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Jutta Günther*

FDI as a Multiplier of Modern Technology in Hungarian Industry

Foreign direct investment is generally expected to play a significant role as a multiplier of modern production and management know-how in Central Eastern European transition economies. The following paper examines the various mechanisms by which such technological spillover effects could in theory take place and compares them with the results of an empirical study of their practical significance for Hungarian industry.

Since the beginning of transition, Central Eastern European countries (CEEC)¹ have undergone substantial restructuring with the result that today the structure of the economy in these countries is not very different from the EU average (cf. Figures 1 and 2). However, with respect to productivity the CEEC-5 still lag far behind Western Europe (cf. Table 1). Therefore, the process of technological renewal of domestic companies needs to go much further if these economies wish to catch up with the EU.

The process of technological renewal requires an international technology transfer, which for the most part takes place via foreign trade but can also be supported by foreign direct investment (FDI).² For the host country FDI not only means the establishment of foreign investment enterprises (FIE) with modern equipment but also a "spread of knowledge from superior foreign to domestic companies".³ In this context, spillover, trickle-down, learning, synergy and multiplier effects are just different expressions of the same phenomenon: innovation activities within technologically backward domestic companies deriving from the presence of FIE.

Technology spillovers are frequently mentioned in the literature and several authors state that the transfer of technology and know-how accompanying FDI is already more important for transition economies than sole capital transfer.⁴ However, there is no comprehensive theory of technology spillovers

and not much empirical research has been carried out that would allow a deeper insight into the practical mechanisms of technology spillovers and their relevance to Central Eastern European transition economies. Therefore it is the intention of this paper first to create a theoretical framework that explains how technology is transferred between FIE and domestic firms in the sense of spillovers and, second, to describe the practical significance of technology spillovers using the example of Hungarian industry.

FDI and Foreign Subsidiaries

In contrast to portfolio investment, FDI is long-term oriented investment abroad, in which the main objective of the investor is to gain a significant impact on the company's decision-making processes.⁵

¹ According to the geo-political definition suggested by Sundhausen, the region of Central Eastern Europe comprises Poland, Slovakia, Slovenia, the Czech Republic, Hungary and the three Baltic states of Estonia, Latvia and Lithuania (cf. H. Sundhausen: Osteuropa, Südosteuropa, Balkan: Überlegungen zur Konstruktion historischer Raumbegriffe, in: H. Sundhausen (ed.): Was ist Osteuropa? Interdisziplinäre Arbeitspapiere des Osteuropa-Instituts, No. 1, Berlin 1998, Osteuropa-Institut der Freien Universität Berlin, p. 5. For reasons of data availability, the introduction of this paper focuses on the Czech Republic (CZ), Estonia (EE), Hungary (HU), Poland (PL) and Slovenia (SL) – the original first candidates for EU Eastern enlargement. They are referred to as CEEC-5.

² H. Klotz: Technologietransfer und internationale Wettbewerbsfähigkeit, in: Außenwirtschaft, Vol. 45, No. 1, 1990, pp. 57-79.

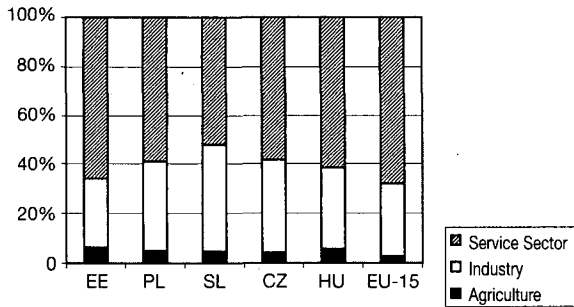
³ G. Hunya: International Competitiveness Impacts of FDI in CEECs. WIIW Research Report No. 268, Vienna 2000, Vienna Institute for International Economic Studies, p. 4.

⁴ G. Hunya: Integration of CEEC Manufacturing into European Corporate Structures via Direct Investment. WIIW Research Report No. 245, Vienna 1998, Vienna Institute for International Economic Studies; C. H. McMillan: Foreign Direct Investment in Eastern Europe: Harnessing FDI to the Transition from Plan to Market, in: S. Chan (ed.): Foreign Direct Investment in a Changing Global Political Economy, New York 1996, St. Martin's Press, p. 139.

