Adoption of standard market economy enterprise practices helped Iskratel to survive. – Two managerial positions held by foreign staff, rest domestic, top managerial position always Slovenian
Knowledge base contribution	– R&D unit contributes significantly to knowledge base in telecommunication in Slovenia – Spill over of management practices into national economy – Model of good practice
Conclusion	– Provides probably the clearest case of R&D transfer. (...) The quality of Slovenia human resources (technical, managerial) were the key factors in making such relationship an equal partnership and therefore of long-term mutual interest.

IBM (Slovenia)

Kind of technology transfer	– Initial investment in equipment and technology (software) of mother company – As a 100% of IBM, firm is fully integrated in the IBM global system and as a result research, technology and new technology of IBM is fully available for the firm. Integration in "matrix organisation scheme".
R&D	– Centralised basic R&D activities in dedicated research centres financed from all its countries – Local R&D: development of applications, using IBM hardware and software tools, suitable to local circumstances and needs. Increasingly important to adapt products to local needs. – One of four global PC Institutes of IBM for education and support in the area of personal computers for entire Europe and Emerging Markets.
Research Collaborations	– Close contact with global IBM R&D units – Co-operation with many smaller IT software companies and institutes and more and more with the two Universities – New ways of university-industry relations are being explored
Management Knowledge	– "The organisations set-up, managerial style, business concept and culture at IBM Slovenia are the replication of IBM anywhere in the world", i.e. the transfer of management techniques and practices. – Close implementation of common company policies and processes (planning, reporting, delegation, hiring, training) – Training programmes for staff
Knowledge base contribution	– Integration of IBM Slovenia into IBM has significant spill over effects for the local environment. Solutions of IBM are solutions on international standard, adapted to local needs. – Some software is freely available to academic circles – Trough IBM Slovenia several professors have visited IBM R&D Units globally – Indirect contribution trough increased technical and managerial knowledge, achieved by continuous education and training of Slovenian IBM staff.
Conclusion	– IBM Slovenia is a case of a wholly integrated daughter company into the international organisational set-up of a large multinational. This integration provides for specific knowledge spill over effects to local environment even though fundamental research remains centralised. Again, the gain of the country depends very much on the quality of the human resources available.

Pragodata (Czech Republic)

Kind of technology transfer	– Access to the advanced applied software products – Co-operative agreements with other foreign hardware producers and distributes its products
Motivation for FDI	– Primary motivation: product placement on a new market (foreign partner) – Access to the financial resources (domestic partner) – Better access to the customers (domestic partner) – Access to advances management practices (domestic partner)
R&D	– No specific R&D department – 30% of staff engaged in product development
R&D Collaborations	– Relations to universities, government agencies are weak – Two information sources are crucial in the development of expertise in the firm: contacts to foreign experts and contacts to domestic customers. Co-operative agreements with some other firms dealing in the respective market segment. Key components are taken over from foreign and domestic partners and completed as final products and services to the customer, demand driven product development
Management Knowledge	– Training for domestic personnel in the foreign firm – Management of the firm is carried out by the domestic personnel

Hella-Behr (Czech Republic)

Kind of technology transfer	– Machinery and Equipment: 100% brand new assembly machines for production. 14% of total investment – Investment in Human Capital: – Internal training “at the production line” by “learning by doing” – Training by external firms (language, quality, engineering and logistics) – Training by mother companies – The key workers were trained in Spain for one year. Management was trained 1 year partly in Spain and Germany – Information channels: – Internal communication: Flat organisation. Most common forms of communication. – Communication with mother companies most important. Communication with other enterprises in the group runs through the mother companies. Communication with VW Skoda as well as with other suppliers of them runs through mother companies.
R&D	– No R&D-Department. Pure assembly facility – All R&D activities are run by the mother companies
Management Knowledge	– Run completely by Czech management, trained in mother companies in Spain and Germany – Different kinds of management styles in mother companies: Behr “tight system of orders and instructions”, Hella: “more decentralised, managers have more competencies” – Hella-Behr puts together the management approach of both mother companies. “there is more independence for the management if compared with other Czech companies”
Knowledge base contribution	– Effects on the knowledge base of the country is concentrated on the upgrading of human resources in the firm, the technological, managerial and organisational capacities of the local staff. – The relations to the other organisations, which are part of the knowledge base of the country have not been established yet.

