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The Effects of Foreign Direct Investment
on R&D and Innovation in Hungary



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SUMMARY

In his follow-up study to an earlier one written in 1997, the author draws on analysing and interpreting professional literature of the last four years to tackle a number of questions. These and the provisional answers to them are as follows:

Has the process of shrinkage in R&D and innovation capacity stopped yet? The accessible statistics lead to the conclusion that the real value of the corporate R&D by firms has stabilized, at a rather low level of about a third of its value ten years ago.

What role do wholly foreign-owned and joint ventures play in this? Has technical development strengthened at foreign-owned firms? Both Hungarian-owned companies and those in partial or total foreign ownership have created small, R&D-intensive groups. The subsidiaries of foreign companies, relying on the existing intellectual capacities of companies sold to them by privatization, maintain smaller researcher groups dealing with product development and adaptation, and with the general technical field belonging to the company's profile. Some of these companies have come to recognize that it would be unwise to let the accumulated specialist knowledge go to waste. Moreover, some investments with expressly R&D aims have been made recently, mainly in telecommunication and software development. Despite all these facts, it is not possible to speak of a breakthrough. Relatively few foreign-owned companies are involved. Surveys in recent years have found a lower proportion of wholly or partly foreign-owned ventures R&D-intensive than was the case in 1994.

How should the widening relations of multinationals and Hungarian research institutions be interpreted? News of this kind proved to refer to isolated instances or to conceal some other event in the background. Multinationals are only giving out considerably more orders for examinations and the issue of certificates required for of-

ficial licences. Only a tenth of the revenue of industrial research institutes comes from corporate research orders.

Is the contribution made to technological renewal by supply and subcontracting activity increasing? Do certain favourable examples that have become widely known indicate a new period? The surveys of recent years suggest slow growth in the supply contribution of Hungarian-owned companies in certain sectors and in certain regions. This, however, is not at all general. According to estimates, plants doing mass production and having been established by greenfield foreign investments, including the basic public services as well, buy about one tenth of their input from Hungarian companies. The surveys also confirm that the technical help of those ordering the supply generally still brings an improvement in the quality-control and information system and concerns only to a small extent production technology. Thus one can hardly speak of a new era.

What will be the result of having some new supplier and component-producer foreign investments in Hungary? In many cases, even in most cases at the beginning, the aim of establishing a component manufacturing plant in Hungary was only to export. As a result of the pyramid concentration of parts and components production, the technical development, research and of course, realized value added become concentrated at the multinational component manufacturers. Hungarian companies may at best be the external subcontractors for these big companies, but even that is not typical. The settling of multinational component manufacturers reduces the logistical advantages of the domestically owned firms.

Is the technological duality of the Hungarian economy becoming stronger? Despite the fact that there are exceptions, the main tendency is for the duality to become stronger. The borderline does not

merely lie between the multinationals and the Hungarian-owned companies. In a few cases, the Hungarian-owned firms integrate into technical development, while in other (more frequent) cases, companies privatized to foreign corporations use traditional technologies in their production. There are only isolated examples of greenfield businesses applying relatively modern technologies.

How well founded is the view that the indirect, multiplier effect of foreign capital is greater than its direct impact? There is some truth in the view that the professional knowledge required for new machinery or management systems, or to meet requirements as a supplier and become more competitive tend to stimulate the technical efforts of many Hungarian-owned firms. However, there is another side ignored by

those who emphasize the indirect multiplier effect. Many Hungarian-owned companies cannot meet the competitive challenge even if they are prepared for it technically and competitive in their prices. The markets are monopolized by a few firms and domestic companies lack the financial muscle to compete, 'pump' the market and supply on credit. This is shown by the abrupt increase in the import demand of the firms privatized to foreign corporations. Whole vertical sector organizations, technological chains and professional cultures have collapsed. This is not just because they were unable to compete on international markets. Sectors and companies with considerable Western exports have also decayed. These market developments contributed to a national loss of one-and-a-half million posts.

INTRODUCTION*

This paper may be considered a follow-up to an earlier one I wrote as part of an Institute for World Economics (IWE) research project (FARKAS 1997), analysing and interpreting professional literature published between 1990 and 1995. The main conclusions were as follows.

- 1) *R&D spending fell.* The share of Hungarian GDP spent on R&D decreased, between 1988 and 1994, from 2.3 per cent to 0.8 per cent, which was a fall of 60 per cent in real terms. However, the R&D spending of the business sector fell even more, by at least 70 per cent, and more than half of the firms did no research or development at all. Only at one in ten firms was an isolated research department maintained.
- 2) *Ownership was a significant factor.* At privatized companies taken over by foreign investors, the number of staff working in R&D departments fell by 80–85 per cent. However, more foreign-owned than Hungarian-owned industrial ventures carried out some kind of R&D (50–60 per cent as opposed to 30–40 per cent). Experimental development and product development were the most typical activities at joint ventures; there were no major differences between Hungarian and wholly foreign-owned firms in this respect. However, the wholly foreign-owned firms were the most likely to apply foreign licences or know-how. The most conspicuous bases for R&D were companies with a medium export intensity, not those wholly oriented towards exports. In 1993–4, new technology was introduced at about 45 per cent of Hungarian-owned firms, 50 per cent of joint ventures, and some 60 per cent of wholly foreign-owned firms.
- 3) *Non-greenfield foreign investment* brought limited technological development or renewal of the technological chain. The purposes of the R&D in these companies were mainly product development, computerization, introduction of new labour-organization methods, and overcoming technological bottlenecks. The total innovation-inducing effect of foreign capital on the national economy was less because most of it flowed into less technology-intensive industries relying on domestic demand. Foreign buyers usually closed the R&D departments or downgraded them to work on product and production adaptation. However, there were notable exceptions: GE, the pharmaceutical industry, Zanussi and Knorr-Bremse, for instance.
- 4) Examples of the transfer of relatively modern technical culture to a whole industry were confined to the *greenfield investments*. However, these generally operated in isolation, with high import intensity. Suzuki was an exception, but even there, the radiation was not considerable, as the technologically sensitive components tended to be the ones bought in from abroad.
- 5) *Supplying and subcontracting* took place over a relatively narrow range. Foreign-owned manufacturers preferred to use their worldwide networks of suppliers. With supplies from domestic sources, the technical level was determined primarily by the previous technical level at the suppliers. When evaluating the innovative effects of foreign capital, it could not be disregarded that its investments have often interrupted vertical, sectoral technical and technological chains.
- 6) The most exciting prospects for technical innovation are in the *added value produced and realizable* in the country. Here, the domestic value added was the lowest in the greenfield investments, which otherwise represented relatively developed technology. The other basic

* The study forms part of the OMFB (National Technical Development Committee) research programme 'Imports of Direct Investment and Technical Development on the Eve of the 21st Century', headed by Academician Mihály Simai.

problem was with the widening gulf in the economy: 'One-sided technological dependencies, well known in the developing countries, may arise... placing the decisions outside the country... This rootless situation may be exacerbated by developed Western technologies' (INOTAI 1993).