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Figure 1

Sectoral Structure of the Economy (Gross Value Added in %) 1999^a

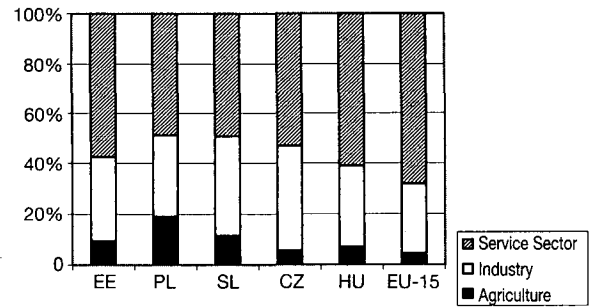


^a Service Sector = NACE: G-O, Industry = NACE: C-F, Agriculture = NACE: A-B

Data source: Eurostat. Cf. S. Stapel: Wertschöpfung, Beschäftigung, Verdienste und Arbeitsproduktivitäten der Beitrittskandidaten, in: Eurostat-Reihe: Statistik kurz gefasst, Wirtschaft und Finanzen, No. 13/2001, pp. 3ff.

Figure 2

Sectoral Structure of the Economy (Employment in %) 1999^a



^a Service Sector = NACE: G-O, Industry = NACE: C-F, Agriculture = NACE: A-B

Data source: Eurostat. Cf. S. Stapel: Wertschöpfung, Beschäftigung, Verdienste und Arbeitsproduktivitäten der Beitrittskandidaten, in: Eurostat-Reihe: Statistik kurz gefasst, Wirtschaft und Finanzen, No. 13/2001, pp. 3ff.

According to the International Monetary Fund, a significant impact is possible when the foreign investor holds a share of at least 10% of the nominal capital.⁶ Lower shares count as portfolio investment, the main objective of the investor being to realise short-term gains on the stock exchange. These IMF definitions have mainly been developed for statistical purposes in order to improve the international comparability of FDI statistics. Most OECD countries and non-OECD transition economies have adopted the recommended IMF definitions in their national accounts.

In practice, FDI appears in the form of foreign subsidiaries. A foreign subsidiary is defined as a

company more than 50% of the voting shares of which are owned by another corporation, termed the parent company.⁷ Foreign subsidiaries are very often 100% foreign owned. They come into existence through the takeover of an existing company abroad (acquisition) or the foundation of a new company (greenfield investment). Companies that establish operating units via FDI in at least two countries are called multinational companies. The term multinational company refers to the whole concern.⁸

Theory of Multinational Companies

There is no lack of theories explaining the existence of FDI or rather the existence of multinational companies. A whole spectrum of theoretical explanations has been developed since the 1960s, when FDI became more and more important in practice.⁹ The different theoretical explanations that developed over time have been integrated by Dunning¹⁰ into his OLI-

Table 1

Labour Productivity (Gross Value Added per Employee) of the CEEC-5 in Manufacturing Industry 1998

	Labour Productivity (EU-15 = 100)
Estonia	26
Poland	38
Slovenia	58
Czech Republic	53
Hungary	49

Data source: Eurostat. Cf. S. Stapel: Wertschöpfung, Beschäftigung, Verdienste und Arbeitsproduktivitäten der Beitrittskandidaten, in: Eurostat-Reihe: Statistik kurz gefasst, Wirtschaft und Finanzen, No. 13/2001, pp. 6ff.

⁵ P. Krugmann, M. Obstfeld: International Economics. Theory and Policy, Addison-Wesley 2000, pp. 169f.

⁶ IMF: Balance of Payments Manual, Fifth Edition, Washington 1993, International Monetary Fund, pp. 86f.

⁷ OECD: OECD Science, Technology and Industry Scoreboard 1999. Benchmarking Knowledge-based economics, Paris 1999, p. 72.

⁸ J. H. Dunning: Multinational Enterprises and the Global Economy, Addison-Wesley 1993, p. 3f.

