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Competitiveness and Industrial Renewal Via Production Relocation by Global Multinational Networks

Post-1990s Development in Hungary's Electrical Industry

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SUMMARY

Electrical industry is regarded as the backbone of the ICT branch's hardware production. The international settlement of this industry is therefore of paramount interest for developed economies and emerging market economies as well. They all compete for investments in this sector. This study analysis the development of Hungarian electrical industry from the early years of transition when output performance was at the deepest level and when this sector along with the automotive branch became the primary source of economic expansion. The sector's performance is compared with data from other CEE countries and with other Hungarian industries in order to illustrate the widespread modernization effects of foreign investments in this sector. The question of activities' relocation from more developed countries to Hungary, and in most recent years from Hungary to less developed regions is also dealt with. Relocations are regarded in this paper from the Hungarian viewpoint as necessary and positive developments. Relocated activities give room for other, more sophisticated and more income generating activities.

INTRODUCTION*

The two main manufacturing industries to have developed the most complex international and global business networks are the electrical (NACE DL) and automotive (NACE DM) industries. (Some of the former also appears under the latter.) They seem to be the most globalized as their global spread applies beyond their markets or production of finished products or main activities, to a much deeper and more extensive international division of labour. Their are very complex, consisting of components and subassemblies with a wide range of technological sophistication. So there is room to settle discretionary activities in locations that provide the most favourable conditions. This is the main technical condition for relatively rapid changes and shifts of production location, which in turn is a major element of cost competition within them. The electrical equipment industry makes diverse products, ranging from computers, electric motors, cables and batteries, semi-conductors, telephones and TV sets to electro-medical equipment, watches and clocks.

The expansion of global division of labour in the 1990s allowed the transition economies of Central Europe a significant role as well. There is a huge literature on the impact of transnational corporations on host economies, which will not be recapitulated here. The main aim of this paper focuses instead on selected issues, the main aim being to analyse how foreign investment has contributed to restructuring of a single branch of Hungarian manufacturing and hence to restoring that industry's international competitiveness. This issue is placed in a dynamic context. An attempt is made to follow up further development of investments, changes in them, upgrading, potential exit, and moves to other locations. The analysis draws on statistics and anecdotal evidence. Hungary's experience in developing the industry is compared with that of several other transition economies and of other manufacturing industries.

The changes in competitiveness and impacts on it can be traced in various dimensions. First is the increase in absolute and relative size of the branch. Another important issue is the ownership pattern, the increasing role of highly efficient transnational corporations in the production. A further important aspect is the improvement of the output structure. This means a steady increase in the level of added value, which also means increasing technological sophistication with options for spill-over effects. This also means the introduction of new products and activities including in some cases high level corporate functions like logistical planning, account management or even R&D. This kind of upgrading of activities is bound in many cases to the relocation of previously pursued activities to other low cost locations and their replacement by functions moved from higher cost countries of the more developed world.

We believe these improvements were most pronounced in the electrical indus-

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try, which has served as the driving force for modernization of the Hungarian economy. But the industry also illustrates the rapid changes that may occur in the global division of labour due to changes in the quantity, quality and price of various production factors available. The electrical equipment industry deserves special attention also for its strategic importance to the whole economy, as a major source of innovation and base for the 'new economy' of the 21st century (ICT technology).[1]

1) STATISTICAL OVERVIEW

The electrical and optical equipment industry plays an important role in the Central and Eastern European (CEE) economies. It is one of the major employers, accounting for 5–12 per cent of the manufacturing labour force, while its 4–25 per cent of manufacturing output amounts to 2–18 per cent of GDP. The industry has increased its size and share in most transition economies in the last ten years. *Table 1* shows that the industry is of paramount importance to Hungary, where it has by far the highest shares of production and employment found in any of the CEE countries examined. It is also important in the other CEE countries, except Bulgaria, where it lags behind, although the industry was important there also under the pre-transition COMECON specialization arrangements. Bulgaria also had a sizeable electrical industry, but it differs from most other transition economies in showing no significant recovery in the industry yet.

Although the production and employment shares are also low in Romania and Poland, the absolute size of the industry there is no smaller than in Slovenia or Slovakia. Poland and the Czech Republic are similarly incorporated in the global production network of the industry. Hungary stands out for high production and employment shares for the industry and because the industry's employment shares are much lower than its shares in production, so that it has a significantly higher level of per capita production, especially compared with those where the production share is lower than the employment share. In these countries, the rough measures used indicate that productivity in the industry is below the average for manufacturing (Bulgaria, Czech Republic, Slovakia and Slovenia). This may point to a different intra-industrial structure or to a lower effective level of productivity in comparable activities. It will be argued later that both factors play a role in the higher level of productivity found in Hungary's electrical equipment industry. The truly important issue here is to determine the origins of excessive productivity. Is this a feature of the competitive advantage of firms or economies (local production factors) or both? Are these factors dynamically interlinked? Do local factor costs and quality of production factors influence capital attraction,

[1] Capturing this through statistical analysis is rather difficult, as many phenomena embody inter-industrial shifts between activities, especially in ICT. Often manufacturing activity is replaced or amended by various services, so that a firm's whole turnover may transfer into services. What has been in-house service activity is entered alongside manufacturing. Further complications come with changing corporate competences and waves of outsourcing. The attempt here is to consider 'off-shoring' of activities (in-house movement of functions), but the statistics fail to differentiate between that and outsourcing, including both forms of transfer of corporate functions.

Table 1
The electrical and optical equipment industry in certain CEE countries

	Production million 1999	Production as % of manufacturing, 1999	Production as % of manufacturing, 2003	Employment in thousands, 1999	Employment as % of manufacturing, 1999	Employment as % of manufacturing, 2003
Bulgaria	265.4	2.3	4.3	36.5	6.2	5.1
Czech Republic	3079.4	6.2	7.9	113.0	10.5	13.2
Hungary	7361.8	16.3	23.6	116.0	15.6	18.3
Poland	6250.3	4.3	7.2	173.2	6.6	7.1
Romania	1029.6	2.8	5.0	74.5	4.4	5.4
Slovakia.	1142.6	6.2	8.4	54.9	11.0	13.6
Slovenia	967.0	5.1	8.6	25.2	11.2	12.4

Source: WIIW 2004.

producing highly productive production facilities by competitive multinationals? Does the presence of the multinationals improve quality of local production inputs? Are there significant spillovers that can further improve location advantages?