There has been an interesting debate among Hungarian economists in recent years, about the innovating role of foreign capital. Many previous studies concentrated on statistically apprehensible processes and on corporate surveys (questionnaires or interviews), in other words, on improvements within companies. This method is criticized for not recording the secondary radiating effects and therefore underestimating the impact of foreign capital on innovation.

This study draws on the professional literature of the last four years to tackle a number of questions. Has the process of shrinkage in R&D and innovation capacity stopped yet? What role do wholly foreign-owned and joint ventures play in this? Do some recent, widely publicized, favourable examples signify the opening of a new period? Has technical development strengthened at foreign-owned firms? How should the widening relations of multinational companies and Hungarian research institutions be interpreted? Is the contribution made to technological renewal by supply and subcontracting activity increasing? What will be the result of the realization of some new supplier, component producer foreign investments in Hungary? Is the technological duality of the Hungarian economy becoming stronger? How well founded is the opinion among writers that the indirect, multiplier effect of foreign capital is greater than its direct impact? Some provisional answers to these questions appear in the final section of this paper.

THE POSITION WITH R&D AND FOREIGN-OWNED FIRMS

The statistically revealed proportion of GDP spent on R&D continued to decrease after

1994 (*Table 1*), but it seems to have stabilized since 1996, albeit at an extremely low level.

Table 1

Employment at research facilities as a proportion of all employed and the proportion of R&D to GDP in Hungary, 1990–98, %

Year	R&D employees as a proportion of all employed	R&D expenditures as a proportion of GDP
1990	0.81	1.61
1991	0.63	1.09
1992	0.57	1.08
1993	0.58	1.00
1994	0.59	0.93
1995	0.54	0.75
1996	0.55	0.67
1997	0.57	0.74
1998	0.56	0.70

Source: KSH (1999), p. 8.

Two-thirds of Hungary's business assets today are in foreign ownership, which is probably a uniquely high proportion by international standards. This means that the general data for the business sector roughly reflect the main tendencies in the foreign investments. *Table 2* shows that after the deep recession in the early 1990s, the business sector, including wholly foreign-owned firms and joint ventures, did not increase its R&D expenditures in the second part of the decade either. A stabilization of these was general.

Table 2

R&D expenditures by enterprise research departments, 1990–98

Year	At current prices		In real terms
	HUF billion	1990 = 100	1990 = 100
1990	9.5	100.0	100.0
1991	8.3	87.2	56.2
1992	8.3	87.6	47.5
1993	8.8	92.3	42.1
1994	12.2	128.1	49.9
1995	16.1	169.3	54.5
1996	15.9	167.4	44.2
1997	23.1	243.1	
1998	28.6	301.0	

Source: OMFB (1997), p. 45.

In the early 1990s, R&D activity at firms decreased even faster than other activity, despite (or perhaps under the influ-

ence of) the considerable inflow of foreign direct investment. R&D by businesses had formed a majority of the R&D activity nationally in the 1980s, which accorded with the trend in the developed countries, but the proportion had decreased to scarcely above 30 per cent by 1993. However, *Table 3* shows that the contribution of R&D by businesses has risen to almost 40 per cent since then. So there seems to be a stabilization in this respect, although the situation is still far from satisfactory.¹

Table 3
The sector structure of R&D expenditure, %

	1991	1992	1993	1994	1995	1996	1997
Business	35.5	31.4	30.8	33.9	40.5	35.8	39.0
Higher education	23.1	25.0	27.3	28.6	25.7	25.0	24.8
Budget-funded	41.4	43.6	41.9	37.5	33.8	39.2	36.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OMFB (1998a), Table 7, and OMFB (1997a), p. 45.

Table 4
The breakdown of R&D expenditures by types of activity, 1990–1996, %

Year	Expenditures			Total
	Basic research	Applied research	Experimental development	
1990	16.1	27.9	56.0	100.0
1991	25.4	34.8	39.8	100.0
1992	27.1	33.9	39.0	100.0
1993	28.3	31.2	40.5	100.0
1994	32.3	33.8	33.9	100.0
1995	29.2	35.1	35.7	100.0
1996	31.7	33.5	34.8	100.0
1997	26.9	29.6	41.7	100.0
1998	28.6	35.8	33.2	100.0

Source: OMFB (1997b) and OMFB (1997a), p. 45.

The competitiveness of companies depends strongly on product innovation. Expenditures on this appear under experimental development headings. *Table 4* shows that the rate of experimental devel-

opment decreased within total R&D spendings.

Privatization to foreign owners and the advent of free market conditions (which in Hungary's case brought a rapid strengthening of competition from the outside world market) joined with the shaky economic position of small and medium-sized ventures and the fall in the real value of R&D spending brought a sharp decrease in the demand for domestic innovation. Statisti-

cally, this is usually represented by the trend in the number of patent registrations. This fell in Hungary from 3200 in 1988 to 700 in 1998, while the number of foreign patents registered rose from 2500 to 40,000

(FOGYNAK ... 1999). In 1989, 131 Hungarian patents were registered in the United States; the figure was about 50 a year in the mid-1990s.

A CLOSER LOOK AT THE R&D AND INNOVATION ACTIVITY OF FOREIGN INVESTORS

In 1996–7, the R&D costs of companies with a foreign capital stake accounted for 42–45 per cent of total R&D expenditure by the Hungarian corporate sector (KOVÁCS 1998, p. 44). This corresponded to the proportion of the sector that these companies represent in terms of subscribed capital. (A figure that has considerably increased since.) According to a survey by the Innovation Research Institute, one-fifth of the foreign-owned and almost a quarter of the domestically owned companies carried on some kind of R&D (INZELT 1996, p. 65). The database compiled by the Central Statistical Office (KSH) between 1992 and 1996, but then terminated, gives even less favourable proportions. Only 362 of the 4000 larger ventures spent money on R&D. Two-thirds of the firms doing so were in Hungarian ownership and

¹ Nyíri (1996, p. 570) notes that 'preponderant state participation and lack of interest by the business sector are typical for R&D in the peripheral countries. Hungary's indicators have clearly moved in this direction in recent years.' On the other hand, Hungary's 40 per cent is a higher proportion than those of Greece, Turkey or Portugal, which are less than 30 per cent.

one-third contained a foreign stake (INZELT 1998, p. 68). These proportions are much worse than those found by surveys in the middle of the decade. (See item 2 at the beginning of this paper.)