⁹ R. E. Caves: Multinational Enterprise and Economic Analysis, Cambridge 1996, Cambridge University Press; J. H. Dunning, op. cit., pp. 68f.

paradigm. This has become the standard theoretical framework for studies on foreign subsidiaries.¹¹ The OLI-paradigm explains FDI by showing under which circumstances a parent company will establish a foreign subsidiary instead of entering the foreign market via exports or licensing to a local producer. Three conditions (O, L, I) must be fulfilled before FDI takes place. First, the potential foreign investor – compared to the firms in the foreign market – must have ownership advantages (e.g. firm-specific production technology, marketing strategies). In order to regard production within the foreign market as more efficient than exports, a second condition must be met: the aspired foreign country must offer locational advantages (e.g. lower taxes, lower wages, cheap raw materials). However, as it could still be more efficient to have a local company within the foreign market produce via a licensing agreement, a third condition must be met before a subsidiary will be established abroad: the potential foreign investor must have internalisation advantages. This means that it must be more efficient for the foreign investor to make use of the firm-specific technology within the multinational concern through a subsidiary because asymmetric information makes licensing agreements impossible (failure of technology markets). Only if all three conditions, i.e. ownership, locational, and internalisation advantages, are met will a firm establish a foreign subsidiary instead of engaging in exports or licensing agreements.

Dunning's theoretical framework, as presented here, does not explain technology spillovers. But it is reasonable to assume that the technology "packed" in a foreign subsidiary cannot be completely prevented from trickling down to domestic firms.¹² Therefore, the OLI-paradigm lays the foundation for a theoretical explanation of technology spillovers. However, it must be developed further in order to understand why technology spillovers exist and how they take place in practice.

¹⁰ J. H. Dunning, *op. cit.*, pp. 75f.

¹¹ Cf. e.g. M. Barz: Foreign direct investment and technology transfer: the case of Russia, Brighton 1998, Dissertation at Sussex University Brighton; J. Autschbach: Internationale Standortwahl: Direktinvestitionen der deutschen Automobilindustrie in Osteuropa, Wiesbaden 1997; B. Klagger: Internationalisierung des Bankwesens in Osteuropa: die ausländische Direktinvestitionstätigkeit im ungarischen und tschechischen Bankensektor im Spannungsfeld zwischen nationalen Bedingungen und der internationalen Niederlassungspolitik multinationaler Banken, Münster 1997.

Explaining Technology Spillovers

In this paper technology spillovers are defined as the transfer of hard technology (tangible assets) or soft technology (knowledge) from FIE to domestic companies outside market transactions. The non-market character of technology spillovers is usually explained by positive externalities which exist because technology is at least partially a public good.¹³ These so-called externality spillovers appear anonymously and without any price to be paid by the technology-taking company. However, besides externality spillovers, foreign investors can also consciously and intentionally transfer hard or soft technology to domestic companies without asking a price to be paid in direct return but expecting future advantages for themselves. These extra-market linkages can e.g. derive from the foreign firm's interest in enabling a domestic company to produce certain products and become a future supplier. This second type of technology spillovers, which requires a direct link between the two sides, will be referred to here as linkage spillovers. Externality and linkage spillovers build two main (theoretical) types of spillovers. However, some further considerations are necessary in order to explain how technology is finally transferred from one company to another (here from FIE to domestic firms). Table 2 presents an overview of the practical spillover mechanisms by type.

The demonstration of technology by foreign investment companies can lead to "learning by watching"¹⁴ or "reverse engineering".¹⁵ "Learning by watching" means that domestic firms observe the foreign investor's entrepreneurial actions, e.g. in the field of marketing or logistics, and legally copy certain practices which are new to them and result in innovation activities. "Reverse engineering" takes place when the domestic firm legally copies product technology after the inspection of a foreign

¹² M. Blomström, A. Kokko: Multinational Corporations and Spillovers, in: CEPR Discussion Paper, No. 1365, London 1996, Center for Economic Policy Research, pp. 48f.

¹³ G. Grossmann, E. Helpman: Innovation and Growth in the Global Economy, Cambridge 1997, pp. 15f.

¹⁴ B. Burger: Ausländische Direktinvestitionen, technologische Spillover-Effekte und industrielle Entwicklung, dargestellt am Beispiel Mexiko, Baden-Baden 1998, Nomos-Verlag, pp. 56f.

¹⁵ P. Mohnen: R&D Externalities and Productivity Growth, in STI Review: Science, Technology, Industry, No. 18, pp. 41.