In 1989, the shares of the electrical equipment industry in manufacturing were similar in all CEE countries. Bulgaria (now lowest) had an 8 per cent industry share similar to Hungary's, while the lowest was recorded in Romania (3 per cent), which cooperated within COMECON less closely than other members (see Hanzl 2001). The importance of the industry increased during the transition years in all CEE countries but Bulgaria, with the most vigorous development occurring in Hungary, now the only CEE country where the industry's share is higher than the EU 15 average. This also means that the industry still has fairly large growth potential in all other countries. *Table* 2 shows the structure of manufacturing. The industry increased its share in production in all the transition economies but Romania's. The impressive increase in the Czech Republic was due to new investment (relocation). The already high share of the electrical equipment industry in Hungary increased further between 1999 and 2003, despite the loss of several large firms that moved to lower-wage locations. New investment in Hungary played a role in the expansion, but the addition of new functions by incumbent companies was also significant. In some cases, this involved relocating activities from more developed countries (GE, Ericsson, Nokia and others introducing various services in Hungary).

During the first period of transformation (1989 to 1992–5), all CEE countries underwent deep transformational recession: steep decline in production followed in some cases by chronic stagnation. The electrical equipment industry declined by over 20 per cent a year in all CEE countries until 1992. In some segments, the decline was sharper, *e.g.* in production of semiconductors and computers in Hungary, which stopped almost completely – output fell by 80 per cent. Furthermore, there was no radio-receiver production in Hungary between 1992 and 1995 (Sipos 2003). In general, the industry was affected by the recession more strongly than was manufacturing as a whole, due to the collapse of earlier COMECON specialization patterns and

Table 2
Shares of CEE countries' manufacturing industries in total manufacturing production
(1999 and 2003, %)

	Bulgaria		Czech Rep.		Poland		Romania		Slovakia		Slovenia		Hungary	
	1999	2003	1999	2003	1999	2003	1999	2003	1999	2003	1999	2003	1999	2003
D: Total manufacturing	100	100	100	100	100	100	100	100	100	100	100	100	100	100
DA: Food…	25.2	21.5	17.2	12.8	25.3	22.8	25.1	19.0	13.9	10.8	14.9	12.8	17.0	15.6
DB: Textiles…	6.7	10.5	4.4	3.5	4.6	3.9	7.2	7.5	4.2	3.2	7.3	6.0	3.6	2.6
DC: Leather…	1.3	1.2	0.8	0.2	0.9	0.7	1.7	2.1	1.3	1.4	1.5	1.6	0.8	0.5
DD: Wood…	1.5	1.9	2.7	1.9	3.5	3.6	2.5	3.5	3.4	3.7	3.2	2.8	1.2	1.2
DE: Paper, publishing...	4.2	4.6	4.7	2.5	6.1	6.9	3.1	3.0	6.1	5.5	7.1	7.4	4.3	4.2
DF: Coke, petrol.	15.0	15.0	2.8	2.9	4.6	4.9	8.0	13.4	6.7	5.3	0.4	0.1	4.9	4.0
DG: Chemicals…	9.3	8.0	6.7	5.6	6.8	7.3	7.4	7.1	6.0	4.0	10.0	11.0	7.0	7.1
DH: Rubber, plastics	2.2	2.5	4.3	6.4	4.4	5.8	2.2	3.1	3.3	4.5	4.5	4.7	3.5	3.8
DI: Non-metal…	5.1	4.9	6.4	5.7	5.4	5.3	4.8	4.0	5.2	4.3	4.8	4.4	2.9	2.9
DJ: Metal products…	10.3	13.7	15.9	14.0	10.6	10.8	16.3	18.5	17.0	15.9	12.3	13.0	8.1	8.0
DK: Machinery…	11.5	7.5	8.0	7.4	5.5	5.4	5.5	3.8	7.3	6.7	10.4	11.3	4.7	5.5
DL: Electrical…	4.3	4.9	7.9	13.9	7.2	7.6	5.0	4.2	8.4	9.2	8.6	9.4	23.6	28.4
DM: Transport equipment	1.9	1.9	14.3	17.6	10.8	9.4	7.7	7.0	14.0	21.3	9.9	10.4	17.0	15.3
DN: Other manufacturing…	1.5	2.0	3.9	3.4	4.3	5.6	3.6	3.6	3.2	4.0	5.3	5.0	1.2	1.1

Source: WIIW 2004.

Eastern markets, falls in deliveries for military purposes, and in many countries, rapid liberalization of trade, so that less sophisticated domestic (CEE) products were swept aside by imports. On the supply side, firms could not follow the rapid changes in demand and many firms went bankrupt. This came sooner in countries where market shocks were not absorbed by state protection and later where the state tried expensive rescue manoeuvres before allowing ailing electrical producers to die. A few domestic firms survived through heavy downsizing and restructuring.

Earlier, local producers were replaced partly by product imports and partly by foreign investors. Then small new domestic producers appeared after 1993, especially after 1995. Growth rates were exceptionally high in Hungary, boosted by several major greenfield foreign direct investments (FDIs), with over 40 per cent a year on average between 1993 and 1999. Growth was also quick in Poland and in the Czech Republic at 16 per cent a year (Hanzl 2001). Compared with total manufacturing, the electrical equipment industry proved one of the fastest growing (alongside automotive) in the three countries. The industry's growth was fastest in Hungary, the Czech Republic and Slovenia, fuelled also by general economic recovery and high growth in other downstream industries such as the automotive industry, which also received substantial FDI. The growth pattern was marked by a rapid rise in exports, due partly to demand from regional markets and partly to exports to developed countries. Multinational corporations fitted the old/new production locations into a new international cooperation network that filled the gap left by defunct COMECON cooperation. The investments were primarily market-seeking, but due to the limited size of local markets, they moved automatically into exporting as well. Efficiency-seeking relocation, with moves of labour-intensive assembly and production in the international network, also started in production areas marked by demand for cheap unskilled labour.

