WIIW INDUSTRY STUDIES
2001/2

Development and Prospects of the Electrical and Optical Equipment Sector in the Central and Eastern European Countries

WIIW INDUSTRY STUDIES

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- *Rubber and plastic products*
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- *Basic metals and fabricated metal products*
- *Machinery and equipment n.e.c.*
- *Electrical and optical equipment*
- *Transport equipment*
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Each of these studies presents a detailed picture of the development and prospects of the particular industry in central and eastern Europe. The first part of each study concentrates on: the patterns of production and employment; international competitiveness and trade performance with the EU (productivity, labour costs, price and quality indicators, revealed comparative advantage, etc.); and foreign direct investment. The second part provides more detailed industry data and valuable information about the leading domestic firms and the foreign investors in the industry.

Michael Landesmann
Research Director, WIIW

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Doris Hanzl

Development and Prospects of the Electrical and Optical Equipment Sector in the Central and Eastern European Countries

July 2001

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Executive Summary

In Central and Eastern Europe, as in most other economies, the electrical and optical equipment sector is an important and strategic part of manufacturing, being at the core of innovation and research. It is considered a R&D- and skill-intensive industry, producing a wide range of mostly high-technology products (e.g. computers, electric motors, cables and batteries, semi-conductors, telephones, TV sets etc.). In Central Europe, the sector has revived and experienced dynamic production and export growth with good future prospects.

The study investigates the development and prospects of the electrical and optical equipment sector in the following countries:

- *Bulgaria*
- *Czech Republic*
- *Hungary*
- *Poland*
- *Romania*
- *Slovakia*
- *Slovenia*

In size, the electrical and optical equipment sector is today of ***relative importance*** *in Slovenia, Slovakia, the Czech Republic and Poland where it contributes between 7% and 9% of manufacturing output. Strong specialization on the sector occurred in* ***Hungary (24%)****, while in Bulgaria and Romania the sector is very small (4% and 5% respectively). The production structure is dominated by the 'electrical machinery and apparatus' industry in all countries, except in Hungary, where the sector is more diversified.*

In the first phase of transition, which lasted from 1989 to around 1992, a severe transformational recession hit the region, with the output of the electrical and optical equipment sector declining even more than the rest of the economy. After 1993, production growth soared in all countries and the sector became one of the ***most successful and dynamic*** *segments in total manufacturing in the whole region. This was due to the general recovery of the CEECs' economies, high growth of downstream industries, e.g. the automotive industry (also driven by FDI), and especially the inflow of foreign direct investment connected with strong export orientation leading to a sharp increase in exports. In 1999, the electrical and optical equipment sector considerably exceeded the 1989 level in Hungary, Poland and the Czech Republic.*

As an employer, the electrical and optical equipment sector plays a major role in Hungary, Slovenia, Slovakia and the Czech Republic (accounting for 16% of total manufacturing employment in Hungary, and for 11% in the latter three countries) and has somewhat smaller shares in Poland, Bulgaria and Romania. Until 1996 employment was reduced in all countries but rose thereafter in Hungary, the Czech Republic and in Slovakia.

As is typical for all CEECs and all sectors of manufacturing, wages, productivity and unit labour costs in the electrical and optical equipment sector have generally been much lower than in West European countries (except Hungary), for which we use Austria as a point of reference. During transition, sectoral wages and productivity rose in all CEECs, in Hungary productivity even surpassed the Austrian level in 1999. Unit labour costs fell in all countries, except Slovakia, between 1993 and 1999. Hence, estimated unit labour costs remain at a much lower level than in Austria (except for Slovenia, upper range, see below).

The range for CEECs' unit labour costs in the electrical and optical equipment sector as a percentage of the Austrian level is:[1]

Bulgaria	*26% - 63%*	*Romania*	*15% - 36%*
Czech Republic	*27% - 41%*	*Slovakia*	*40% - 62%*
Hungary	*10% - 16%*	*Slovenia*	*92% - 109%*
Poland	*34% - 45%*		

*In CEECs' manufacturing **exports** to the EU, the importance of the electrical and optical equipment sector differs across country groups: the sector has an enormous share of 35% of total manufacturing exports in Hungary and still accounts for 16% in the Czech Republic, 13% in Poland and Slovakia and 11% in Slovenia. It is less pronounced in Bulgaria and Romania (4% and 7% respectively). However, in all countries the electrical and optical equipment sector shows an above-average **export orientation** and **dynamic export growth,** with the main export products coming from 'electrical machinery & apparatus n.e.c.', except in Hungary.*

*In CEECs' manufacturing **imports** from the EU, electrical and optical equipment played an even more important role, with shares ranging between 14% of total imports in Slovenia and Bulgaria and 28% in Hungary; this is related to the import needs of foreign investors (outward processing) and increased demand for consumer electronics and information technology imports. Most imports came from 'electrical machinery & apparatus n.e.c.' and from 'radio, TV & communication equipment'.*

*The electrical and optical equipment sector was a **net importer from the EU** in all CEECs between 1995 and 1999, except in Hungary where it achieved a trade surplus from 1997 onwards. Compared to total manufacturing, the sector shows a **revealed comparative disadvantage**, although to a decreasing extent, and a **negative price/quality gap indicator**, which is nevertheless improving.*

[1] The lower range is calculated at purchasing power parities (PPP) for GDP, the upper range at PPP for fixed capital formation; figures are for 1999.

*On the **EU market**, in 1995, CEEC(7) electrical and optical equipment exports had a market share of about 3.5%, which increased to 7% in 1998 (all shares without intra-EU trade). This share was significantly lower than total manufacturing market shares (9% in 1989 and 11% in 1998). On the **Austrian market**, CEEC exports had a decisively larger share, accounting for 17% of Austria's non-EU imports of electrical and optical equipment in 1995, increasing to 36% in 1999. However, the CEECs are also a major export destination for Austrian electrical and optical equipment exports and absorbed about 42% of Austria's non-EU exports in 1999. Ultimately, the CEECs registered a **trade deficit with Austria** (again with the exception of Hungary).*

*The electrical and optical equipment sector is a prominent target of **foreign direct investment**, due to low-cost qualified labour, export possibilities and generous incentives. Foreign penetration was above-manufacturing-average and highest in 'radio, TV and communication equipment'.*

***Future prospects** of the sector are quite good due to increasing export competitiveness (decreasing comparative disadvantage, better quality of exports) and growth potentials on domestic markets. Trends of production and exports also point in this direction. On the negative side, developments on international markets (information technology, automotive industry) are currently weakening and import competition on domestic markets is strong.*

Doris Hanzl

Developments and Prospects of the Electrical and Optical Equipment Sector in the Central and Eastern European Countries

Part I: INDUSTRY SURVEY

The electrical and optical equipment sector is of strategic importance for the whole economy today; it is at the core of innovation and research and represents, with parts of the 'information and communication technology' (ICT), the 'new economy' of the 21st century. The sector is strongly shaped by globalization and fierce competition, comprising large multinational companies as well as small and medium-sized enterprises. It produces a large diversity of mostly high-technology products, ranging from computers, electric motors, cables and batteries, semi-conductors, telephones, TV sets and radios to electro-medical equipment, watches and clocks. Consequently demand stretches from enterprises to the state and the final customer. The electrical and optical equipment sector is considered a R&D- and skill-intensive industry.