Conclusion	– Green field investment with complete transfer of technology and intensive training of local staff up to the current standards of the mother company – Different management styles of the mother company influenced the management style. Centralist mode of organisation leaves local management limited space for its own initiative – Local staff was able to take over all management posts in the firm – No R&D department – Co-operative relations with suppliers and companies are run through the mother companies – No relations to domestic knowledge base

Bosch Diesel (Czech Republic)

Kind of technology transfer	– Technology transfer: free of change general licence under which all products are being produced. – Investment into human capital – Headquarters serves as a development centre of new products for the whole group, the final production is always transferred into subsidiaries after the development phase is completed. Learning by doing. Implementing team of about 40 technicians, R&D employees and workers is trained for one month in German Headquarters and subsequently trains the workers etc. at home. – Continuous training from management to foremen level by external company (quality, environmental issues) – Foreign language courses – Internal mobility – Information channels: Vertical and horizontal communication within the Group extremely important. – Learning by doing. Person to person, internal information network – No direct information flow between firm and final customer or competitors – R&D in headquarter, afterwards transferred to one subsidiary. Thus initial information flow between subsidiary and headquarters and afterwards between subsidiaries producing the same product.

R&D	– In the beginning mainly assembly facility without R&D department – Now R&D department, employing 28 employees carries out R&D for two products for the entire group
R&D –collaboration	– Contacts to local science and technology system and private research organisation are not important
Management Knowledge	– Two high ranking Germany Manager (General Manager, Financial Manager) – Transfer of management style similar to German headquarter, tight and fairly centralised
Knowledge base contribution	– Very close co-operation with suppliers, which are connected to knowledge transfer. Firm puts high demands on quality and just-in-time delivery of suppliers. This is at present a problem. These demands, managers of the firm are convinced, will increase suppliers' competitiveness and will prepare them for the entry into the world market.
Conclusion	– Extensive (tangible) technology transfer, most of the manufacturing equipment was replaced – Intensive transfer of human capital in the technological and management skills – Despite centralised management style close vertical and horizontal interaction in the group. – Firm could gain active position in the technology infrastructure of the company and has now own R&D unit. Interacts with the central R&D laboratories – From assembly to more difficult activities. Now higher value added products and R&D activities – Transfer of technology, knowledge and (centralised) management style.

Vertex Litomysl (Czech Republic)

Kind of technology transfer	– No transfer of technology. Company was already equipped with up-to-date technology – Human capital: Long term plan of various forms of training for employees, specialists, language courses, training abroad.
Export share	– 85% (East and Sotuh Eastern Europe)
Motivation for FDI	– Take over of the advanced competitor
R&D	– R&D facility
Management Knowledge	– Management has not been changed after the foreign investor has entered the firm.
Knowledge base contribution	– The entry of the foreign investor into the domestic firm has not improved the knowledge base of the domestic firm in the manufacturing and organisation practices so much. R&D and performance of the firm are at good level. Improvement in marketing practices and sales opportunities.
Conclusion	– Firm is producing a product the innovation of which is closely related to process innovation. Improvement of manufacturing is gradual, know-how based and R&D intensive – Firm has possessed manufacturing know-how and R& capacities and leading position in domestic market – FDI influenced; extension of contacts, improvement of technology, expansion of markets

Volkswagen (Slovakia)

Export share	– Almost 100%
R&D	– Research unit oriented on experimental development activities for production process, not for development of new products
Research Collaborations	– Co-operation with Dept. of industrial design, Academy of Rts at Bratislava, however, with mother company
Management Knowledge	– Small part of managers from mother company – Emphasis on training of domestic experts – Transfer of management works very efficiently
Knowledge base contribution	– Problems with reliability and sustainability of product quality from Slovak suppliers
Conclusion	– Several FDI effects: – Development of market milieu – change in communication culture – raising the quality of products and services – more responsible approach to obligations of national suppliers – Raising labour productivity – Transfer of management method – Rapid growth of employment and average wages – Long term co-operation links with domestic suppliers – Impact on secondary education system – Main impact: production process quality – General environemtn ofFDI in Slovakia: – Legal framework is fully comparable with neighbouring countries – Missing regioanl competencies and industrial parks – Major Problem is attempts to revitalis (i.e. preserve) an old industrial production structure with FDI