Development of the electrical equipment industry lost impetus in Hungary after 2000. Hungary as a production location fitted into well-established coop-

Table 3
Changes of gross output and export sales in the electrical and optical equipment (DL) and transport equipment (DM) industries in Hungary
(1996–2003, previous year = 100)

	D: manufacturing		DL: electrical & optical equipment		DM: transport equipment	
	Gross output	Exports	Gross output	Exports	Gross output	Exports
1995	100	100	100	100	100	100
1996	103	119	142	179	126	140
1997	115	137	179	205	163	168
1998	116	129	146	159	148	157
1999	112	123	155	161	120	124
2000	121	128	154	157	116	117
2001	104	109	109	115	104	104
2002	104	106	105	106	101	101
2003	107	111	117	117	114	114

Source: Central Statistical Office, Budapest.

eration networks by then, and further development went more slowly, partly because of recession on world markets. The period since 2001 has seen slower expansion, but big structural changes within the industry. A close link between production and export changes is shown in *Table 3*. Signs of recovery and a more stable growth pattern can be seen in the 2003 data.

During and since the second half of the 1990s, the Hungarian economy and manufacturing in general have been driven primarily by exports. Changes in export sales have always exceeded the expansion of output, which indicates that domestic sales grew much slower than exports. The impact of the world economic recession that began in 2001 can be seen in lower growth rates in exports and output, especially in automotive and electrical equipment, the two most internationalized industries, whose growth rates exceeded manufacturing average in the years of quick expansion, but lagged behind it in the recession years. This means they depend on world economic growth, so that boom and downturn in the world economy are transferred to them. Nevertheless, another contributor to this slowdown after 2000 was the fact that the restructuring process was reaching completion. Growth rates in the second half of the 2000s can be expected to be similar to those of 2003.

2) INDUSTRIAL COMPETITIVENESS

Wages, productivity and unit labour costs in the electrical equipment industry have been much lower in CEE economies than in almost all EU 15 countries. This also indicates, though, that wage levels were usually lower than productivity levels, or else unit labour costs would have been higher than in the EU 15. Moreover, wage and productivity development during the 1990s widened the gap in some transition economies, most strongly in Hungary, but also in the Czech Republic and Slovenia. So unit labour cost (ULC) fell continually in the 1990s. This had changed by the turn of the millennium, most sharply in Hungary, where real wages increased faster than productivity for two reasons. (i) Rapid improvements in productivity were made in the 1990s through mass replacement of obsolete technology in manufacturing. Hungarian productivity levels became comparable to EU 15 averages, which were even attained in some industries, such as electrical equipment. From this higher base, it became harder to sustain rapid rates of improvement. On the other hand, deliberate government policy (demand stimulation, vote-catching measures) caused average real wages to start to rise in 2000, most strongly in the state administration, but with knock-on effects on manufacturing wages.

According to calculations by Hanzl (2001), CEE nominal wage rates per employee in the electrical equipment industry were about 10 per cent of those in Austria, lower still in the Balkan countries (4 per cent), and highest among CEE countries in Slovenia (27 per cent). Productivity levels ranged from Bulgaria's 13 per cent to 45 per cent in Poland, but in Hungary surpassed Austria's at 110 per cent in 1999. So Hungary had the lowest unit labour costs of any CEE country – under 10 per cent of the Austrian level (Hanzl 2001, p. 10). Yet in

1991–2, it had still been over 50 per cent.

This highly advantageous situation for investors began to change in 2000 as real wages rose. The long period when wage increases lagged behind productivity rises must have changed the distribution of added value between labour and capital somewhat. The increase in real wages was only marginal in Hungary in the 1990s, while GDP was starting to grow. Wage rises were also meagre compared with other transition economies (except the Balkan countries). But the miraculous decrease in unit labour costs was mainly achieved by introducing highly efficient, up-to-date technologies, and only to a lesser extent through better labour performance. Productivity continually increased by 20–30 per cent a year over the 1993–2000 period in the electrical equipment industry, while earnings rose at a slower rate of 10–15 per cent. This changed after 2000, as *Table 4* shows. Figures for 1999 and 2000 still show very high productivity increases, but there is a drop in 2001 and 2002.

For a more careful analysis, however, it has to be noted that per capita output is a sensitive measure. Output potential is broadly influenced by the capabilities of production factors, but actual usage of these depends on sales potentials. The dramatic drop in the productivity figures of the computer industry (NACE 30) is a straight consequence of falling sales revenues, due to world economic recession and partly to the sale, shutdown and move to China of perhaps the most productive plant in the industry: IBM Storage Products Inc. Thus the situation is not that bad: the productivity indices were depressed temporarily by low sales levels.

Another way besides cost analysis to express the competitiveness of industries is through sales and especially trade performance. Industries able to expand on sales markets can be regarded as com-

Table 4
Competitiveness and foreign ownership. Changes in some indicators for Hungary's electrical industry 1998–2003, % change, previous year = 100, except in foreign ownership (% share of foreign owners in subscribed capital)

		30	31	32	33	DL	DM	D
1990	Output/employee	83.4	107.0	150.6	109.4	134.8	125.6	111.0
	Average monthly earnings	96.5	120.0	123.5	111.1	118.4	116.9	115.9
	Foreign ownership	39.6	85.3	85.1	22.4	71.4	74.4	60.5
2000	Output/employee	127.3	136.8	133.6	108.7	129.0	114.2	118.9
	Average monthly earnings	111.9	115.2	117.7	116.3	115.9	117.0	116.4
	Foreign ownership	30.9	76.0	90.8	31.1	73.0	71.9	61.3
2001	Output/employee	66.8	162.9	91.5	105.5	107.3	96.8	104.3
	Average monthly earnings	111.0	111.3	116.7	114.5	113.0	116.0	114.8
	Foreign ownership	31.7	86.8	93.8	29.9	80.6	84.5	64.4
2002	Output/employee	80.7	108.5	126.0	86.0	107.5	97.4	104.3
	Average monthly earnings	122.0	112.0	112.7	105.1	112.2	112.6	112.8
	Foreign ownership	30.3	82.3	92.5	20.9	76.3	82.0	63.5
2003	Output/employee	124.8	79.9	147.0	119.8	120.4	108.6	110.6
	Average monthly earnings	102.0	107.8	109.2	115.1	108.6	105.3	109.4
	Foreign ownership	29.2	83.4	95.3	31.6	79.5	82.2	67.5

Source: Central Statistical Office, Budapest.

petitive: increase in market share results from a high level of competitiveness. Trade with the EU stands out in this respect. In the 1990s, the former role of COMECON was taken over by the EU. The EU 15 became the main export market for the electrical equipment industry as well. In the Czech Republic, Poland and Hungary, the EU 15 share in industrial exports was around 80 per cent in the early 2000s.