This study provides a thorough picture in two parts of the electrical and optical equipment sector in the Central and Eastern European countries (CEECs). Part I gives a more macroeconomic survey of the developments and prospects of the sector, while Part II presents further detailed information and selected company profiles. The first part consists of four sections: Section 1 deals with trends in growth and structure of the sector, including characteristics of production and employment. Section 2 analyses indicators of international competitiveness, in particular wage rates, productivity levels and unit labour costs. Section 3 examines various aspects of trade performance with the European Union, while section 4 takes a closer look at foreign direct investment in the sector. A concluding section provides a summary and outlook on future prospects, the appendix presents additional tables and figures.

In the NACE rev. 1 classification system (Statistical classification of economic activities in the European Community) the term 'electrical and optical equipment' denotes the sub-section 'DL', which consists of the following industries (30, 31, 32, 33):

- Manufacture of office machinery and computers (30)
- Manufacture of electrical machinery and apparatus n.e.c. (31)[1]
- Manufacture of radio, television and communication equipment and apparatus (32)[2]

[1] Including 'electric motors, generators and transformers' (sub-branch 31.1), 'electricity distribution and control apparatus' (31.2), 'insulated wires and cables' (31.3), 'accumulators, primary cells and primary batteries' (31.4), 'lighting equipment and electric lamps' (31.5), 'electrical equipment n.e.c.' (31.6).

- Manufacture of medical, precision and optical instruments, watches and clocks (33)[3]

The following analysis is based on this classification. Data come from the WIIW Industrial Database – Central and Eastern Europe (IDB-CEE), which currently covers Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia. Data on foreign direct investment originate from the WIIW Database on Foreign Investment Enterprises (FIEs), data on foreign trade from EUROSTAT.

1 Overview: Trends in growth and structure

The electrical and optical equipment sector in the region

The electrical and optical equipment sector plays an important role in the economies of the CEECs, with a total production volume of EUR 20 billion in 1999 and a workforce of 590,000 persons.

Among the CEEC(7), Hungary was the largest producer of electrical and optical equipment in terms of current production in 1999 (EUR 7 billion), followed by Poland (EUR 6 billion). Other important producers were the Czech Republic (EUR 3 billion) as well as Slovakia, Romania and Slovenia (EUR 1 billion each), whereas in Bulgaria production was relatively low (see Table 1).

Regarding employment, Poland took the lead in the region, followed by Hungary and the Czech Republic. In Poland about 170,000 persons were employed in the electrical and optical equipment sector in 1999, in Hungary and the Czech Republic more than 110,000. In Romania about 75,000 persons worked in the sector, in Slovakia about 55,000, while the workforce in Bulgaria and Slovenia was smaller (see Table 1).

Comparing the levels of production with the levels of employment in the different CEECs reveals differences in output per employee (= labour productivity) in the sector. While in Hungary the sector produced an output of EUR 7 billion with 116,000 persons, in Poland the sector produced only EUR 6 billion but employed 173,000 persons. The high inflow of foreign direct investment into Hungary, increasing the efficiency and upgrading technology, might explain these discrepancies (see analysis of labour productivity and foreign direct investment below).

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[2] Including 'electronic valves and tubes and other electronic components' (sub-branch 32.1), 'television and radio transmitters and apparatus for line telephony and line telegraphy' (32.2), 'television and radio receivers, sound or video recording or reproduction apparatus and associated good' (32.3).

[3] Includes 'medical and surgical equipment and orthopaedic appliances' (sub-branch 33.1), 'instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment' (33.3), 'industrial process control equipment' (33.3), 'optical instruments and photographic equipment' (33.4), 'watches and clocks' (33.5).

Table 1

Electrical and optical equipment

Overview of production and employment, 1999

	Production[1]			Employment	
	EUR mn	% of GDP	% of manuf.	ths. persons	% of manuf.
Bulgaria	265.4	2.279	4.3	36.5	6.2
Czech Republic	3079.4	6.196	7.9	113.0	10.5
Hungary	7361.8	16.273	23.6	116.0	15.6
Poland	6250.3	4.292	7.2	173.2	6.6
Romania[2]	1029.6	2.793	5.0	74.5	4.4
Slovak Republic	1142.6	6.180	8.4	54.9	11.0
Slovenia	967.0	5.132	8.6	25.2	11.2

Notes: 1) At current prices. - 2) Production data 1998.

Source: WIIW Industrial Database.

Growing importance of the sector in production – especially in Hungary

Today, the electrical and optical equipment sector is the largest segment of manufacturing in Hungary, accounting for 24% of production in 1999 (at current prices). In Slovenia, Slovakia, the Czech Republic and Poland the electrical and optical equipment sector is not among the major sectors but nevertheless of relative importance with shares ranging between 7% and 9%. Only in Romania and Bulgaria is the sector very small and accounted for 5% and 4% respectively (see Table 2).

In 1989, the shares of the electrical and optical equipment sector had been rather similar in the individual CEECs, ranging between 3% (Romania) and 8% (Hungary and Bulgaria; at constant prices, see Table 3). In fact, under the former communist system, Hungary and Bulgaria specialized on the electrical and optical equipment sector under the Council for Mutual Economic Assistance (CMEA) division of labour.[4] In general, the importance of the sector increased in all countries (except in Bulgaria) during the past ten years – shares (measured at constant prices) grew and were larger in 1999 than in 1989. In Hungary in particular a specialization on the electrical and optical equipment sector could be observed (see Figure 1). The former specialization in Bulgaria has vanished completely during the transformation period, partly due to the enormous brain drain of skilled workers (see Part II).

When compared to the countries of the European Union, including Austria, the electrical and optical equipment sector of the CEECs is mostly smaller revealing a still existing, inherited deficit of this sector (see Appendix, Figure A1). In the last few years, however,

[4] For example, a special division of labour by size occurred in computer hardware: Hungary produced small-sized hardware, Bulgaria medium-sized and the former Soviet Union large computer hardware.

some exceptions to this general pattern have emerged: Hungary and to a minor extent the Czech Republic[5] showed a relative larger electrical and optical equipment sector than the more advanced countries of the 'EU-North', Slovenia and Poland against the less advanced countries of the 'EU-South', pointing to gradual structural change in these transition countries.

Table 2

Production shares of individual industries in total manufacturing (at current prices), 1999, in %

	Bulgaria	Czech Republic	Hungary	Poland	Romania[1)]	Slovak Republic	Slovenia
D Manufacturing total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DA Food products; beverages and tobacco	25.2	17.2	17.0	25.3	25.1	13.9	14.9
DB Textiles and textile products	6.7	4.4	3.6	4.6	7.2	4.2	7.3
DC Leather and leather products	1.3	0.8	0.8	0.9	1.7	1.3	1.5
DD Wood and wood products	1.5	2.7	1.2	3.5	2.5	3.4	3.2
DE Pulp, paper & paper products; publishing and printing	4.2	4.7	4.3	6.1	3.1	6.1	7.1
DF Coke, refined petroleum products & nuclear fuel	15.0	2.8	4.9	4.6	8.0	6.7	0.4
DG Chemicals, chemical products & man-made fibres	9.3	6.7	7.0	6.8	7.4	6.0	10.0
DH Rubber and plastic products	2.2	4.3	3.5	4.4	2.2	3.3	4.5
DI Other non-metallic mineral products	5.1	6.4	2.9	5.4	4.8	5.2	4.8
DJ Basic metals and fabricated metal products	10.3	15.9	8.1	10.6	16.3	17.0	12.3
DK Machinery and equipment n.e.c.	11.5	8.0	4.7	5.5	5.5	7.3	10.4
DL Electrical and optical equipment	**4.3**	**7.9**	**23.6**	**7.2**	**5.0**	**8.4**	**8.6**
DM Transport equipment	1.9	14.3	17.0	10.8	7.7	14.0	9.9
DN Manufacturing n.e.c.	1.5	3.9	1.2	4.3	3.6	3.2	5.3