A breakdown of the companies doing R&D by ownership structure and sectors appears in *Table 5*.

Table 5
Company spending on R&D by ownership
and sector in 1995, %

Sector/industry	Domestic ownership	Foreign stake			Total
		Minority	Majority	Total	
Non-manufacturing	84	11	11	22	106
Manufacturing	151	36	55	91	242
Food and beverages	22	9	11	20	42
Chemicals	18	4	12	16	34
Rubber and plastics	7	4	2	6	13
Non-metallic ores	4	3	2	5	9
Machines and equipment	21	5	6	11	32
Office, accounting, information technology and electronic machines	8	1	7	8	16
Radio, television and communications machines	8	2	3	5	13
Medical, precision and optical instruments, clocks	8	3	2	5	13
Vehicles and transport equipment	7	1	2	3	10
Total	235	47	66	113	348 ^{a)}

Note: ^{a)} Probably owing to defects in data supply, 14 companies are not included.

Source: Inzelt (1998), p. 68.

The survey by Annamária Inzelt, which is the source for Table 5, reaches an important conclusion. Of the 362 companies doing R&D, 116 earned R&D revenues. 'This difference is a legacy of socialism,' she writes. 'These companies were able to market expertise they had gathered in the past' (p. 67). Over the period concerned, the R&D expenditure of the foreign-owned companies grew faster than that of the domestically owned firms. The average amount spent by a foreign-owned company was 3.6 times higher at current prices in 1992 and 4.5 times higher in 1995 (p. 72). It is worth noting that smaller foreign-owned ventures spent relatively more on R&D than the larger ones (p. 69). Moreover, the ratio of R&D expenditure to sales turnover correlates positively with the proportion of foreign ownership, except in the case of those

in 51–75 per cent foreign ownership. The exception is because this group is dominated by companies in less R&D-intensive sectors and contains a lot of new entrants into the market (p. 71). Finally, foreign investors generally carried out 'superficial' R&D, motivated from the demand side and displaying product-adaptation characteristics. 'Underlying', technology-orientated and supply-motivated R&D activities were quite rare (pp. 61 and 67).

With innovation in a more general sense, it is not surprising that foreign-owned firms should be in the forefront. The economic research institute GKI, looking at a sample of several hundred ventures, found that foreign-owned firms were two or three times more innovative than Hungarian-owned ones.² (This survey used the widest meaning of innovation, it included the occupation of new markets as well.) *Table 6* reflects also the competition, or rather monopoly advantage related to the size of the company well.

The R&D activity that receives most media and even expert attention is conducted by multinational corporations in the engineering industry. In fact, the most important conductors of R&D are in the pharmaceutical industry. More than 75 per cent of the R&D expenditure in manufacturing is conducted by firms in the chemical industry, as opposed to 19 per cent by those in engineering (SZTANKÓ 1998, p. 246). *Table 7* shows that foreign-owned firms account for most of the chemical industry's R&D spending.

² Gábor Papanek (1998, pp. 41 and 43) puts the number of innovative ventures at 10,000–20,000 out of a total for Hungarian-registered firms of several tens of thousand.

Table 6

The proportion of companies performing considerable business development between 1995 and 1997, by size of workforce and by type of ownership, %

Type of development	No. of employed			Type of ownership			Total
	< 50	51–300	301>	State	Domestic private	Foreign stake	
Developing a product, service or technology	8 (10)	9 (11)	15 (19)	6 (16)	8 (9)	23 (19)	10 (12)
Marketing a new product or service	14 (28)	20 (32)	28 (42)	13 (36)	18 (32)	30 (37)	20 (33)
Introducing a production technology	7 (13)	12 (21)	18 (17)	3 (16)	11 (17)	20 (19)	11 (17)
Opening a new market in Hungary	35 (35)	24 (42)	18 (43)	22 (42)	25 (42)	38 (31)	27 (40)
Opening a new market abroad	13 (21)	23 (27)	29 (41)	3 (41)	20 (23)	40 (35)	21 (28)
Average investment/revenue ratio*	12	10	8	8	8	10	9
Median investment/revenue ratio	9	5	6	7	6	7	6

Note: Developments with great business results (developments yet to yield results). The figures are based on the responses of companies assessing themselves as innovative, so that they give an 'optimistic' picture.

* Averages weighted by size of workforce.

Source: Papanek (1998), p. 42.

Table 7

The proportion of R&D expenditure to sales, by ownership and sector, 1995, %

		Foreign stake			
		<50%	>50%		
Non-manufacturing	0.50	0.07	0.08	0.07	0.31
Manufacturing	0.57	0.50	0.88	0.97	0.86
Food and beverages	0.08	0.11	0.15	0.14	0.12
Chemicals	0.71	4.30	4.95	4.74	2.58
Machines and equipment	1.12	0.36	0.71	0.81	0.66
Office, accounting etc.	0.77		0.15	0.15	0.21
Total	0.57	0.50	0.80	0.68	0.63

Source: Inzelt (1998), p. 69.

It is worth noting that Hungarian-owned firms in the relatively research-intensive engineering industry and in the non-manufacturing industries spent a higher proportion of their revenues on R&D than those in foreign ownership (at least in 1995). However, the foreign-owned sector was more research intensive, mainly because of the chemical industry (including pharmaceuticals).

The pharmaceutical industry is in an exceptional position for R&D. The main factor here is that Sanofi has turned the former Chinoin research institute into one

of its worldwide research centres, and the Philaxia-Sanofi merger promises further development. The engineering multinationals operating research bases in Hungary include General Electric (which some accounts put at the top, with an expenditure of USD 30 million a year – VRANNAI 1997, p. 18), Knorr-Bremse which has a research staff of 100 in Kecskemét and at Budapest Technical University, and ZF Hungaria, which develops and produces gears in Eger. The remarkably energetic exporter ABB-Lang incorporates considerable intellectual adaptation into its products, while Electrolux has sited some experimental work into production

technology, insulation technology and freezing at its plant in Jászberény. Ericsson has quite a large software capacity in Hungary. Other companies conducting software development in Hungary include IBM. Nokia has opened a centre for telecommunications R&D. The research staff in such units usually numbers fewer than 30 and the R&D mainly means technological adaptation or perhaps product development to meet the demands of the local market. Other foreign companies establishing R&D bases in Hungary include Unilever and the German rubber firm Phoenix.