As with production and employment, Hungary has the highest share of electrical equipment in total exports (about 30 per cent). This share was proportionally lower in other CEE countries in 2003: 21 per cent in the Czech Republic, 11 per cent in Poland, Slovakia and Slovenia, 7 per cent in Romania, and 4 per cent in Bulgaria. Export shares were higher for this industry for overall production, which reflects an above-average export intensity in the electrical equipment industry (see *Tables 5* and *6*). The share of the industry in total exports in the CEE countries grew steadily. Hungary achieved the largest export increase, 460 per cent, between 1995 and 1999, as several greenfield investments in the industry came into operation. When the flow of such extensive investment dried up, the increases in export sales returned to 'normal', much lower levels.

But the industry had even higher share of total imports, due to the import needs of foreign investors (*e.g.* outward processing) and increased demand for consumer electronics and IT imports. The exception was Hungary, where the share was lower in imports than exports – this can be explained several ways, but all to do with relatively high development of the electrical equipment industry. For example, equally high export and import shares indicate a low level of local value added in exports. Another cause may be a higher share of local consumption (*e.g.* in consumer electronics) delivered from local factories, which pushes imports lower. Indeed, there is ample evidence of upgrading of production and export structure in the Hungarian electrical equipment industry. At first sight, a profound difference in finer trade structure appeared, when compared with other transition economies. According to 1999 calculations by Hanzl (2001), all other countries' exports were heavily concentrated on electrical machinery and apparatus n.e.c. (NACE 31, 50–60 per cent), followed far behind by radio, TV and communication equipment (NACE 32, 10–37 per cent of exports). Exports of office machinery (NACE 30) and medical precision and optical instruments (NACE 33) were far behind. The 1999 structure in Hungary was markedly different: radio, TV and communication equipment in first place (big investments in cellular telephony and consumer electronics), and office machinery (big investments by leading world firms in electronics, computer technology and informatics) a close second.

Comparing 1999 with 2003, big shifts appear in the Czech Republic, where hitherto low-level specialization in computer and office machinery greatly increased, making the intra-industrial structure more balanced. The drop in Hungary's computer industry came from relocation of assembly by IBM and Flextronics in 2002. The structure in the other 4 countries remained fairly stable and concentrated (*Tables 5* and *6*).

Table 5
Detailed export structure of electrical industry in 1999, % of total DL exports

	Czech Republic	Poland	Slovakia	Slovenia	Hungary
30 Office machinery, computers	*7.2*	*1.8*	*17.2*	*2.1*	*32.4*
31. Electrical machinery	*64.0*	*55.4*	*66.5*	*59.8*	*30.1*
311 Electric motors, generators, transformers	14.4	10.0	18.4	26.2	5.5
312 Electrical distribution, control apparatus	18.3	8.3	3.3	9.4	5.7
313 Insulated wire, cable	8.7	8.2	6.2	2.8	3.0
314 Accumulators, primary cells, primary batteries	4.9	3.9	0.0	2.0	0.0
315 Lighting equipment, electric lamps	2.2	10.2	3.0	3.9	5.6
316 Electrical equipment n.e.c.	15.5	14.7	35.5	15.6	10.3
32 Radio TV telecommunications	*19.9*	*37.3*	*13.4*	*12.0*	*33.6*
321 Electronic valves, tubes, components	12.4	9.1	5.4	7.4	5.7
322 TV, radio transmitters, line telephony, telegraphy	2.4	2.5	1.6	1.0	1.1
323 TV, radio receivers, sound, video recording, *etc.*	5.1	25.7	6.3	3.5	26.7
33 Instruments, watches	*8.9*	*5.5*	*3.0*	*26.0*	*3.9*
331 Medical, surgical equipment, *etc.*	1.7	2.1	1.2	2.8	0.9
332 Measuring, testing, *etc.* equipment	4.6	2.8	1.6	16.9	2.2
334 Optical, photographic equipment	2.3	0.2	0.2	5.3	0.7
335 Watches, clocks	0.3	0.5	0.0	1.0	0.0
DL Electrical & optical equipment	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
DL in € million	*2634*	*2167*	*752*	*591*	*5792*

Source: EU New Kronos.

Table 6
Detailed export structure of electrical industry in 2003, % of total DL exports

	Czech Republic	Poland	Slovakia	Slovenia	Hungary
30 Office machinery, computers	*29.3*	*2.0*	*12.8*	*2.7*	*24.6*
31. Electrical machinery	*40.3*	*53.5*	*57.0*	*56.7*	*30.4*
311 Electric motors, generators, transformers	8.0	8.0	17.8	21.7	5.2
312 Electrical distribution, control apparatus	11.8	10.8	5.4	9.0	7.8
313 Insulated wire, cable	4.7	7.5	4.0	2.6	9.2
314 Accumulators, primary cells, primary batteries	3.1	3.0	0.1	3.7	0.2
315 Lighting equipment, electric lamps	1.5	7.7	4.7	3.4	5.5
316 Electrical equipment n.e.c.	11.2	16.5	25.0	16.3	2.5
32 Radio TV telecommunications	*23.1*	*36.4*	*23.4*	*20.5*	*38.2*
321 Electronic valves, tubes, components	9.0	8.3	10.3	7.2	8.6
322 TV, radio transmitters, line telephony, telegraphy	7.5	2.4	0.9	9.9	2.8
323 TV, radio receivers, sound, video recording, *etc.*	6.6	25.7	12.2	3.4	26.8
33 Instruments, watches	*7.3*	*8.1*	*6.8*	*20.1*	*6.9*
331 Medical, surgical equipment, *etc.*	1.5	2.9	2.9	2.8	1.4
332 Measuring, testing, *etc.* equipment	4.0	4.7	3.3	13.0	4.3
334 Optical, photographic equipment	1.7	0.3	0.5	4.0	1.2
335 Watches, clocks	0.1	0.2	0.1	0.3	0.0
DL in € million	*43027*	*47526*	*19305*	*11285*	*38096*
D in € million	*43027*	*47526*	*19305*	*11285*	*38096*
DL share in total D, %	*21.7*	*11.5*	*11.0*	*11.9*	*28.5*