Table 2

Types and Mechanisms of Technology Spillovers

Externality Spillovers	Linkage Spillovers
Demonstration	Supplier contacts
Labour mobility	Customer contacts
	Networking

company's product. Technology spillovers that derive from demonstration are a typical example of externality spillovers.¹⁶

Labour mobility is another mechanism from which externality spillovers can result. Foreign investment companies often invest in professional education and training of their local staff.¹⁷ Thus employees acquire general and specific qualifications through training programmes or just by learning on the job. If the qualified employees move to domestic companies or open their own business they automatically transfer technological knowledge that can be of use to the existing or newly founded domestic enterprise.

Supplier contacts are another often mentioned mechanism for technology spillovers.¹⁸ The underlying consideration is that foreign firms transfer hard or soft technology to domestic firms in order to circumvent transaction costs related to the otherwise costly search for adequate suppliers. If domestic suppliers receive such support from foreign investors and do not have to pay for it, a typical linkage spillover arises.

On the other hand, linkage spillovers can arise from customer contacts between foreign investors as suppliers and domestic firms as customers. The idea is that the foreign investor transfers technology to the domestic customer above the contractual obligation in order to gain a new customer or bind an existing one i.e. for strategic marketing reasons. Compared to supplier contacts, this spillover mechanism plays a less important role in the empirical literature, but Blomström¹⁹ and Blomström/Kokko provide evidence for the growing importance of that mechanism, e.g. with respect to computer-based production goods.

The fifth spillover mechanism, the so-called networking, covers all remaining forms of formal cooperation between independent foreign and domestic companies outside business contact. Such cooperation, aimed to realise common interests, can take place within business organisations, joint research and development projects etc. Linkage spillovers within such networking activities appear

when an FIE regards it as useful to transfer technology to the domestic cooperation partner, who in turn does not have to pay for it.

The distinction between these five observable mechanisms of technology spillover is analytical and in practice they can often overlap. So it is highly probable, for example, that supplier or customer contacts are accompanied by "learning by watching". However, the empirical study was based on the distinction between these five mechanisms. Before turning to empirical results the research concept will be briefly outlined.

Research Concept

The intention of the empirical study was not to measure directly the possible effects of technology spillovers on domestic industry (e.g. productivity growth) but to elaborate the real significance of spillover mechanisms on the basis of an explorative empirical study. As the selection of such a qualitative research subject requires a qualitative research approach, expert interviews were chosen as the main method of investigation. Semi-structured interviews as defined by Lamnek²⁰ were carried out in Hungary in the second half of the year 2000 with experts from the following five fields:

- foreign investment enterprises
- domestic enterprises
- policy-makers
- business associations
- science

At least five interviews were carried out in each expert group with leading representatives from various companies and organisations (see Table 3).²¹

¹⁶ It can be argued that reverse engineering and learning by watching can also take place without the presence of FIE, i.e. technology spillovers appearing across national boundaries. However, transaction costs are much lower for domestic companies when FIE operate "next door". Therefore, FIE do indeed have a multiplier function (cf. J. H. Dunning, *op. cit.*, pp. 470 f.; E. Mansfield, A. Romeo: *Technology Transfer to Overseas Subsidiaries by U.S.-Based Firms*, in: *The Quarterly Journal of Economics*, Vol.95, 1980, pp. 737-750).

¹⁷ J. H. Dunning, *op. cit.*, pp. 372f.

¹⁸ *Ibid.*, pp. 446f.

¹⁹ M. Blomström: *Host Country Benefits of Foreign Investment*, in: D. G. McFetridge (ed.): *Foreign Investment, Technology and Economic Growth*, Toronto 1991, Toronto University Press, pp. 93-110.

²⁰ S. Lamnek: *Qualitative Sozialforschung, Volume 2: Methoden und Technik*, Weinheim 1995, Psychologie Verlags Union, pp. 36ff.

²¹ I wish to thank all the experts for their time, openness and willingness to give interviews in English or German.

The evaluation of the interview material (verbal data) took place according to the "reductive procedures" described by Lamnek²² and Meuser/Nagel.²³ Summarised results of the expert interviews are presented below. They are put in italics and quotation marks. For reasons of data protection, only the relevant expert group is indicated.