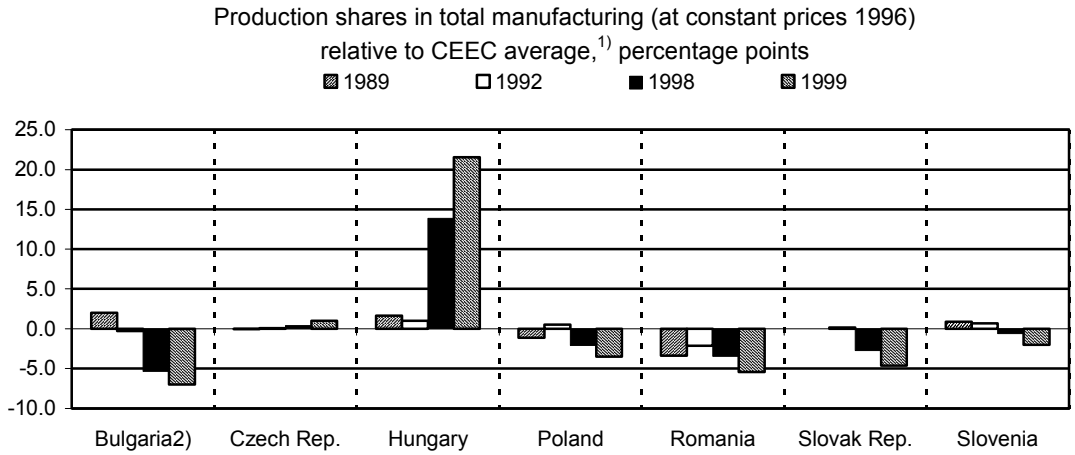
Notes: 1) Latest reliable data available for all branches: 1998; share of DL in 1999: 2.6%.

Source: WIIW Industrial Database.

[5] At constant prices 1996 only.

Figure 1

Electrical and optical equipment
Relative position of CEECs' electrical and optical equipment sectors in the region



Notes: 1) The CEEC average includes the all CEEC(7) countries. - 2) Bulgarian data are not consistent over the whole period. Data before 1996 can be compared with those for 1996 to 1998 only to a limited extent.
Source: WIIW Industrial Database.

Vigorous growth – most pronounced in Hungary, Poland and the Czech Republic

During the first period of transformation, from 1989 to about 1992, all CEECs experienced a severe transformational recession, and the production of the electrical and optical equipment sector declined as well – by more than 20% per year (see Table 4). In comparison to total manufacturing, the sector was much more affected and hence may be called a relative 'loser'[6] of this period (except in Poland, see Table 4, average annual changes relative to total manufacturing, 1990-1992). In fact, the electrical and optical equipment sector was one of the segments of manufacturing hit most by the recession.

This development might be explained by several factors on the demand side: First, the electrical and optical equipment sector produces a wide range of consumer goods the purchase of which can be deferred and which are highly exposed to western import competition. Second, the sector is also an important supplier to other industries such as the defence industry – which had played a significant role during communism, experienced a breakdown afterwards and hence dragged down the electrical and optical equipment sector as well. And third, with the collapse of the CMEA, important export markets for low-quality products vanished. On the supply side the transition was characterized by two processes especially pronounced in the electrical and optical equipment sector: First, the liquidation of companies and the creation of new firms (in particular in the 'office machinery

[6] 'Losers' of transition are here defined as industries that performed worse than total manufacturing in terms of production growth, 'winners' as those that performed better – see Urban (2000), p. 22.

and computers' industry) and second, the restructuring and reorientation of surviving firms (e.g. changes in products, see the case of Videoton in Hungary, Part II).

During the second period of transformation, from 1993 onwards, growth returned to the region and the electrical and optical equipment sector participated in this general upswing. Growth rates were exceptionally high in Hungary (more than 40% per year between 1993 and 1999) and also relatively pronounced in the Czech Republic and Poland (16% per year, see Table 4). When compared to total manufacturing, the electrical and optical equipment sector did extremely well and was a major 'winner' of that period (see Table 4, average annual changes relative to total manufacturing, 1993-1999). In fact, the sector was the best performing branch of total manufacturing in the Czech Republic, Hungary and Slovenia. This extraordinary growth was based on the general recovery of the CEE economies, high growth of downstream industries, e.g. the automotive industry (also driven by FDI), and especially the inflow of foreign direct investment associated with a high export orientation that led to a sharp increase in exports. Also in 2000, the electrical and optical equipment sector grew dynamically, with growth rates ranging between 8% in the Czech Republic and 46% in Hungary. Only in Romania did production of the sector decline, by 13%.

Table 3

Electrical and optical equipment

Production shares
(at constant prices 1996), in %
Manufacturing = 100

	1989	**1992**	**1997**	**1998**	**1999**
EU-North [1)3)]	.	11.6	.	11.4	.
EU-South [2)3)]	.	6.0	.	6.6	.
Austria [4)]	11.9	12.4	11.9	13.1	14.5
Bulgaria	8.3	4.5	3.8	4.0	4.1
Czech Republic	6.2	4.9	7.0	9.7	12.1
Hungary	7.9	5.8	17.9	23.2	32.6
Poland	5.1	5.3	6.7	7.2	7.6
Romania	2.9	2.7	6.1	5.8	5.7
Slovak Republic	6.2	4.9	6.1	6.6	6.5
Slovenia	7.1	5.5	8.8	8.7	9.1

Notes: 1) Including UK, France, Germany and Belgium. - 2) Including Greece, Portugal and Spain. - 3) At current prices. - 4) 1989 and 1992 data at constant prices 1993.
Source: WIIW Industrial Database, Eurostat.

Table 4

Electrical and optical equipment

Production growth (at constant prices 1996)

	Average annual changes in %		Relative to total manufacturing, in percentage points		Index 1999	Annual change
	1990-92	**1993-99**	**1990-92**	**1993-99**	**1989=100**	**2000**
Bulgaria	.	.	.	.	.	8.6
Czech Republic	-20.8	16.2	-6.6	14.2	141.8	7.6
Hungary	-22.3	41.3	-7.1	30.9	526.6	46.0
Poland	-10.3	15.7	0.8	5.8	200.4	9.6
Romania	-25.8	8.1	-1.7	11.1	70.5	-12.5
Slovak Republic	-22.3	5.1	-6.4	4.1	74.6	9.6
Slovenia	-18.7	8.5	-7.4	7.6	94.8	14.1

Source: WIIW Industrial Database.

Looking at the production index for the electrical and optical equipment sector, the decline of production in the first period was more than offset in Hungary by 1999, reaching 530% of the 1989 level. Also in Poland and the Czech Republic, the sector more than surpassed

the 1989 level (200% and 140% respectively). In Slovenia, production nearly reached the 1989 level in 1999, while in Romania, Slovakia and Bulgaria it stayed still below (see Figure 2). For 2000, production increased again in all countries, except in Romania.