Source: EU New Kronos.

Hungary's different production and export structure may provide some explanation for the industries' outstanding development pattern. Éltető (1999) and others also noted that in Hungary's trade structure, so-called high-technology products had a larger share than in other CEE countries and that this share was still increasing. *Table 7* shows developments in the export structure of Hungarian manufacturing. Even conservative observers would agree there was substantial up-grading in the structure, especially in the second half of the 1990s. Marginalization of resource-based exports is an especially welcome development, as Hungary has always been poor in natural resources and had to import them to run facilities in these industries, whose value added was therefore low. But the very high share of high-tech products covers activities of a mixed nature. There are simple assemblies, as in some electronics products, but also activities with fairly high local content and local value added.

But do these results really indicate better performance? Moves by two factories from Hungary to China much altered the industry's production and export structure. This shows firm-specific features and advantages may have been important in these Hungarian operations. Local competitive advantages seem to have played little role, as large-scale investments were moved almost overnight from one location to another. Yet despite the loss of some 5 per cent of total Hungarian exports by these moves, the trade deficit did not deteriorate; in these cases, imports were also very high: the activity was rather assembly with very low local value added. So 'screwdriver' industries should be distinguished from those with longer-term prospects in a country, which produce more local value added and intend to increase the level of this.

One measuring method, developed by the WIIW, is

Table 7
High, medium and low-technology products in Hungary's exports to the EU

	1985	1990	1995	2000
Market share	*0.3*	*0.3*	*0.5*	*0.9*
1. Primary products	0.3	0.5	0.4	0.4
2. Resource based manufactures	0.4	0.5	0.5	0.5
3. Manufactures not based on res.	0.2	0.3	0.5	1.1
Low technology	0.4	0.5	0.8	0.8
Medium technology	0.1	0.2	0.5	1.3
High technology	0.1	0.1	0.4	1.1
4. Others	0.1	0.2	0.2	0.1
Export structure	*100.0*	*100.0*	*100.0*	*100.0*
1. Primary products	26.9	20.8	10.5	4.5
2. Resource based manufactures	32.9	27.1	18.4	9.8
3. Manufactures not based on res.	39.2	50.5	70.0	85.1
Low technology	22.6	27.2	25.9	14.9
Medium technology	12.7	18.2	32.6	44.9
High technology	3.9	5.1	11.6	25.2
4. Others	1.0	1.6	1.0	0.6
Principal exports	*2.8*	*4.9*	*23.9*	*50.2*
Internal combustion piston engines	0.1	0.1	7.2	12.4
Automatic data-processing machines	0.1	0.0	1.0	10.1
Passenger motor cars	0.0	0.1	1.8	6.6
Sound equipment	0.0	0.0	1.1	3.4
Telecommunications equipment	0.2	0.9	2.4	3.4
Equipment for electricity distribution	0.1	1.1	3.7	3.3
Parts, accessories of motor vehicles	0.3	0.5	2.0	3.1
Parts of electrical equipments	0.1	0.2	0.9	2.8
Electrical machinery	1.7	1.5	3.1	2.7
Television receivers	0.1	0.5	0.9	2.4

Source: UNCTAD 2002

based on differences of unit export values. Unit value of total EU imports is compared with unit value of imports from specific countries, the differences being expressed in a 'price/quality gap indicator'. A low unit price level indicates less sophistication and/or inferior quality in exports of a given product group. *Table 8* gives figures for 1995–9.

and telecommunication equipment and apparatus' (32). Hanzl (2001) adds lighting equipment and lamps (315), watches and clocks (335).

Scores for the price/quality gap indicator support the same picture of superior performance by Hungary's electrical equipment industry. But an exceptionally high figure for computers (+1.061) sug-

Table 8
Price/quality gap indicator for CEE exports
to the EU of electrical and optical equipment (DL)

	Bulgaria	Czech Republic	Poland	Romania	Slovakia	Slovenia	Hungary
1999							
30 Office machinery, computers	-0.303	-0.429	-0.417	-0.346	-0.158	0.162	1.061
31. Electrical machinery	-0.312	-0.234	-0.080	-0.281	-0.195	-0.134	0.160
32 Radio TV telecommunications	-0.017	0.064	-0.057	0.383	0.139	-0.139	0.046
33 Instruments, watches	-0.539	-0.438	-0.474	-0.563	-0.345	-0.181	-0.410
DL Electrical & optical equipment							
1995	-0.402	-0.239	-0.252	-0.433	-0.282	-0.237	-0.087
1996	-0.477	-0.293	-0.288	-0.460	-0.374	-0.238	-0.066
1997	-0.432	-0.228	-0.224	-0.393	-0.313	-0.269	0.012
1998	-0.375	-0.152	-0.044	-0.207	-0.189	-0.231	0.061
1999	-0.304	-0.219	-0.103	-0.262	-0.157	-0.148	0.318
Average 1995–9	-0.398	-0.226	-0.182	-0.351	-0.263	-0.225	0.048
Change in % 1995–9	4.8	2.3	6.6	9.1	5.8	2.3	8.6

Source: WIIW database in Hanzl 2001.