Table 8 shows data about R&D spending by foreign firms, known to the OMFB (National Technical Development Committee).

ogy does not merely mean the acquisition of the knowledge, but how to use the transferred machines.' 'The way the technology is operated' is similarly important to competi-

Table 8
Foreign companies with the highest estimated R&D expenditures in Hungary, 1997

Name of company	R&D expenditure (USD mn)	R&D expenditure to revenue (%)	Name of company	R&D expenditure (USD mn)	R&D expenditure to revenue (%)
General Motors	4.98	4.9	NTT	1.54	3.7
Ford Motor	3.85	4.1	Volkswagen	1.49	3.9
Siemens	2.75	7.6	Intel	1.43	9.4
IBM	2.62	5.5	Hoechst	1.35	7.7
Hitachi	2.35	5.9	Bayer	1.34	7.2
Toyota	2.11	5.7	Sony	1.32	5.2
Matsushita Electric	2.03	5.7	Northern Telecom	1.30	13.9
Daimler-Benz	1.91	4.6	Johnson & Johnson	1.30	9.5
Hewlett-Packard	1.87	7.2	Bell Canada	1.24	8.8
Ericsson Telephone	1.86	14.5	Philips	1.22	5.3
Lucent Technologies	1.84	11.5	Roche	1.21	15.5
Motorola	1.67	9.2	Honda Motor	1.17	4.7
Fujitsu	1.65	7.8	Pfizer	1.17	15.8
NEC	1.63	7.0	Microsoft	1.17	16.9
Asea Brown Boveri	1.61	8.5	Boeing	1.17	4.2
El Du Pont de Nemours	1.58	5.8	Glaxo Wellcome	1.15	14.4
Toshiba	1.55	6.1	Alcatel Alsthalm	1.11	6.8
Novartis	1.54	11.8	Robert Bosch	1.10	7.0

Source: Horváth (1999), p. 99.

Much of the state subsidy for R&D goes to companies with a foreign stake, although earlier analyses suggest that the justice of this can be queried, to put it mildly. The conditions for such subsidies include an active sales turnover and the creation of 30 new research jobs. On these grounds, the allocation of HUF 800 million in 1998 included sums of HUF 200 million to Knorr-Bremse, HUF 457 million to Audi, and HUF 143 million to Nokia (HORVÁTH 1999, p. 100).

A WIDER INTERPRETATION OF THE INNOVATION EFFECT OF FOREIGN DIRECT INVESTMENT

Andrea Szalavetz may have expressed most clearly the idea that the innovation effect of foreign capital cannot be measured simply by the physically present technological knowledge transferred or the money spent on R&D. The process to concentrate on is qualitative, not quantitative: 'We set out from the idea that the adoption of technol-

iveness. According to the specialist literature, she adds, 'The technology transferred includes, by definition, all the non-material goods essential for operating the equipment and manufacturing the products' (SZALAVETZ 1999a, p. 32). She adds that this includes marketing, as well as methods and labour organization.

The essence of this theoretical interpretation can be accepted: providing the conditions for the non-material use of technical knowledge is included in innovation transfer, whether it relates to the transfer of machinery or not. Some examples of the latter are technological description, know-how, or the transfer of labour-organizational knowledge that improves productivity. However, it should be added in passing that although the transfer of labour-organizational and information-processing knowledge belongs to innovation in a wider sense, it does not itself result in an improvement in the technical content of production. It constitutes innovation that improves competitiveness, but not technology transfer. That is not even to mention the question of markets.

The main conclusions drawn by Szalavetz from analysing 15 German-owned companies in Hungary are that they could rely on former technical knowledge, that they were able to adapt the technology of the parent company, and that the time factor was important in the latter. Initially, they specialized in products that were in the declining stage of their life cycle, but in several cases, the subsidiaries gradually became charged with making products that represented new developments. This increased their technology-accumulating potentials. In some cases, the owners charged the subsidiary (or R&D department) in Hungary to develop technical methods and solutions and make consumer adaptations or computer programmes of outstanding importance even on an international scale (Knorr-Bremse, Thyssen, Phoenix, ZF Hungaria, UKM Rekard, Adtranz – SZALAVETZ 1999b, pp. 64–84). All in all, the picture described is promising and these hopeful conclusions predominate in the author's summary.

However, the positive impression is lessened by other statements made by Szalavetz. 'Where development work was maintained at all, [the R&D activity] was very rarely oriented towards the future... At most of the companies in the sample, typical activities were consumer adaptation, sometimes developments aimed at lengthening the lifetime of obsolescent products, or at best, process development.' She also speaks of a duality between 'the definitely positive results of technology transfer and the negative symptoms in R&D activity (or, in a wider sense, in innovative activity)' (SZALAVETZ 1999a, p. 38). She emphasizes that 'the production modernized with the aid of foreign direct investment did not divert the domestic privatized companies from their former technological course.' Furthermore, 'the specialization strategy of the foreign

owners kept the subsidiaries in Hungary on a lower than optimum technological course.' She concludes that technological diffusion effects beyond the companies are rare. Because the activity is closely related to the needs of the Hungarian market, there is no horizontal relation with the specialized departments built into the hierarchic network of the multinationals. Generally, the company research units in Hungary do not maintain R&D cooperation with academic research institutes or universities, but simply buy services from them. The evolution of vertical relations within the multinationals is restrained by the fact that domestic suppliers are not able to provide equable and good quality in many cases. However, there is a positive example in this respect, where the supplier does independent development (Prec-Cast for Knorr-Bremse). The customers give some technical support to the suppliers (SZALAVETZ 1999b, pp. 85–98).

Based on a methodology developed by the OECD, the OMFB conducted a survey that corroborated the views of Andrea Szalavetz, setting out to put figures to the factors behind technological diffusion that are not related to R&D. It was found that the share of domestic R&D in the technology introduced was 27 per cent in 1994, but only 18 per cent in 1997, while the share of imported R&D increased from 64 per cent to 73 per cent.