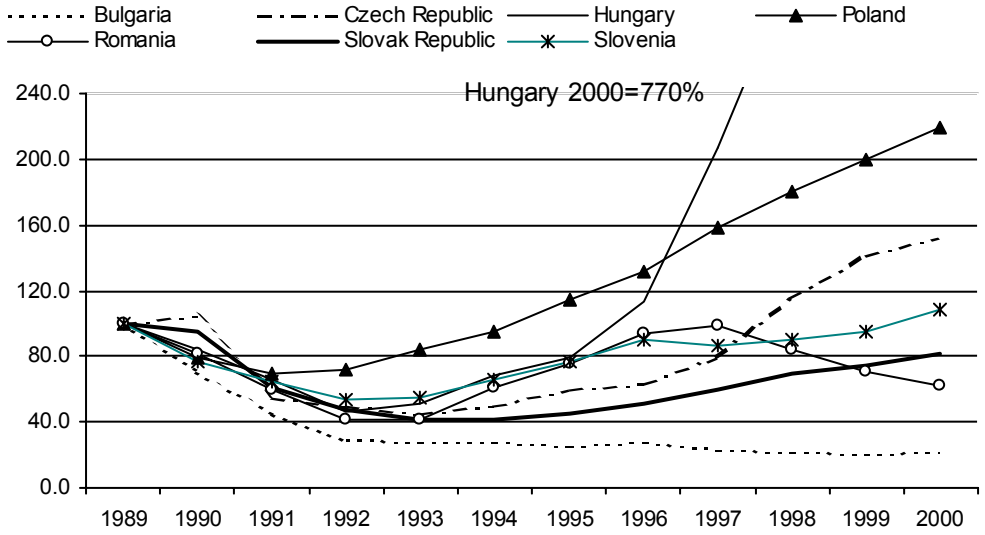
The main growth segments were the following (for details see Part II):

- Hungary: 'computing machinery' (sub-branch 30.2) and 'radio, TV and communication equipment and apparatus' (industry 32)
- Poland: 'radio, TV and communication equipment and apparatus' (32) and 'electrical equipment n.e.c.' (31.6, including electronic components for the automotive industry)
- Czech Republic: 'electrical equipment n.e.c.' (31.6) and 'radio, TV and communication equipment and apparatus' (32)

Figure 2

Electrical and optical equipment

Industrial production index (at constant prices 1996, national currency), 1989 = 100



Source: WIIW Industrial Database.

Important employer

Today, the electrical and optical equipment sector plays a major role in employment in Hungary, Slovenia, Slovakia and the Czech Republic. It accounted for 16% of total employment in Hungary and for about 11% in the latter three countries in 1999. In Poland, Bulgaria and Romania the shares are relatively smaller (7%, 6% and 4%, see Table 5). Today, about 173,000 persons are employed in the sector in Poland, more than 110,000 in Hungary and the Czech Republic (see Table 6). During transition, employment declined in all CEECs until 1996. While in some countries the decrease continued thereafter (Bulgaria, Poland and Romania), employment was growing slightly in others (Hungary, the Czech Republic, Slovakia) – also partly due to changes in the data coverage. Hence, employment

shares were smaller in 1999 than in 1989 in most countries. In 2000, according to provisional data, employment further declined in Bulgaria, Poland and Romania and increased in the Czech Republic, Slovakia and Slovenia.

Table 5

Electrical and optical equipment

Employment shares, in %
Manufacturing = 100

	1989	1992	1997	1998	1999
EU-North[1)]	.	14.4	.	13.4	.
EU-South[2)]	.	5.7	.	6.5	.
Austria	13.9	14.5	12.6	12.3	12.3
Bulgaria	10.8	9.9	6.6	6.4	6.2
Czech Republic	6.8	8.7	9.4	9.9	10.5
Hungary	15.5	9.8	13.1	14.3	15.6
Poland	8.9	7.2	6.5	6.4	6.6
Romania	6.4 [3)]	5.7	5.2	4.8	4.4
Slovak Republic	.	9.3	8.7	10.2	11.0
Slovenia	12.0	11.3	11.0	11.2	11.2

Notes: 1) Including UK, France, Germany and Belgium. - 2) Including Greece, Portugal and Spain. - 3) 1990.
Source: WIIW Industrial Database, Eurostat.

Table 6

Electrical and optical equipment

Employment
thousand persons

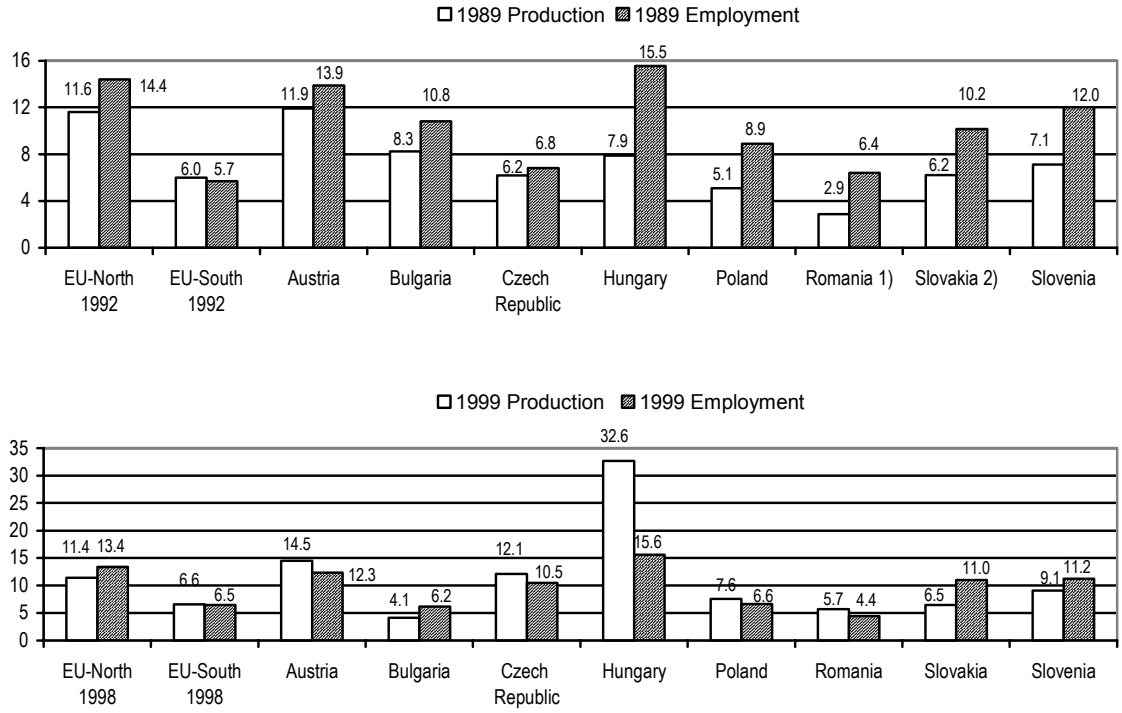
	1989	1992	1997	1998	1999	1999 1989=100
Bulgaria	154	87	48	44	36	.
Czech Republic	113	103	110	113	113	99.6
Hungary	182	84	83	94	116	51.6[2)]
Poland	296	199	183	180	173	58.5
Romania	221[1)]	161	91	75	71	33.7[3)]
Slovak Republic	.	49	38	53	55	.
Slovenia	45	32	25	26	25	.

Notes: 1) 1990. - 2) 1998. - 3) 1990 = 100.
Source: WIIW Industrial Database.

Figure 3

Electrical and optical equipment

Shares in production (at constant prices 1996) and employment in total manufacturing, in %



Notes: 1) Employment share 1990. - 2) Employment share 1991.
Source: WIIW Industrial Database.

Comparing the production and employment shares of the electrical and optical equipment sector, the latter were markedly larger in all CEECs in 1989, indicating a high labour intensity and labour hoarding, respectively. By 1999, output shares were slightly higher than employment shares in most countries, except in Bulgaria, Slovakia and Slovenia. As the sector is generally more labour-intensive this development points to a remarkable structural change in the CEECs connected with a sharp increase in productivity (see Figure 3).