For the five-year average and for 1999, the indicator was negative for EU exports of electrical equipment exports from all CEE countries but Hungary. The largest trade gaps appeared in the two Balkan countries and the Czech Republic, while Slovakia, Slovenia and Poland were near equilibrium, though still negative. Hungary showed a remarkable +0.30 in 1999, *i.e.* prices on average 30 per cent higher than the average of total EU imports. The indicator improved in all countries between 1995 and 1999 (Hanzl 2001). Table 8 shows the price/quality gap indicator across segments of the industry, with best values in 'radio, TV

gests that the high average hides wide intra-industry differences. A fairly low (-0.41) value for instruments, for example, is around average for the countries studied. In a more detailed list in Hanzl (2001, p. 23), no less than 9 negative scores out of 15 appear even in Hungary's case. A few industries did very well and their outstanding performance pushed averages very high, presumably because their weight in exports was high too. Especially strong in Hungary were lighting equipment (+0.53), a traditionally strong Hungarian area now run by General Electric, and electrical equipment n.e.c. (0.45), another stronghold with

much foreign investment (Siemens, ABB, Bosch and others). TV and radio receivers, sound video recorders (+0.42) were also strong industry with high export shares, dominated by Phillips, Sony, TDK and other well-known brands. Office machines and computers (+0.23) also had high shares in exports and were dominated by a few multinationals such as IBM and Flextronics. Electric motors, generators and transformers scored positively (+0.02) but export share was marginal. Industries with strong foreign penetration in local production achieved better price/quality gap values. Data for Hungary's largest exporters appear in *Table 9*.

Table 9
Exports from Hungary by the 12 leading foreign affiliates, 2000

Name	Country of origin	Industry	Value (USD million)	% of exports
Audi Hungaria Motor	Germany	Automotive	3187	11.2
IBM Storage Products	United States	Electronics	2240	7.8
Philips Magyarország	Netherlands	Electronics	2027	7.1
GE Hungary	United States	Electronics	639	2.2
Opel Magyarország	United States	Automotive	628	2.2
Flextronics International	Singapore	Electronics	430	1.5
Alcoa Köfém	United States	Aluminium	314	1.1
Magyar Suzuki	Japan	Automotive	300	1.1
NABI	United States	Automotive	249	0.9
Samsung Electronics	Korea	Electronics	241	0.8
Electrolux Lehel	Sweden	Machinery	212	0.7
Visteon Hungary	United States	Electronics	187	0.7

Source: UNCTAD 2002.

Another often-used way of analysing trade performance is Bela Balassa's RCA (revealed comparative advantage) indicator, a trade specialization index showing the industries where one country or another has above-average specialization in trade. RCA says little about the 'quality' of specialization: evaluation is left to the subjective opinion of the observer. Nor can it shed light on the real content of the trade flows, but it becomes possible with WIIW's price/quality gap indicator to assess whether a country's strong specialization in, say, high-tech product groups really covers high-tech activities or at least substantial local contributions to high-tech products. A snapshot comparison of the CEE countries in 1999 appears in *Table 10*. Hungarian specialization indices are unsurprising. As expected the same branches showed strong specialization which also provided positive price/quality gap values, and weighted the most in the export structure of Hungarian electrical equipment industry (Tables 5, 6 and 8).

Similarly, the RCA index was negative in all other countries, which reflects their negative industrial trade balances. And a comparison with RCA data for all manufacturing indicates a comparative disadvantage for the industry in all other CEE countries. The disadvantage or 'de-specialization' was greatest in the Balkan countries and smallest in Slovenia. But here again, the interpretation of the figures is questionable. Very high negative values indicate virtually no export activity or even local production in the given product group. In internationally highly competitive and complex industries like electrical equipment, today's firms can no longer thrive on the domestic market alone. On the other hand, most CEE countries are small or at most medium-sized economies (Poland

Table 10
The RCA structure of the electrical and optical equipment industry, 1999

	Bulgaria	Czech Republic	Poland	Romania	Slovakia	Slovenia	Hungary
30 Office machinery, computers	-0.95	-0.50	-0.92	-0.44	-0.11	-0.85	0.23
31. Electrical machinery	-0.33	0.04	-0.10	-0.07	0.06	0.02	0.14
311 Electric motors, generators, transformers	0.14	0.05	-0.13	0.20	0.12	0.40	0.02
312 Electrical distribution, control apparatus	-0.52	-0.11	-0.45	-0.70	-0.67	-0.29	-0.12
313 Insulated wire, cable	-0.45	0.07	-0.18	-0.59	-0.25	-0.54	-0.14
314 Accumulators, primary cells, primary batteries	-0.86	0.33	0.08	-0.57	-0.98	0.03	-0.83
315 Lighting equipment, electric lamps	0.08	-0.17	0.22	0.23	0.24	-0.19	0.53
316 Electrical equipment n.e.c.	-0.61	0.20	0.17	0.17	0.41	0.13	0.45
32 Radio TV telecommunications	-0.70	-0.35	-0.32	-0.79	0.42	-0.53	0.09
321 Electronic valves, tubes, components	-0.13	-0.17	-0.27	-0.87	-0.32	-0.12	-0.35
322 TV, radio transmitters, line telephony, telegraphy	-0.93	-0.73	-0.88	-0.72	-0.80	-0.91	-0.63
323 TV, radio receivers, sound, video recording, *etc.*	-0.43	-0.26	0.23	-0.89	-0.12	-0.41	0.42
33 Instruments, watches	-0.54	-0.38	-0.67	-0.77	-0.74	-0.05	-0.31
331 Medical, surgical equipment, *etc.*	-0.93	-0.52	-0.63	-0.88	-0.47	-0.53	-0.33
332 Measuring, testing, *etc.* equipment	-0.50	-0.44	-0.69	-0.76	-0.81	0.07	-0.32
334 Optical, photographic equipment	0.01	0.04	-0.87	-0.37	-0.62	0.24	-0.20
335 Watches, clocks	0.24	-0.18	-0.31	-0.74	-0.98	-0.24	-0.71
DL Electrical and optical equipment	-0.60	-0.17	-0.35	-0.42	-0.14	-0.20	0.12

Source: Hanzl (2001)

and perhaps), with limited production input capacities. So there has to be some kind of specialization. It is virtually impossible to produce everything and have high specialization indexes in all product groups.