Siemens (Slovakia)

Kind of technology transfer	– Sales – Production – Know-how – Human capital: training in Slovakia and Germany – Sources of information: Austrian and German mother companies, suppliers of software, fairs, exhibition and competitors abroad
Export share	– Ca. 80%
R&D	– Small R&D unit for software – Is currently building experimental development unit
Research Collaborations	– Generating long-term co-operation links with with domestic suppliers (which) – Impact on R&D system (which?)
Management Knowledge	– Difficulties of foreign experts to understand Slovakian “mental maps” – Now mix of experts
Knowledge base contribution	– Learning effects by-doing – Technological upgrading – Reducing of waste – New standards in oft skills – Transfer of management methods: eg. balance of payment – Raising quality of services (e.g. just-in-time delivery) – Raising suppliers’ awareness for quality
Conclusion	– Problems with Slovakian supplier (quality) – Advantages for FDI in SK are not high enough to countervail disadvantages compared to neighbouring countries.

OMV (Slovakia)

Kind of technology transfer	– Construction projects and technological equipment for filling stations – Investment into human capital: targeted training of all employees. Raising the qualifications of employees – Most important source of information: Austrian mother company – Transfer of management methods
Export share	– Ca. 80%
R&D	– No research unit
Research Collaborations	– Co-operation with market agencies (private profit organisation)
Management Knowledge	– Smaller part of managers from Austrian mother company. – Emphasise was put on training domestic experts – ISO 9000
Knowledge base contribution	– Impacts on education systems and infrastructure
Conclusion	– Change in the cultrue of sales – Raising quality of services – Raising awareness for obligations (which?) – Impact on environment protection

Ceva-Phylaxia Veterinary Bologicals Co Ltd (Hungary)

Kind of technology transfer	– Continuous transfer of technology, personnel (mainly related to management), information and R&D strategy has happened. – The transfer of product and technology know-how is very important – Source of know-how from mother company – Technology from dismounted American company – Information and decision making structure integrated into international system
Export share	– Ca. 80%
R&D	– Biologicals development situated in Budapest – Goals of R&D: develop new products and select “first category products” from the assortment for development to meet requirement everywhere
Research Collaborations	– The firm has an interactive and strong connection with the Hungarian professional institutes in the fields of co-operative research and training
Management Knowledge	– Several managers from abroad, their number decreased, but is increasing again

Knorr Bremse (Hungary)

Kind of technology transfer	– Initially most simple wage work with installed machines and transferred technology. – After one year the company took over responsibility of technological preparation an later logistic
Export share	– Ca. 80%
Motivation for FDI	– High industrial culture in Hungary – Low wages
R&D	– Over the last 5 years the firm could build up a development facility
Research Collaborations	– Good co-operation with Budapest Technical University from the beginning (contract research, teaching, recruitment)
Management Knowledge	– Initially majority of suppliers German and logistic s provided by the headquarter – Hungarian Management

Ericsson (Hungary)

Kind of technology transfer	– Technology transfer trough: courses, on the job training, mobility of personnel, project-based team work, extra net
Export share	– 49%
R&D	– Runs crucial R&D activities in Hungary – R&D laboratories in one of the integral parts of Ericsson Research Branch – Hungarian R&D activity is tightly connected with 2 of 19 strategic research areas of Ericsson (radio access, network management)
Research Collaborations	– Co-operates tightly with Hungarian universities – Relationships with other Regional centres and R&D divisions within the group and with competitors.
Knowledge base contribution	– Introduces multicultural environment – Bring higher education closer to industry – Realises knowledge production as well as knowledge dissemination – Sets an example and has followers
Conclusion	– Ericsson successfully filled the vacuum caused by the disappearance of the traditional electronic industry

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