2 International competitiveness

As typical for all CEECs and their manufacturing industry, wages, productivity and unit labour costs in the electrical and optical equipment sector have been generally lower than in the Western countries (except Hungary, see below). In 1999, nominal wage rates (per employee) in the electrical and optical equipment sector hovered at around 10% of the Austrian level in most countries; they were even lower in Bulgaria and Romania (4%), and somewhat higher in Slovenia (27%). The productivity level ranged between 13% in Bulgaria and 45% in Poland; only in Hungary did the productivity level surpass the Austrian level, in 1999, and reached 110%. Thanks to this high productivity, Hungary showed the lowest unit labour costs in 1999, reaching only 10% of the Austrian level. In the other countries, unit labour costs lay between 15% in Romania and 40% in Slovakia and were highest in Slovenia with 90% (see Figure 4).[7]

During transition, wages and productivity grew throughout the region. In Hungary wages increased slowest, by about 6% annually between 1993 and 1999, while productivity increased fastest, by as much as 36% per year. As the productivity increase was higher than the wage increase, unit labour costs fell in all countries, except Slovakia, between 1993 and 1999. The decrease was most pronounced in Hungary (see Table 7).

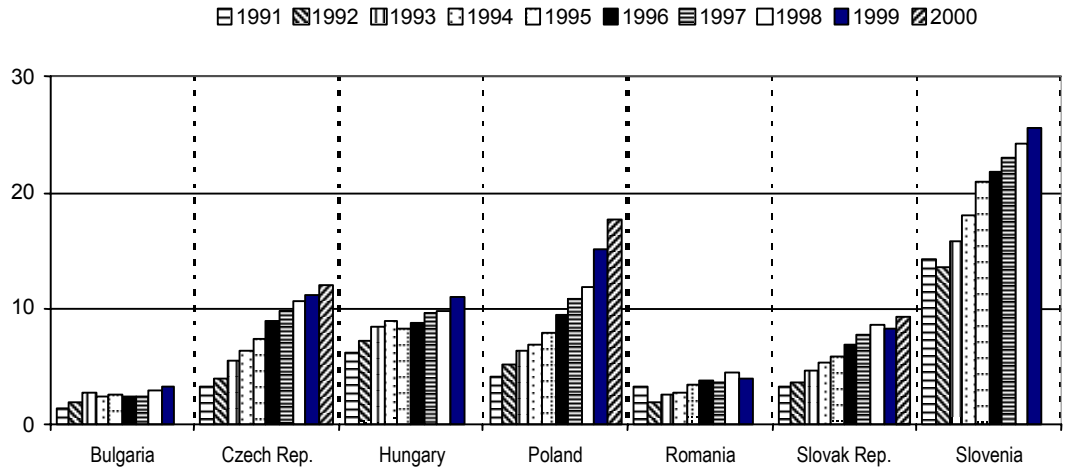
Looking at the wage level in the electrical and optical equipment sector, wages mostly lay around manufacturing average or slightly above in 1999. In Bulgaria workers received slightly less than manufacturing average (92%), in Poland somewhat more (118%). During transition, a small relative increase can be observed (Table 8).

[7] These figures are however strongly affected by different productivity estimates. Table A2 in the Appendix shows the lower and upper ranges for estimated unit labour costs in 1999, using alternative measures for productivity. In the text, only the lower range (productivity calculated at PPP for GDP) is stated. When using the upper range (productivity calculated at PPP for fixed capital formation) unit labour costs are higher but still below the Austrian level, except in Slovenia (109%).

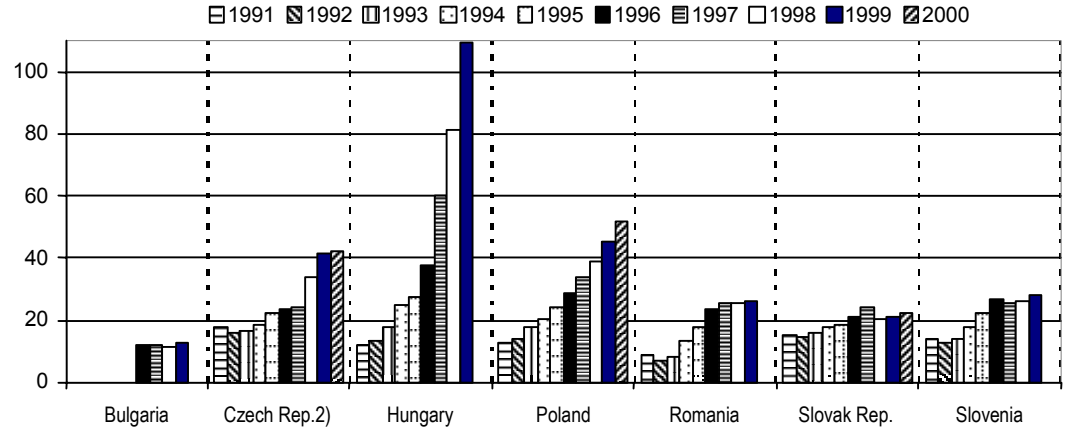
Figure 4

Electrical and optical equipment

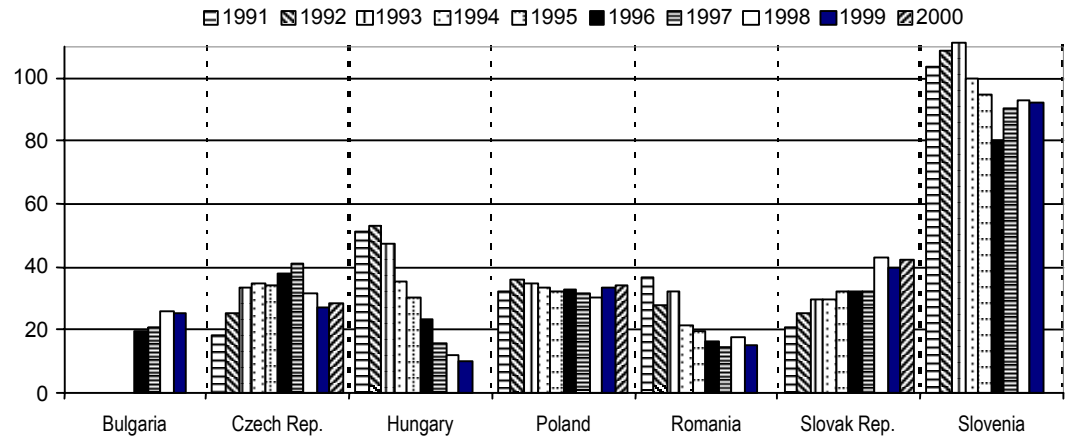
Wages (ECU), Austria 1999 = 100



Productivity (PPP)[1)], Austria 1999 = 100



Unit labour costs (ECU), Austria 1999 = 100



Notes:

1) PPP = Purchasing Power Parities for GDP. - 2) Coverage of Czech industrial statistics had a break in 1996/97 due to the size of enterprises included.

Source: WIIW Industrial Database.

Table 7

Electrical and optical equipment

Average annual growth rates, 1993-1999

in %

	Output	Employment	Productivity (ECU basis)	Wage rates (ECU basis)	Unit labour costs (ECU basis)
Czech Republic	16.2	-2.1	18.6	15.6	-2.5
Hungary	41.3	3.7	36.2	6.3	-22.0
Poland	15.7	-2.0	18.0	13.5	-3.9
Romania	8.1	-10.4	20.7	12.3	-6.9
Slovak Republic	5.1	-2.4	7.6	11.3	3.4
Slovenia	8.5	-3.9	12.9	9.5	-3.0

Source: WIIW Industrial Database.