In addition to expert interviews, secondary analysis of data from company surveys has been conducted. The search for secondary data took place in Hungary in the year 2000 and despite the high specialisation of the research subject several research institutes were able to offer relevant secondary data that has been included in the empirical study. Details will be given below.²⁴

Empirical Results

Hungary, at first glance, offers favourable preconditions for technology spillovers to take place – regarding the quantity and quality of foreign direct investment and the overall absorptive capacity of the economy. Simplified, absorptive capacity can be regarded as a function of the economy's human capital and research and development (R&D).²⁵ As in most other transition economies, the educational system in Hungary has a high standard. Accordingly, the economy is well equipped with a qualified work force.²⁶ Despite severe cut-backs in the state budget for R&D, the Hungarian R&D potential is still characterised as advanced and comparable with the EU average.²⁷ With respect to the qualitative composition of FDI in Hungary it can be stated that it is no longer dominated by low-tech labour-intensive activities but

²² S. Lamnek, op. cit., pp.107f.

²³ M. Meuser, U. Nagel: *ExpertInneninterviews – vielfach erprobt, wenig bedacht. Ein Beitrag zur qualitativen Methodendiskussion*, in: D. Garz, K. Kraimer (eds.): *Qualitativ-empirische Sozialforschung*, Opladen 1991, Westdeutscher Verlag, pp. 441-468.

²⁴ I wish to thank all my colleagues at the Hungarian research institutes for discussion, friendly support and access to survey material.

²⁵ W. M. Cohen, D. A. Levinthal: *Absorptive Capacity: A New Perspective on Learning and Innovation*, in: *Administrative Science Quarterly*, Vol. 35, pp. 128- 152.

²⁶ EBRD: *Transition Report 2000. Employment Skills and Transition*. London 2000, European Bank for Reconstruction and Development.

²⁷ OMF: *National Innovation System in Hungary*, Budapest 1999, National Committee for Technological Development; A. Inzelt: *The Transformation Role of FDI in R&D: Analysis Based on Material of a Databank*, in: D. A. Dyker, S. Radosevic (eds.): *Innovation and Structural Change in Post-Socialist Countries: A Quantitative Approach*, Dordrecht, Boston, London 1998, Kluwer Academic Publishers, pp. 185- 201.

Table 3
List of Expert Interviews

	Number of Interviews
Expert group 1:	
Foreign investment enterprises	
AUDI Hungaria Motor Kft.	2
General Electric Lighting Tungsram Rt.	1
Henkel Magyarország Kft.	1
TEMIC Telefunken microelectronic Hungary Kft.	1
Reemtsma Debrecen Tobacco Factory Kft.	1
Zeuna Stärker Magyarországi Kft	1
Expert group 2: Policy-makers	
Economic policy	
Hungarian Ministry of Economic Affairs, Department: supplier programme	2
Hungarian Ministry of Economic Affairs, Department: regional development	1
Hungarian Foundation for Enterprise Development (MVA)	2
Investment and Trade Development Agency (ITD)	1
Technology policy	
Hungarian Ministry of Education and Technology, Department: R&D-strategy	1
Hungarian Ministry of Education and Technology, Department: Technology Foresight Programme	1
Institute for International Technology (NETI), Department: International Technology-transfer	1
Expert group 3: Business associations	
Industry associations	
Association of Hungarian Automobile Industry (MGSZ)	1
Association of Hungarian Automobile Supplier Industry (MAJOSZ)	1
Association of the Hungarian Chemical Industry	1
Association of the Hungarian Electrical Industry	1
Chambers of Commerce and Industry	
Hungarian Chamber of Commerce and Industry (MKIK)	1
Budapest Chamber of Commerce and Industry (BKIK)	1
Further interest associations	
German-Hungarian Chamber of Commerce and Industry (DUIHK)	1
American Chamber of Commerce and Industry (AmCham)	1
Austrian Chamber of Commerce	1
Joint-Venture-Association (JVA)	2
Hungarian Association of International Companies (HAIC)	1
Association of Hungarian Employers and Industrialists (MGYOSZ)	1
Expert group 4: Representatives of domestic companies	
Videoton Holding Rt.	2
Videoton Precíziós Kft.	1
Hungarian Foundation for Enterprise Development (MVA), Department: Domestic supplier industry	1
Budapest Agency for Enterprise Support	2
Expert group 5: Science	
Hungarian Academy of Sciences, Institute for World Economics	1
Economic Research Institute of the Hungarian Chamber of Commerce and Industry (MKIK-GVI)	1
GKI Economic Research Co.	1
Kopint Datorg - Economic Research Institute	1
Eco Stat (Research Institute of the Central Statistical Office)	1

takes place mainly in high-technology branches and since the mid-1990s also in R&D.²⁸