There is a subjective element in how to evaluate some specialization pattern or other. The OECD guidelines on technology intensity (Table 7) may be an important aspect. High-tech branches may provide important growth and modernization impulses for other industries. But this is obviously not the case if the local value added is small and the local activity less than high tech, even if the figures project positive pictures in every respect. What if an industry consists solely of 'screwdriver' factories? Do these also give the expected spillover effects? They may under some conditions and in the longer run. The 'screwdriver' industries of South-East Asian countries gave necessary stimuli, and Indian software ventures also show some upgrading of activities from their original data processing. Here the quality of the local business environment and economic policies (industrial policy) are crucial.

3) Foreign ownership, relocation and competitiveness

The main purpose of this paper has been to analyse relationships of competitiveness and FDI through production relocation, in one particular segment of manufacturing: the electrical equipment industry. The intention here is not to draw general conclusions on the subject, but concentrate on that single industry. It has been shown in the previous section that foreign-owned companies have played a dominant role in shaping the structure of Hungarian manufacturing and exports. Two main new issues now emerge. The first is new experience with dynamics of FDI inflows and outflows, and the second the question of spillover effects. This section covers rather briefly these two issues in the context of electrical equipment industry.

The data in earlier tables has already shown that there were fundamental changes in the structure of the manufacturing industry and exports, due largely to the electrical equipment (DL) and automotive (DM) industries. These two also accounted for most of the foreign investment. The firms settling in Hungary included not only primary producers, but first and even second-tier suppliers. A good example of a big first-tier supplier is Flextronics, which supplies several electrical and automotive firms.

FDI flows up to 2000 were almost exclusively inward investment, mainly in privatization purchases and greenfield investments. There were relatively few privatization transactions in the electrical equipment industry, partly because the industry was not so big as it is today, and partly because many of the state-owned firms failed in 1993–5. The biggest deal was General Electric's purchase of its competitor Tungsram. Siemens also made important privatization investments (cable production, telecommunications equipment production) and added greenfield establishments. ABB purchased the electrical apparatus branch of Hungarian Ganz and Samsung the Hungarian TV maker Orion. But the biggest investments were in greenfield plant, and

most privatization purchases were later complemented by greenfield investments, sometimes entailing the relocation of production from other countries. The largest factories established were IBM Storage Products and Flextronics, other major investments being made by Ericsson and Nokia. Almost the entire computer industry was set up as greenfield ventures, as were large parts of the consumer electronics and telecommunications equipment segments. Observers agree that the main incentives to invest were proximity to Western European markets, reliable, motivated and relatively cheap labour, fiscal incentives, and privatization opportunities. These also appear to have played a role in investment in electrical equipment production.

It is not easy to estimate the extent of relocation in this period. Most privatization deals and many greenfield ventures resulted in a sizeable increase in total corporate production and sales. The opening-up of new markets in the CEE countries called for an increase in capacity, especially for consumer markets. But with the electrical equipment industry, the huge increase in consumer electronics sales were not the only factor behind the rapid rises in production, as there was a high replacement ratio of outdated production machinery, an unprecedented boom in infrastructural development, investment in environmental protection *etc.* Much of this new demand could not have been met from existing in production facilities in developed countries, only through heavy expansion of capacity in the CEE countries themselves. So much of the new investment in the early period was new capacity that could have gone to developed countries, but CEE countries were preferred. Factories that supply global markets also serve developed countries, and this is the case with many investments in the electrical industry. Relocation of activities was exceptional in this period.

Relocations started become more important after about 1998–2000. This was quite natural: efficiency-seeking investments based on more sophisticated cost calculations gained momentum after an initial introductory period marked by experience gathering, privatization bargains, and jostling for position on the new markets. This also meant that existing facilities in CEE countries came to be evaluated and compared like other elements in the global cooperation network, so that they increasingly became regular players in the global corporations' in-house sourcing competition, where they won in many cases, so expanding 'at the cost' of other locations within the group. New investment and the movement of various activities among foreign affiliates is regarded as relocation. The rationale behind the whole relocation issue to increase efficiency by tapping new resources or lowering production costs. The main beneficiary is obviously the corporation, which can expand its markets or enhance its efficiency. But it can also benefit host economies, especially if the low costs are not secured through excessive state support costing more than the potential benefits of the investment. More indirectly, donor countries may benefit from transfers of activities due to increased overall turnover (a kind of spillover effect of overall expansion), profit transfers and increased efficiency.

A good illustration of the changes in conditions and corporate strategies at the turn of the millennium is the case of Flextronics. By 2000, the company had invested some USD 800 million in Hun-

gary: 80 per cent of its cumulative regional investment. Flextronics has designated Hungary as one of its potential centres of excellence for electronics development. The strategy is based on the assumption that a balance between costs and capabilities can be maintained only if the location is gradually upgraded by investing more into capabilities,. Simple handling activity should be replaced or supplemented by design work and product development. Another option is to abandon the location when growing local costs (especially wages) mean that simple handling activities become unprofitable there. Recent developments, for example the moving of Flextronics' X-Box production and IBM's hard-disk drive assembly to China highlight the need to upgrade from increasingly uncompetitive assembly to activities with higher value added. It was seen that development of skills and EU membership would continue to push up wages in Hungary, and so Flextronics, after 2000, considered subcontracting sub-assembly work to lower-wage countries not previously selected for investment. In 2001, the firm opened a facility at Berekhovo (Beregszász) in the Ukraine, close to the Hungarian border, to assemble circuit boards for its Nyíregyháza facility.