Table 9
The sources of the R&D behind technology introduced, 1994 and 1997, based on current prices

	1997/1994	1994	1997
	(%)	Distribution (%)	
1. Direct domestic R&D	153	26.9	18.0
2. Domestic material consumption	210	6.8	6.2
3. Domestic investment	195	3.6	3.1
4. Imports of material R&D	463	18.8	37.9
5. Investments of imported R&D	182	43.9	34.9
6. Total	229	100.0	100.0
7. Technology obtained under the Total of 1–6	257	-	-
8. GDP	201	-	-

Source: OMFB (1998b), p. 24.

Methodologically, this report is assailable, however. The inputs for developing technology (e.g. import costs) were included with the R&D costs in the same table. How

was the selection made of the raw materials whose imports improve the 'technological development'? As for the added value (and its realizability) or the improvement of production, no imported raw material or even a machine can be as significant as an important R&D result.

Even the study itself weakens the conclusions drawn from the numerical estimates. It states that 'the main part of the growth in technology imports between 1994 and 1997 was accounted for by multinational industrial firms in customs-free zones ... The customs-free zones have integrated into the Hungarian economy only to a very small extent.' The domestic material consumption of firms in these zones stagnated around 8 per cent, 'so that in the examined period it was not possible to implement the Hungarian policy objective of improving the contribution of Hungarian firms to supplying these ventures' (OMFB 1998b, p. 28).

VIEWES EMPHASIZING THE LIMITED EXTENT OF THE MULTIPLIER EFFECT

Another survey, not confined to companies in which there is a foreign stake, found that the isolation of foreign firms in their R&D relations was not confined to customs-free zones. An OMFB research programme headed by Judit Fried Mosoni covered 76 (40 questionnaires and interviews) companies and research institutes that have contacts with state R&D institutions, generally possess development capacities and use self-developed products and/or technology (MOSONINÉ 1997). Eleven of these were joint ventures and seven were ventures with a foreign stake.

The Hungarian-owned firms in this special sample of companies closely involved with innovation were independent in their innovation activities.³ This, from one

point of view, is positive, but it is also clear that the Hungarian-owned firms are able to sell products that incorporate new high technology only through some well-known foreign intermediary, often under the intermediary's brand name.

The survey also makes it clear that the foreign-owned companies are 'highly separated units': 'We consider the economic role of the foreign ventures to be much more pronounced than their contribution to strengthening the domestic innovation processes... It is not just the receptiveness of the domestic firms that is limited.⁴ An intention to transmit and „give access” to innovations is very rare, too... Most of the potential innovation partners have been bought up by the foreign companies' (MOSONINÉ 1997, p. 126). 'Knowledge is absorbed rather than being distributed' (MOSONINÉ 1997, p. 121).

Companies bought by foreign interests did not usually undergo any considerable technological renewal (even after 1995).⁵ Most existing R&D departments were dis-

been expected. 'However, this tends to highlight earlier misconceptions about the operations of the multinationals, rather than the innovative nature of Hungarian-owned companies. The account by É. Sztankó (1998) gives plentiful illustrations of how corporate R&D capacities and results have been reduced. It establishes that 'the average technological age of production has not changed; there have been no new technologies introduced at *most* companies' (p. 248).

⁴ The usual arguments are these: 'Domestically owned firms possess little financial muscle and few references. There are many problems with deliveries and deadlines. The capacity and order size required by multinational corporations is much greater than potential domestic small and medium-sized suppliers can offer' (NKI 1999, p. 46). Although this statement is true in many respects, it is weakened by the fact that in the course of privatization, larger Hungarian firms that could not be sold to foreign investors in one piece were deliberately broken up into smaller units, ostensibly to enhance their 'adaptability' and in response to international pressures. Another factor is that although domestic firms could be competitive in some cases, they are hampered by production-financing conditions that are much worse than they are abroad. Furthermore, markets are turning into monopolies. Even where there are alternative suppliers, the multinationals generally prefer to stick to strategic suppliers, with which they often have ownership ties.

⁵ The main exceptions, where investments creating new capacity have been made are General Electric, Electrolux, Alcoa, BPW, ZF, Michelin, Linamar, Knorr-Bremse and Unilever (NKI 1999, p. 47).

³ Also a survey conducted by the former Ministry of Industry and Trade covered 3500 companies in the Ministry's database. It reported, 'The technological positions of the companies are partly influenced by the changes in the ownership structure, but the advantage of the foreign companies is smaller than had

continued or hived off. 'The multiplier effect produced by the new owner is much stronger outside the company than within the subsidiary,' because it generates competition (MOSONINÉ 1997, p. 128). This corresponds to the opinion in the previous item, that the indirect multiplier impact (incentive) has a more important role than the direct impact materializing in machines and technologies.

Although with some companies that are more competitive or in a special position, the competition generated by foreign-owned companies and their products has had incentive effects, it has to be noted that the backwash from innovative companies was much stronger in earlier years. Hungarian readers need only think of MOM, BRG, MMG or Videoton, for instance, which mainly undertook subcontracting work for Western companies and conducted considerable export with an intellectual content of their own, to Western markets as well as Comecon.

Returning to the OMFB paper, the continuation of earlier R&D trends has more often proved possible at smaller foreign-owned companies. Some of the earliest foreign investments were in software developers. The survey confirms that in other trades, there was a time lag, with some time passing before the intellectual capacities present in acquired companies were recognized by new owners. The sample, however, included positive examples such as General Electric Lighting, Taurus Emergé and Knorr-Bremse.

With suppliers of products embodying R&D, the survey found examples among the Hungarian-owned firms, with the supply of self-developed parts and components proving to be most frequent (in electronics, telecommunications and engineering, p. 101). 'In the sample examined, the Hungarian firms and joint ventures (incidentally?) make a bigger contribution as suppliers than the wholly foreign-owned firms do. The fate of vehicle-makers Rába or Ikarus, for instance, may be fundamental to the future of many innovative Hungarian firms' (MOSONINÉ, p. 127). Apart from these Hungarian companies, the customers were mainly foreign-based companies (in chemicals and plastics). In telecommunications and electronics, the survey found examples of firms becoming suppliers of products

with a relatively high added value, to Hungarian-based foreign companies. Only one development order given to a research institute or university covered a period of more than one year.

These statements support the conclusion of my earlier paper (FARKAS 1997) that the involvement of foreign capital in privatization caused the integral technical chains in the Hungarian economy and the links within and between the sectors to disintegrate to a large extent.⁶ This also explains the high import intensity of production. As trading processes moved inwards, into the multinationals, or at least towards foreign countries, the issues of technical development also became more internal or common to multinationals.