Table 8

Electrical and optical equipment

Average monthly gross wages

Manufacturing = 100

	1992	**1995**	**1997**	**1998**	**1999**
Bulgaria	86.1	85.1	93.3	91.7	92.2
Czech Republic	94.2	96.9	100.5	100.0	100.9
Hungary	104.3	102.2	102.5	102.7	108.6
Poland	100.6	109.9	113.6	115.5	117.7
Romania	93.5	100.7	106.3	110.4	113.9
Slovak Republic	93.3	93.8	96.4	101.2	99.6
Slovenia	98.5	103.0	104.6	102.3	103.0

Source: WIIW Industrial Database.

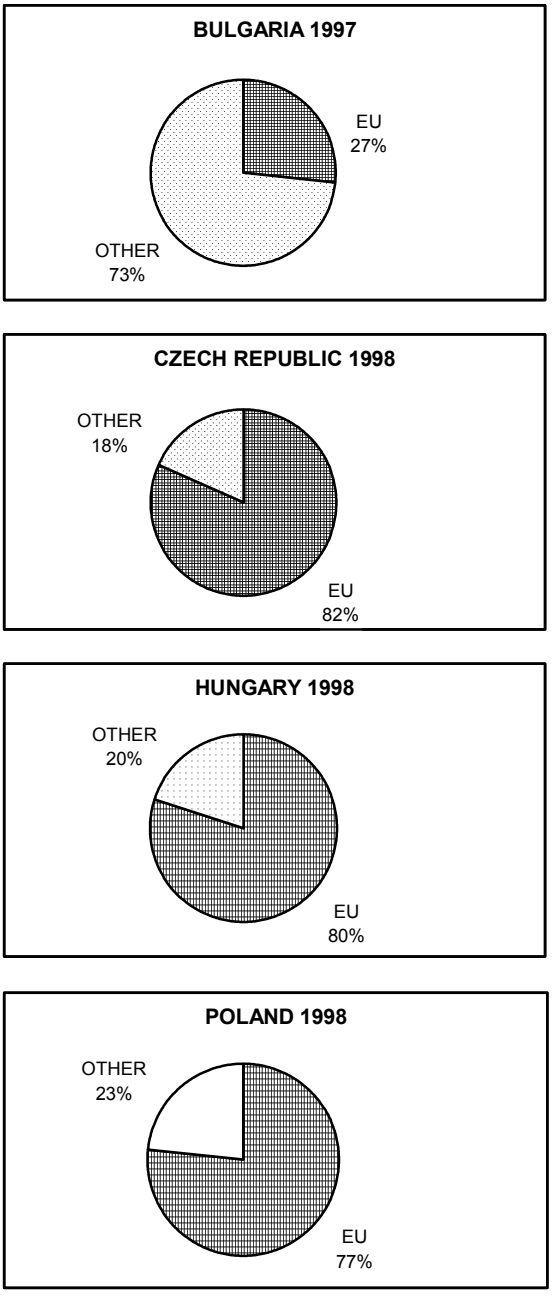
3 Trade performance with the EU(15)

Trade with the EU is investigated in detail as the EU is the dominant trading partner of all CEECs today: after the collapse of the CMEA market, CEECs' trade became heavily oriented towards EU markets. Also in the electrical and optical equipment sector, the EU(15) became the major trading partner of the CEECs (see Figure 5). By the end of the 1990s, the EU accounted for 85% of total electrical and optical equipment exports in Romania, for 80% in the Czech Republic, Hungary and Poland, for 70% in the Slovak Republic and for 60% in Slovenia. Only in Bulgaria was the share of exports going to the EU(15) smaller, reaching only 27%. In total electrical and optical equipment imports, the EU was important as well, accounting for 60% to 70% of CEECs' total imports.