Flextronics and IBM were not the only foreign-owned companies to disinvest in Hungary. The many new investments and capacity expansions in the country after 2000 coincided with cutbacks in simpler, now unprofitable activities, producing a qualitative change in the activity structure of multinationals in Hungary. UNCTAD (2003) lists the main changes in the stock of foreign-owned ventures in the period 2002–mid-2003; these are epitomized in *Table 11*. Assuming the data are broadly representative of the types of direct-investment movement in Hungary, some conclusions can be drawn. (i) Despite some important cases of relocation from Hungary to China or Ukraine, the scale of expansion and foundation of ventures in Hungary remained far greater, in terms of numbers of cases and potential impact on employment. (ii) Most relocations from Hungary involved labour-intensive activities in light industry or 'screwdriver' activity in electronics. (iii) While existing activities were expanded, new activities were taken up. There were even some parallel movements within the same firm: one activity giving way to another, usually more sophisticated one with higher added value. (iv) The new activities involved both expanding production and introducing new corporate functions, such as R and D. (v) The two seminal, fastest growing areas of capital movement were the automotive and electrical equipment industries.

These two industries also appear to be leaders in the development of local roots. Maybe this is only because they are the most dynamic industries worldwide and also very strong in Hungary. But empirical evidence suggests that automotive firms are strong in establishing of local supplier ties and electrical equipment makers rely actively on local engineering and research staff. Sass and Szanyi (2004) provided detailed analysis of the determinants of the likelihood and nature of multinationals' local-supplier ties, concluding that overall local supplies are marginal.

There are very few exceptions, where special circumstances induced multinationals to be active in promoting linkage creation or transferred preparatory knowledge and technology to potential

Table 11
Selected cases of expansion and reduction of production by foreign affiliates in Hungary (2002–2003)

Affiliate	Industry	Action	Employment impact
Alcoa-Köfém	Aluminium	Relocation to H, regional computer centre	+150
Artesyn Kft	Electronics	Relocation to H, power supplies for telecom	+100
Audi Hungária	Automotive	Capacity expansion, 8-cylinder engine	+330
Robert Bosch Kft.	Electronics	Relocation to H. car electronics	+500
Robert Bosch Elek. Kft.	Electronics	Relocation to H. car electronics	+250
Bosch Rexroth Kft	Electronics	New capacity in car electronics	+400
Elcoteq Magyaro.	Electronics	Capacity expansion	+250
Electronic Data Systems	Electronics	New capacity, regional service centre	+110
Electrolux Lehel Kft	White goods	Relocation to H, refrigerator production	+400
Flextronics Internat.	Electronics	Expansion of cap. mobile phone production	+2100
Flextronics Internat	Electronics	Relocation from H X-box production	-1000
Foxconn Hon Hai	Electronics	New capacity, computer and phone parts	+1600
GE Capital	Financial services	Relocation to H, Regional call centre	+400
GE Hungary	Electronics	Capacity expansion light bulb production	+100
GE Hungary	Electronics	GE Lighting's regional headquarters	+500
IBM Storage Products	Electronics	Relocation from H hard disk drive production	-3700
Jabil Circuit	Electronics	Relocation to H	+600
Kenwood Electronics	Electronics	Consolidation of regional production bases	-200
Küpper Hungaria	Metallurgy	New capacity foundry and metal working	+80
Magyar Suzuki	Automotive	Capacity expansion	+150
Ortech Europe	Automotive	Capacity for supplies to Suzuki and Opel Polska	+?
Philips Magyarország	Electronics	Reloc. to H Cathode ray tube TV production	+330
Philips Magyarország	Electronics	Reloc. from H Cathode ray tube monitor prod.	-500
Philips Magyarország	Electronics	Expansion of capacities	+1170
Salamander Hungary	Footwear	Closure of factory	-560
Samsung Elektrom	Electronics	Expansion of factory television production	+?
Samsung Elektrom	Electronics	Relocation to H cathode ray tube production	+500
Sara Lee	Food	Expansion filtered tea for exports	+?
SEWS Magyarország	Automotive	New capacity, car spare parts	+300
Sunarrow Hungary	Electronics	New capacity supplies Nokia	+120
TDK Elektronika	Electronics	Relocation from H to Ukraine	-200
Toyo Seats	Automotive	New capacity	+150
Visteon Hungary	Automotive	Product development centre	+30
Visteon Hungary	Automotive	Relocation from H manufacturing of starters	+?
Zenon Systems	Water treatment	New capacity R&D centre	+32

Source: UNCTAD 2003.

local suppliers. The problems in the way of local supplies were twofold. Multinationals preferred to rely on traditional suppliers, many of which followed the 'flagship' by investing in Hungary. On the other side, the current structure of Hungarian-owned industry is unsuitable for the role. Hungarian firms are too small and weak, and lack the technical and financial backup to supply the batches multinationals require to meet global demand.

The question of technology transfer from multinationals, as a type of spill-over effect, has been discussed by many authors. The author believes that in the

Hungarian context, the problems with establishing supplier linkages again apply. Hungarian firms are not suitable partners for multinationals, and so direct transfers to other companies are not very frequent. Based on empirical surveys, Artner (2003a) found that multinationals treated technological knowledge as confidential and did not want to facilitate Hungarian partners' capabilities. But Artner (2003b) also found that a number of multinationals in Hungary were cooperating with Hungarian universities and think tanks, to tap their capacities. Such linkages were also promoted by some government measures. Artner named 5-6 major cooperation cases in the electrical equipment industry, and 2 in the automotive industry. She concluded that the flow of knowledge in these was rather unequal, but there was also some knowledge transfer from companies, typically in the form of investment in technical equipment for universities. Based on her studies of linkages and technology cooperation, she criticized multinationals for their lack of interest in knowledge transfer. This judgement has also been made by some other authors, such as Günther (2002).

Seen from the point of view of relocations, the sluggish development of supplier networks and small scale of R and D activity suggests that many investors still treat locations in CEE countries as transitional sites, with changing factor endowments and prices. IBM Storage Products, for example, preferred to rent, rather than buy its production facilities. One would assume that this investment for assembling computer hard-disk drives was intended to stay only temporarily in Hungary. Chances of quick relocation were kept open and exit barriers minimized. It is not possible here to estimate the prevalence of this approach, but there is evidence that it exists. It is preferable here to emphasize that many firms relocating activities from Hungary have replaced them by new, usually more demanding functions. Hungary, as a transitional site, serves as an important hub in the global task-distributing system of corporate networks, as host and donor simultaneously.

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