Instead of summary, let me quote Mosoniné (1997, p. 104) again: 'A minority of respondents say that a business contact (in practice, a supplier contact) with a foreign company would be a help to them... The innovation effect of foreign direct investment was rated positively by 11 respondents' (about 25 per cent of the total). 'Nine of them were foreign owned.'

Another report on innovative companies was compiled for the OMFB at the Budapest Technical University. This covered 44 companies, all of which received R&D subsidies. The results correspond to the conclusions of the paper just described: 92 per cent mentioned developments of their own and 34 per cent cooperation with a domestic R&D institution. The author points out that a low proportion of the sample, 8.3 per cent, maintained R&D relations with a Western partner, while 5.5 per cent had such contacts with an Eastern partner. Product development was put at the centre. In 32 cases, own development by companies provided the background for introducing a new product, while there were only four Western and two Eastern European developments (FARKAS 1998, p. 1227).⁷

⁶ Fésüs (1996) deals with the way the technical chains of Comecon production specialization were broken and the negative consequences of this.

⁷ The sample included, for example, large foreign-owned pharmaceutical factories, so that the relatively knowledge-intensive Hungarian-owned companies have practically no foreign R&D contacts.

As for the effect of foreign direct investment on Hungarian scientific work, the surveys found that industrial research institutes receive few R&D commissions from commercial firms. Such orders account for 10–12 per cent of their revenues (with the rest deriving from production activities, trading, engineering services, consumption of assets, *etc.*, REGÖS 1997, p. 14).

There was an interesting survey of the contribution of the business sector to university research commissions totalling more than HUF 5

million. Figures for 1996 show that only 22 out of 86 institutes of higher education had won outside contracts of this magnitude, and within these, the proportion of orders from businesses was small. *Table 10* shows that the business sector accounted for about 20 per cent of the number and value of the contracts.

Table 11 makes it clear that half the domestic orders are concentrated in technical research, while three-quarters of the foreign orders belong to the medical field (probably medical research and experimentation).

There is an apposite longer quotation that sums up the effects of foreign capital on domestic R&D: 'The foreign investments operating in Hungary follow a pattern general in international practice, which has been described by many experts. They primarily make use of „R&D products” made by their parent company or one of the centres of the global company in a developed country (abroad to us). The consequence is a reduc-

Table 10

The contribution of R&D commissions from the business sector to research orders to higher education under contracts exceeding HUF 5 million

	No. of contracts		Value of contracts (HUF mn)		Base year receipts (HUF mn)	
	1995	1996	1995	1996	1995	1996
Hungarian-owned total	134	137	1377.6	1555.7	541.6	690.7
Business sector total	16	26	227.9	327.5	114.1	184.4
Joint-venture total	14	25	108.3	274.0	52.1	121.1
Of which, business sector	1	-	9.3	-	9.3	-
Foreign-owned total	53	72	743.7	1317.1	251.3	419.0
Of which, business sector	11	16	120.7	230.9	59.4	82.9

Note: The Hungarian-owned total includes the business sector and governmental organizations. The business sector total includes both Hungarian and foreign-owned firms.

Source: Inzelt (1999), p. 350.

Table 11

Breakdown of receipts from corporate-financed R&D contracts, by scientific fields, %

Type of financing firm	Natural Sciences		Technical Sciences		Medical Sciences		Agrarian Sciences		Social Sciences		Total	
	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996
Domestic	9.7	12.1	61.4	50.0	19.5	22.9	9.4	11.3	-	3.8	100	100
Joint	-	-	100.0	-	-	-	-	-	-	-	100	-
Foreign	5.0	6.8	23.5	18.0	71.4	75.3	-	-	-	-	100	100
Total	7.7	10.4	51.1	40.0	35.4	39.1	5.9	7.8	-	2.6	100	100

Source: Inzelt (1999), p. 357.

tion in the R&D activity formerly carried at the privatized Hungarian company, and even more importantly owing to the radiating effects, companies bought by foreign owners will generate less and less solvent demand (compared with the previous period) for the products of R&D centres outside the company (sectoral research institutes and universities).

'So the fact that more than half of the domestic economic capacities have become controlled by foreign owners has resulted in a decline in R&D work at the privatized companies, and through the reduction in orders to outside R&D centres, to a decline in the demand for a wide range of the domestic R&D sector. This process is of great importance and continues. It is probable that in the absence of counteracting influences, foreign-owned Hungarian companies will steadily reduce their R&D orders further, within the companies and at external R&D centres' (OMFB/NKI, 1998, p. 36).

ARE TECHNICAL TIES GETTING STEADILY TIGHTER?

According to the latest statistics, the supply contribution of Hungarian-registered firms to the production of multinationals rose from 16 per cent in 1997 to 21 per cent in 1998. The Ministry of the Economy and ITD Hungary have 1500 such suppliers on record, most of them are in engineering and vehicles, electronics, electrical technology, chemicals and plastics. Ministry of the Economy estimates of the proportion of Hungarian sourcing at the biggest multinationals appear in *Table 12*.

Table 12
Proportion of Hungarian sourcing at biggest multinationals, %

Name of multinational	Proportion of domestic sourcing (%)
Audi	< 10
Ford	> 10
General Motors	10–20
Philips	c. 10
Suzuki*	55–60
General Electric*	60–70
Electrolux	40–50
Sony	< 5

Note: * To my knowledge, the proportions at Suzuki and General Electric include own value added. With General Electric, the proportion given is an order of magnitude greater than the figure published in the mid-1990s.

Source: Erősödő ... (1999).

The question is obviously to what extent the growth in the proportion of local sourcing indicates a radiating effect of innovation.

Some surveys in recent years have suggested that the economic (including the technical) relations of the mainly small and middle-sized ventures in foreign and Hungarian ownership are slowly starting to widen. According to an OMFB survey of the trends and intentions at 106 companies, small firms these days are making greater efforts to establish strategic connections with partners possessing capital and above all markets. Some medium-sized firms that

are innovative also try to find foreign partners with no research basis of their own. The attitude seems to be, 'We are able to develop, we are able to produce, but we are not at all able to sell as much as we should' (OMFB 1998c, pp. 13, 68 and 72).