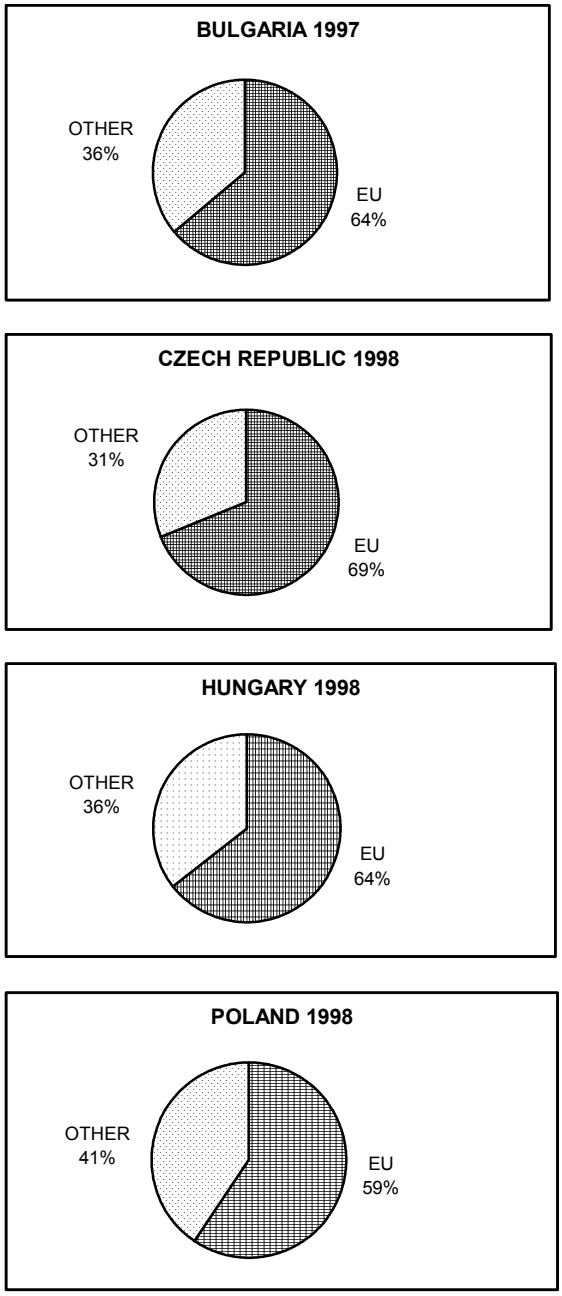
Figure 5

Electrical and optical equipment
Exports to and imports from the world

Exports to the world



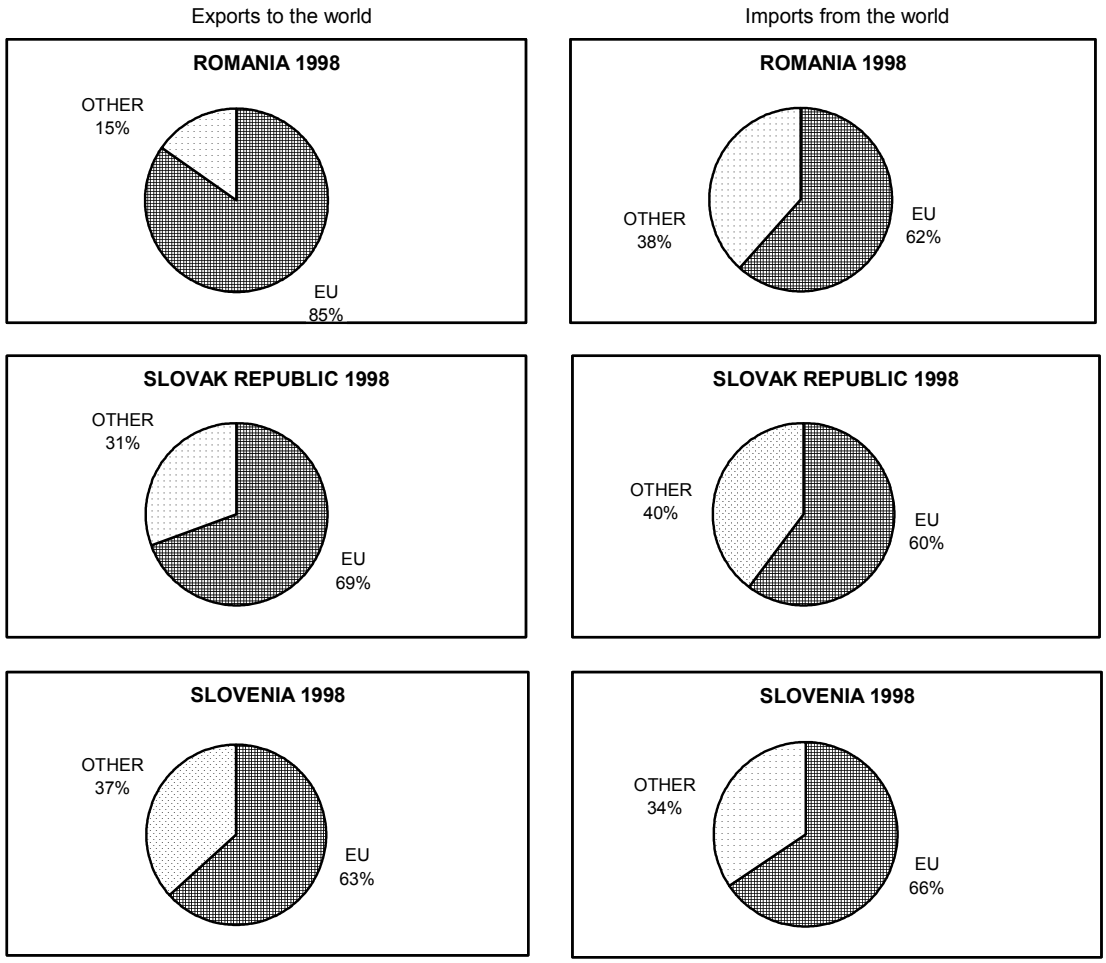
Imports from the world



(Figure 5 contd.)

(Figure 5 contd.)

Electrical and optical equipment
Exports to and imports from the world



Source: UN-Database.

High-growth sector, export orientation coupled with a trade deficit

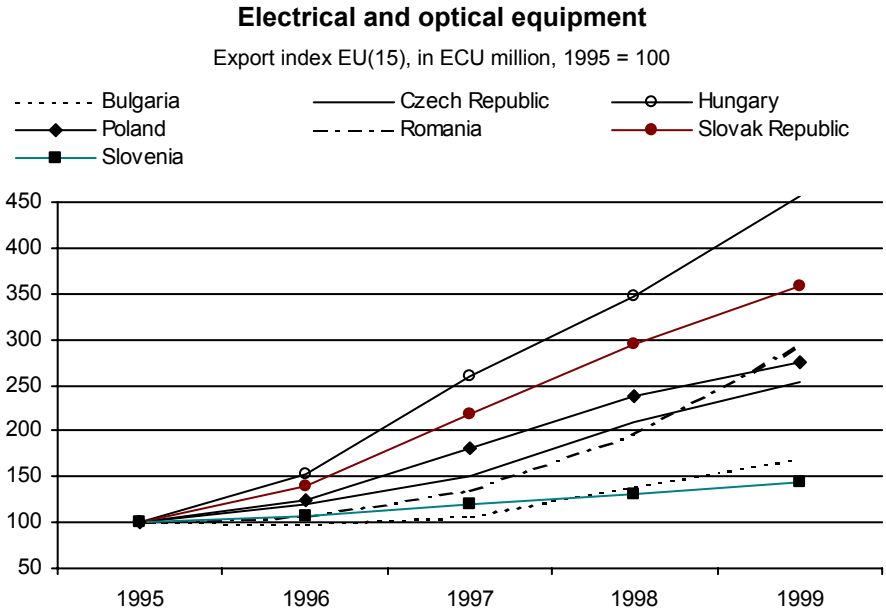
In total manufacturing exports to the EU(15), the electrical and optical equipment sector has a significant position in most of the CEECs and is most important in Hungary, where it accounted for a share of as much as 35% of total exports in 1999. In the Czech Republic (16%), Poland, Slovakia (both 13%) and Slovenia (11%) the sector also held large shares, while in Romania (7%) and Bulgaria (4%), the two economically relatively less advanced countries, export shares were relatively small (see Appendix, Table A3 and Figure A2).[8] In

[8] In Hungary, exports from the electrical and optical equipment sector ranked first in total manufacturing exports, in the Czech and Slovak Republics second. In the other countries the sector's exports still ranked fourth, only in Bulgaria were they of minor importance (see Appendix, Table A3).

general, export shares were larger than production shares (except in Bulgaria), reflecting the above-average export orientation of the electrical and optical equipment sector.

Between 1995 and 1999, electrical and optical equipment export shares grew in all countries, due to above-average export growth of the sector. In fact, growth was one of the most dynamic in total manufacturing exports. In the region, Hungary achieved the largest export increase and electrical and optical equipment exports reached 460% of the 1995 level in 1999, followed by Slovakia and Romania (see Figure 6).

Figure 6



Source: Eurostat, WIIW calculations.

In total manufacturing imports from the EU(15), the electrical and optical equipment sector plays an even more important role than in exports, as import shares were larger than export shares in all countries, except Hungary. This is due to the import needs of foreign investors (outward processing) and increased demand for consumer electronics and information technology imports. In 1999, the sector accounted for between 14% of total imports in Slovenia and Bulgaria and 28% in Hungary (see Appendix, Figure A2). Compared to 1995, import shares were larger in 1999 pointing to above-average import growth, which was however less marked than that of exports. Within the region, import growth was most pronounced in Hungary, Poland and Romania.

In absolute terms, higher imports than exports led to increasing sectoral trade deficits in all CEECs, except Hungary. In Poland, the trade deficit was largest and reached EUR 2.4 billion in 1999, in the Czech Republic it stood at EUR 1 billion. In the other countries the trade deficit was rather small (see Appendix, Figure A2). Only in Hungary did

the electrical and optical equipment sector achieve a trade surplus from 1997, which increased to EUR 1.3 billion in 1999.

Exports still concentrated on electrical machinery, imports diversified

At a more detailed two-digit NACE level (industries 30, 31, 32, 33), in 1999 exports of the CEECs (without Hungary) were heavily concentrated on 'electrical machinery & apparatus n.e.c.' (between 50% and 60% of the sector's exports), followed with a gap by 'radio, TV & communication equipment' exports (between 10% and 37%). Exports from 'office machinery and equipment' (between 2% and 17%) and 'medical, precision & optical instruments' (between 3% and 26%) were relatively smaller (see Table 9). Only in Hungary did a significantly different export structure prevail in 1999: exports were not concentrated on one particular industry but were rather evenly distributed, with 'office machinery and equipment', 'electrical machinery & apparatus n.e.c.', and 'radio, TV & communication equipment' all accounting for about one third of the sector's exports.