However, empirical research carried out through expert interviews and the secondary analysis of survey material does not point to the fact that FIE serve as a source of technology spillovers. Each of the mechanisms of technology spillovers described above exists occasionally rather than generally. The effects are not broad enough by far to induce significant innovation activities within domestic firms. The reasons for that are the following.

Technology spillovers via demonstration proved to be difficult to investigate empirically. As expected, most respondents stated that "learning by watching" often takes place without being noticed, neither by the learning company nor by the foreign firm demonstrating the technology. If at all, demonstration effects were of importance in the early stage of transition "when more and more foreign investors came and domestic firms copied one or another directly visible practice, especially in marketing and logistics. However, many observable techniques require investments which domestic companies are hardly able to finance" (expert group: domestic companies). With respect to "reverse engineering", no evidence could be found that it has been relevant at any time during transition: "In the service sector companies adopted many new services which were unknown before and possibly copied from foreign companies but not necessarily from those within Hungary. In industry the copying of products is insignificant and often impossible from a legal perspective" (expert group: domestic companies). A sophisticated intellectual property right scheme that meets the standards of the European Union's patent office does limit the scope for copying new products in Hungarian industry.²⁹ With respect to labour mobility, it becomes clear – from the expert interviews and from survey material of the German-Hungarian Chamber of Commerce and

Industry³⁰ – that the majority of FIE in Hungarian industry invest in the professional education of their local workforce. Even so, it can be concluded that it is strongly unattractive for employees to switch from FIE to domestic employers because they usually cannot pay an income or additional benefits as high as those paid by foreign investors. "Sometimes labour turnover from a foreign subsidiary to domestic companies takes place but occasionally rather than generally. It is too expensive for Hungarian owned firms to attract employees from multinational companies, especially those with an academic degree and leading position" (expert group: economic policy). The possibilities for qualified persons to open a small or medium-sized company in Hungary are not very attractive either due to credit market failure. "Private banks hardly offer finance schemes for small and medium-sized companies and there is only very limited support for company start-ups by the state. Entrepreneurs have to have their own financial resources if they intend to open up or enlarge a business in Hungary" (expert group: science).

With regard to supplier contacts, an investigation carried out by the Hungarian Ministry of Economic Affairs among selected large FIE (>500 employees) shows that their domestic purchases vary extremely, i.e. from below 5% to more than 70% depending on the company's purchasing policy. The Hungarian Ministry of Economic Affairs estimates that foreign companies on average buy 10-20% of their supplier products from domestic firms.³¹ A more comprehensive survey carried out by the Economic Research Institute of the Hungarian Chamber of Commerce and Industry (MKIK-GVI) in the year 2000 among all 100% foreign owned firms in Central Hungary points in the same direction.³² Foreign investment firms buy on

²⁸ G. Csáki: Foreign Direct Investment in Hungary, in: Economic Trends and Research Summaries, No. 1, Budapest 1998, GKI-Economic Research Co., pp. 13-31; P. Farkas: The Effects of Foreign Direct Investment on R&D and Innovation in Hungary, Institute of World Economics, Working Paper, No. 108, Budapest 2000, Hungarian Academy of Sciences.

²⁹ Hungarian Patent Office: Summary of Industrial Property Protection in Hungary, Budapest 1999; S. Smid: Intellectual Property Law Uniformity in the CEECs and the EU: Conformity Issues and an Overview, in: E. Altvater (ed.): Intellectual Property Rights in Central and Eastern Europe. The Creation of Favourable Legal and Market Preconditions, Berlin 1998, IOS Press, pp. 72-81.

³⁰ DUIHK: Direktinvestitionen in Ungarn. Eine Umfrage zu Motiven, Erfahrungen und Zukunftsperspektiven deutscher Investoren in Ungarn, Budapest 1995, Deutsch-Ungarische Industrie- und Handelskammer.