Based on its own database and analyses, Hungary's Privatization Research Institute (PKI) has also concluded that the supply is slowly getting wider, but that it will not bring a technological leap. 'There is a slow, but explicit change going on in this field, especially over simple mass products, while in the case of complex manufactures, domestic suppliers are taking the place of foreign import much more slowly' (PKI, 1997b, p. 33).⁸ In the car industry, some R&D-intensive medium-sized companies have started supplying (from Székesfehérvár, Győr and Tatabánya), but most of these are foreign strategic partners that have settled in Hungary (p. 40). 'The foreign-owned companies rarely offered help to Hungarian suppliers, and if they did so, it usually was help in the introduction of quality assurance systems (ISO 9001)' (PKI 1997b, p. 54). According to another survey by the same institute, the proportion of domestic supply has increased at some foreign-owned firms, as foreign subcontractors have followed them to Hungary, generating secondary imports of capital, and because 'foreign companies have finally found that Hungarian suppliers are able to supply better quality, on schedule and flexibly. The cost of this, however, is to pay higher, West-European prices to the new suppliers, instead of the earlier low prices.' Meanwhile, unsurprisingly, 'foreign-owned firms of greater size have been able to replace domestic suppliers of poor quality more easily than have the managers of smaller investment' (PKI 1997a, p. 82).

A very recent study by the now re-named institute analyses the idea that there are four phases in the inflow of foreign di-

⁸ The survey makes the remarkable statement that the hardly liberal tax surcharge introduced as part of the 1995 stabilization package caused a growth in the country's imports (PKI, 1997b, p. 26).

rect investment. The main aim of the early investments was to conquer the Hungarian market. In the second phase, greater emphasis was placed on labour-intensive production (e.g. cables, ready-made clothing, sewing or component production). The third phase was based on the presence of a qualified, disciplined labour force (for vehicle production, computers, office technology or telecommunications). The latest period is one in which firms are coming for activities that demand R&D of a higher value added, mainly software (NKI 1999, p. 36). This means that the technical sophistication of foreign operations in Hungary has increased. Does this have a radiating, multiplier effect? The response seems more negative than the one in the study written two years earlier: 'The multinational companies and middle-size international ventures that have settled in Hungary are operating in isolation. They have integrated into the domestic economy only to a very limited extent. The proportion of domestic sourcing is very low... The more usual way is for the multinational suppliers of the multinational corporations to establish domestic manufacturing capacities here' (NKI 1999, p. 46).

Other papers with a similar content have been published. Perhaps it is not the most exciting statement to be found in them, for instance, that 'companies in 100 per cent foreign ownership integrate into the global manufacturing network of their parent companies.' This was already recognized in earlier analyses. The new symptom is that multinationals which have recently settled to produce components, such as Lorangen, which is a Ford supplier with a factory in Székesfehérvár, 'stay outside the country's network of economic relations and counteract even the attempts' of Hungarian small and medium-sized ventures to become suppliers (KOVÁCS 1998, p. 44).

The presence behind the increase in domestic sourcing of multinational component manufacturers (bringing only secondary imports and assembly to Hungary) is corroborated by the latest trends in foreign direct investment: 'Many of the investments realized in Hungary' in 1999 'were of a

much smaller volume than earlier ones, and in connection with this, most were related to the supplying industry' (MARTIN 1999, p. 27).

OPINIONS FROM EXPERTS

The basic problems discussed in the last three sections have become central to the debates among experts as well. Many economic policy-makers and economists not involved in research into this subject but with influence on macroeconomic questions have stated views on domestic and imported technological development and the effect of the multinationals operating in Hungary.⁹ Let me quote without comment the opinions expressed by some of the better known and reputed of these.

Ákos Balassa writes, 'I wish to controvert the simplified interpretation that technical development is the result of research and development activity. In small and open economies like ours, the source of technical development is not solely domestic R&D, but at least to the same or even to a greater extent, the product-development results imported by foreign-owned and joint ventures or bought in the form of licences or know-how. Related to this, the investments that implement developed technologies become definitive factors of technical development. The problem arises, or at least the results become only partial, if the foreign R&D results appear only in isolation, in other words, they do not generate domestic developments. Unfortunately, it often happens in this way...

'On the other hand, I also wish to controvert those who claim it is immaterial whether there are any domestic R&D results or how many there are (and how much is spent on them), because everything of this kind can be bought in from abroad. Coun-

⁹ The actuality of this topic is indicated by the fact that even a literal – although of social interest – weekly opened a debate on it. The several times ten comments were published in a collected volume. (R&D. Ideas on...1997.)

tries are in a position to compete in the international field provided they are not merely „adopters” of technology, but „developers” and „transferors” of it as well’ (BALASSA 1997, p. 61).

György Csáki writes that besides other factors, ‘the reduction in R&D, especially R&D and innovation within a company framework, is a consequence of the growing contribution of foreign capital... Privatization sales to foreign partners integrate the Hungarian subsidiary into the global network of the company concerned, and so the local R&D may become needless... This makes it difficult to increase domestic sourcing of supplies... The investments of multinationals in Hungary have introduced more up-to-date products and higher-level technologies to the country, but neither the products nor the technologies have been created in domestic research and development institutes’ (CSÁKI 1997, p. 83).

István Bihari cites surveys showing that ‘greenfield investments and the appearance of the multinationals in privatization have generally brought modern technologies into the country, but these are the results of foreign developments and do not spread through the whole economy, or even a major part of it... The modern technologies remain isolated units, and since the vertical sector structures of old have decayed, they have not been able to strengthen the integral unity of the Hungarian economy. This is well indicated by the fact that the range of suppliers to Hungarian units of multinational corporations is relatively narrow. As a consequence, the domestic intellectual product content and the domestic added, and especially the domestically realizable value of production lessens’ (BIHARI 1996, p. 12).

Zsuzsa Szentgyörgyi notes that knowledge transfer may theoretically be bought in the form of licences and know-how. ‘However, the product is usually not on sale in the first, extra profit-giving phase, only in the saturated phase of its life cycle... Most of the licences have been product-related... Most of the foreign companies do not do any

research or development. They have established „screw-driver” plants where product assembly is carried out’ (SZENTGYÖRGYI 1997, p. 58). She warns that ‘prior to World War II, the independent research and development was generally carried on at companies in majority Hungarian ownership’ (SZENTGYÖRGYI 1997, p. 59).

Magdolna Csath comments that ‘most of the manufacturing equipment, technologies and manufactures brought to Hungary are in the declining phase of their life cycles in the developed countries. The equipment has been written off there, and no costs are incurred on them... Hungarian wages allow extra profit to be made on production. Although such products and technologies are of higher level than those they replace, they do not help Hungary to reduce its technological lag. They even ‘set’ Hungary at a certain level for a long time, while the technical and technological development proceeds rapidly in the developed world’ (CSATH 1996, p. 262).