³¹ Hungarian Ministry of Economic Affairs: Szechenyi-Plan. National Development Plan, Budapest 2000, pp. 39ff.

³² The region of Central Hungary comprises the city of Budapest and the surrounding district "Pest". This region accounts for 60% of all FIE and 66% of the total FDI within Hungary (cf. CSO: Hungary. Report on Major Processes in the Society and Economy, Budapest 2000, Central Statistical Office, pp. 68ff.; 170 companies have gone into the evaluation of the survey, 87% were SME (cf. MKIK: A külföldi tulajdonú vállalatok beszerzési politikájának vizsgálata a Közép-Magyarországon letelepedett cégek példáján. (Purchasing policy of Foreign Investment Companies – a survey of foreign firms in Central Hungary), in: MKIK-GVI Newsletter, Budapest November 2000, Hungarian Chamber of Commerce and Industry (MKIK).

average 43% of their industrial supplier products within Hungary, but one third of this in turn comes from other foreign investment firms settled within Hungary.³³ Especially the big foreign investment companies usually bring with them their suppliers from abroad that establish subsidiaries close to their customers in Hungary. That contributes to the domestic value added but does not help existing Hungarian suppliers to modernise technologically. Supplier contacts are a necessary but not a sufficient condition for technology or, rather, linkage spillovers to take place in the way described above. However, it is reasonable to assume that the scope for spillovers via supplier contact is higher, the more domestic suppliers are involved. But so far the proportion of domestic suppliers is low. According to expert interviews, supplier support through FIE is offered very rarely and only to the already advanced and competitive domestic suppliers. *"Supplier support is not the main task of foreign investors in Hungary. It can be efficient but the domestic supplier must fulfil minimum quality standards and production capacities. This is often not the case with Hungarian suppliers. The technological backwardness of domestic suppliers is usually too great"* (expert group: foreign investment companies).

Customer contacts play an insignificant role because foreign investors in Hungary mainly produce for export or for other foreign investment enterprises within Hungary. FIE accounted for 86% of Hungarian exports in manufacturing industry in 1998.³⁴ *"The Hungarian market is too small for foreign investment companies. They rely on exports, especially to the EU. Customer support in order to gain customers in Hungary or in order to compete with other firms is of no importance"* (expert group: business associations). No survey material could be found on customer contacts as a spillover mechanism – probably another indication for its insignificance in transition economies.

Last but not least networking as another potential spillover mechanism was investigated, focusing on relevant business associations established in Hungary and joint R&D activities. It was found that business associations are either dominated by foreign investment companies (e.g. foreign chambers of commerce and industry, Joint Venture Association) or

do not engage in activities that are suitable to increase cooperative links between foreign owned and domestic companies (e.g. Hungarian Chambers of Commerce and Industry, industry associations). Joint R&D projects by foreign and domestic companies hardly exist in Hungary because of the technological backwardness of domestic firms and the embeddedness of foreign subsidiaries in the global R&D strategy of the multinational concern.

Conclusions

It can be concluded on the one hand that foreign subsidiaries clearly contribute to the overall modernisation process of Hungarian industry by establishing modern production plants including investments in R&D. However, on the other hand at this time they still build "modern islands" cooperating mainly among themselves if at all. The empirical study shows that FIE and domestic companies have no significant contact and build virtually separate spheres within Hungarian industry. Not much different effects are expected for other CEEC that are struggling with the same difficulties (low productivity) and have attracted FDI in a similar quantity and quality (e.g. Poland, Czech Republic, Slovenia, Estonia).

Multinational companies are of course not developmental agencies for economies in the process of catching-up. However, CEEC have to take into account that an increasing gap between modern equipped foreign-owned companies and technologically backward domestic firms leads to the already visible dual structure of the economy. If that process goes further, innovation-stimulating spillovers between the two sides become more and more difficult. From the author's perspective, as a first step against the increasing duality of industry much stronger support for small and medium-sized enterprises should be given so that they can become equal partners for all Hungarian-based companies. Furthermore, the ability to carry out innovation activities – a prerequisite for competitiveness within the world market – requires an overall development strategy that in the long run supports the establishment of firms in the sense of parent companies.

³³ MKKI, op. cit.

³⁴ G. Hunya, op. cit., p. 13.