Tamás Bácskai considers that Hungary’s weak competitiveness means ‘the way forward may only be to find a place in the service of technological development and shape ourselves into suppliers and subcontractors for American research and development, or for that of Western Europe, which lags behind the previous at present’ (BÁCSKAI 1997).

According to István Gergely, ‘In a small country, successful research must always take into account the inability of small-scale firms to finance development and market acquisition. The innovation profit is made by world companies with financial muscle, so that only royalties, or at best, production rights remain’ (GERGELY 1997, p. 119).

László Árva comments that ‘foreign companies operating in Hungary, apart from some pleasing exceptions, do not usually change the general practice. They primarily... make use of the R&D products manufactured... at their parent companies. As a consequence, the development done before privatization at Hungarian compa-

nies will waste away, and what is even more damaging, companies that have become foreign-owned will hardly place any orders with the remaining domestic R&D centres, sectoral research institutes and universities... If the government allows the economy to drift helplessly along the path taken in recent years, the division in the economy will deepen' (ÁRVA 1999).

ANSWERS TO THE INTRODUCTORY QUESTIONS

The introduction to this paper put forward a number of questions that antedate this study, so that indirectly they encompass hypotheses. Having reviewed the specialist literature summarized here, let me try to respond to these questions briefly.

Has the process of shrinkage in R&D and innovation capacity stopped yet? The accessible statistics lead to the conclusion that the real value of the corporate R&D by firms has stabilized, at a rather low level of about a third of its value ten years ago.

What role do wholly foreign-owned and joint ventures play in this? Has technical development strengthened at foreign-owned firms? According to the information available, both Hungarian-owned companies and those in partial or total foreign ownership have created small, R&D-intensive groups. With the domestically owned firms, the direct market application of inventions and developments is general without maintaining an R&D department. These are small or medium-sized ventures. The subsidiaries of foreign companies, relying on the existing intellectual capacities of companies sold to them by privatization, maintain smaller researcher groups dealing with product development and adaptation, and with the general technical field belonging to the company's profile. Some of these companies have come to recognize that it would be unwise to let the accumulated specialist knowledge go to waste. Moreover, some investments with expressly R&D aims have been made recently, mainly

in telecommunication and software development. Despite all these facts, it is not possible to speak of a breakthrough. Relatively few foreign-owned companies are involved. Surveys in recent years have found a lower proportion of wholly or partly foreign-owned ventures R&D-intensive than was the case in 1994. (In the meantime, the number of such ventures has grown considerably. The R&D expenditures of foreign-owned companies have been proportionate to their sales revenues, or one or two percentage points below.)

How should the widening relations of multinationals and Hungarian research institutions be interpreted? News of this kind proved to refer to isolated instances or to conceal some other event in the background. Multinationals are only giving out considerably more orders for examinations and the issue of certificates required for official licences. Only a tenth of the revenue of industrial research institutes comes from corporate research orders.

Is the contribution made to technological renewal by supply and subcontracting activity increasing? Do certain favourable examples that have become widely known indicate a new period? The surveys of recent years suggest slow growth in the supply contribution of Hungarian-owned companies in certain sectors (mainly car components) and in certain regions (Northern Transdanubia). This, however, is not at all general. According to estimates, plants doing mass production and having been established by greenfield foreign investments, including the basic public services as well, buy about one tenth of their input from Hungarian companies. The surveys also confirm that the technical help of those ordering the supply (and lease work) generally still brings an improvement in the quality-control and information system and concerns only to a small extent production technology. Thus we can hardly speak of a new era.

What will be the result of having some new supplier and component-producer foreign investments in Hungary? This is a

worldwide phenomenon. The production capacities transported to the low-wage countries are followed by parts and component producers representing bigger and bigger capital concentration and operating in a pyramid structure. In many cases, even in most cases at the beginning, the aim of establishing a component manufacturing plant in Hungary was only to export. As a result of the pyramid concentration of parts and components production, the technical development, research and of course, realized value added become concentrated at the multinational component manufacturers. Hungarian companies may at best be the external subcontractors for these big companies, but even that is not typical. The settling of multinational component manufacturers reduces the logistical advantages of the domestically owned firms.

Is the technological duality of the Hungarian economy becoming stronger? In my opinion, despite the fact that there are exceptions, the main tendency is for the duality to become stronger. The borderline does not merely lie between the multinationals and the Hungarian-owned companies. In a few cases, the Hungarian-owned firms integrate into technical development, while in other (more frequent) cases, companies privatized to foreign corporations use traditional technologies in their production. There are only isolated examples of greenfield businesses applying relatively modern technologies.

How well founded is the view that the indirect, multiplier effect of foreign capital is greater than its direct impact? There is some truth in the view that the professional knowledge required for new machinery or management systems, or to meet requirements as a supplier and become more competitive tend to stimulate the technical efforts of many Hungarian-owned firms. However, there is another side ignored by those who emphasize the indirect multiplier effect. Many Hungarian-owned companies cannot meet the competitive challenge even if they are prepared for it technically and competitive in their prices. The markets are monopolized by a few firms and domestic

companies lack the financial muscle to compete, 'pump' the market and supply on credit. This is shown by the abrupt increase in the import demand of the firms privatized to foreign corporations. Whole vertical sector organizations, technological chains and professional cultures have collapsed. This is not just because they were unable to compete on international markets. Sectors and companies with considerable Western exports have also decayed. These market developments contributed to a national loss of one-and-a-half million posts.

Among the arguments put forward is that the machines, methods and products at subsidiaries of multinationals include a significant intellectual input, so that notably modern technology is being transferred to Hungary. This is true to a certain extent, because these machines are brought into the country, but they operate in isolation and often provide only semi-skilled assembly work.

The high technical standard of such machinery and multinationals' monopolization of the markets are justified ultimately by the profits they produce. If they operate relatively high-level technologies and use their financial muscle to squeeze out local competitors, the multinationals will be able to increase their value added and make extra profits.

The emphasis on the indirect multiplier effect treats the Hungarian subsidiaries of multinationals as if they were Hungarian-owned companies, which is a simplification also found in the statistical accounts. In my view, this is a mistaken approach. It hides the very important consequence that the technical duality between the foreign-owned and the domestically owned sectors is increasingly becoming a distributive problem.

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