Between 1995 and 1999, changes in the export structure of the CEECs (without Hungary) were in general modest, with some increase of shares in 'office machinery and equipment' as well as 'radio, TV & communication equipment', while shares of 'electrical machinery & apparatus n.e.c.' and 'medical, precision & optical instruments' declined slightly. In Hungary, the increase in the share of 'office machinery and equipment' exports and the decrease of 'electrical machinery & apparatus n.e.c.' was especially pronounced. In the Czech Republic and Slovenia the export structure remained almost stable at the 2-digit level. Some changes in the export structure occurred in Bulgaria (industry 31-, 32+), Romania (30+, 31-) and Slovakia (30+, 31-).

The import structure of the electrical and optical equipment sector was far less concentrated than the export structure in 1999 (see Table 10): only about one third of the sector's imports was made up of 'electrical machinery and apparatus', less than one third of 'radio, TV & communication equipment', less than 20% of 'office machinery and computers' and more than 10% of 'medical, precision & optical instruments' (data average CEEC-7). In more detail, shares ranged from 30% to 45% in 'electrical machinery and apparatus', 25% to 38% in 'radio, TV & communication equipment', 15% to 26% in 'office machinery and computers' and from 10% to 18% in 'medical, precision & optical instruments'.

Between 1995 and 1999, changes in the import structure of the CEECs were on average modest: the share of 'office machinery and computers' and especially 'radio, TV & communication equipment' imports increased, while that of 'electrical machinery and apparatus' and especially 'medical, precision & optical instruments' imports declined. Changes in the import structure went into the same direction as in the export structure.

Table 9

Detailed export structure of the electrical and optical equipment sector, 1999, in %

		Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovak Republic	Slovenia
30	**Office machinery and computers**	**2.1**	**7.2**	**32.4**	**1.8**	**14.4**	**17.2**	**2.1**
31	**Electrical machinery & apparatus n.e.c.**	**48.6**	**64.0**	**30.1**	**55.4**	**70.3**	**66.5**	**59.8**
31.1	Electric motors, generators & transformers	17.9	14.4	5.5	10.0	19.4	18.4	26.2
31.2	Electricity distribution & control apparatus	10.8	18.3	5.7	8.3	3.7	3.3	9.4
31.3	Insulated wire & cable	4.6	8.7	3.0	8.2	3.8	6.2	2.8
31.4	Accumulators, primary cells & primary batteries	0.5	4.9	0.0	3.9	0.6	0.0	2.0
31.5	Lighting equipment & electric lamps	9.9	2.2	5.6	10.2	5.6	3.0	3.9
31.6	Electrical equipment n.e.c.	4.9	15.5	10.3	14.7	37.3	35.5	15.6
32	**Radio, TV & communication equip. & apparatus**	**27.2**	**19.9**	**33.6**	**37.3**	**10.4**	**13.4**	**12.0**
32.1	Electronic valves & tubes & other electr. components	8.4	12.4	5.7	9.1	1.6	5.4	7.4
32.2	TV & radio transmitters, app. for line teleph.& line telegraphy	3.7	2.4	1.1	2.5	8.0	1.6	1.0
32.3	TV & radio receivers, sound, video rec.or reprod.apparatus	15.1	5.1	26.7	25.7	0.8	6.3	3.5
33	**Medical, precision & optical instr., watches & clocks**	**22.1**	**8.9**	**3.9**	**5.5**	**5.0**	**3.0**	**26.0**
33.1	Medical & surgical equ. & orthopaedic appliances	1.1	1.7	0.9	2.1	1.0	1.2	2.8
33.2	Instr. & appliances for measuring, checking, testing, navig.	11.1	4.6	2.2	2.8	2.7	1.6	16.9
33.4	Optical instruments & photographic equ.	8.3	2.3	0.7	0.2	1.1	0.2	5.3
33.5	Watches & clocks	1.5	0.3	0.0	0.5	0.1	0.0	1.0
DL	**Electrical and optical equipment**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
	in ECU mn	**88**	**2634**	**5792**	**2167**	**398**	**752**	**591**

Source: Eurostat, WIIW calculations.

Table 10

Detailed import structure of the electrical and optical equipment sector, 1999, in %

		Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovak Republic	Slovenia
30	**Office machinery and computers**	**19.7**	**15.2**	**26.2**	**19.8**	**15.1**	**15.9**	**16.8**
31	**Electrical machinery & apparatus n.e.c.**	**24.0**	**41.7**	**28.8**	**32.3**	**33.4**	**44.5**	**38.0**
31.1	Electric motors, generators & transformers	3.4	9.1	6.7	6.2	5.4	10.8	7.4
31.2	Electricity distribution & control apparatus	8.7	16.0	9.2	10.6	8.8	12.5	11.4
31.3	Insulated wire & cable	3.0	5.3	5.0	5.7	6.1	7.9	6.3
31.4	Accumulators, primary cells & primary batteries	1.7	1.8	0.6	1.6	0.9	0.8	1.3
31.5	Lighting equipment & electric lamps	2.1	2.2	2.2	3.2	1.4	1.4	3.7
31.6	Electrical equipment n.e.c.	5.1	7.3	5.0	5.0	10.9	11.2	7.9
32	**Radio, TV & communication equip. & apparatus**	**37.9**	**29.2**	**35.5**	**34.4**	**35.6**	**24.7**	**26.1**
32.1	Electronic valves & tubes & other electr. components	2.7	12.2	15.4	7.6	9.8	7.9	6.2
32.2	TV & radio transmitters, app. for line teleph.& line telegraphy	25.6	10.7	6.1	19.2	20.7	10.7	14.3
32.3	TV & radio receivers, sound, video rec.or reprod.apparatus	9.6	6.2	14.1	7.6	5.2	6.0	5.6
33	**Medical, precision & optical instr., watches & clocks**	**18.4**	**13.9**	**9.5**	**13.5**	**15.8**	**14.9**	**19.1**
33.1	Medical & surgical equ. & orthopaedic appliances	7.8	3.9	2.4	4.5	6.3	2.5	6.0
33.2	Instr. & appliances for measuring, checking, testing, navig.	8.3	8.3	5.5	7.3	8.1	11.0	9.7
33.4	Optical instruments & photographic equ.	2.0	1.5	1.4	1.2	1.0	0.6	2.2
33.5	Watches & clocks	0.2	0.3	0.2	0.4	0.3	0.7	1.1
DL	**Electrical and optical equipment**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
	in ECU mn	**352**	**3737**	**4534**	**4523**	**965**	**1001**	**886**

Source: Eurostat, WIIW calculations.

Improving but negative price/quality gap indicator

The price/quality gap indicator (measured by export unit values, value per kg) reveals differences in export prices, which under certain conditions can be interpreted as differences in product quality. For the average 1995 and 1999 as well as for 1999, the price/quality gap indicator was negative for exports of electrical and optical equipment from all CEECs to the EU, except those from Hungary (+30% in 1999). The gap was smallest in Poland (-10% in 1999), Slovenia and Slovakia (both -15%) and largest in Bulgaria and Romania (-30%), the Czech Republic fell in between (-20%).[9] From 1995 to 1999, the indicator improved in all countries, pointing to an upgrading of exports and growing competitiveness (see Table 11).

At a more detailed level, the price/quality gap indicator was mostly negative across industries and sub-branches. Positive values can be found for 'TV, radio receivers, sound, video recording or reproduction apparatus' (sub-branch 33.3) in all countries in 1999, for 'lighting equipment and electric lamps' (31.5) and 'watches and clocks' (33.5) in four countries. Among the different industries, 'radio, TV and communication equipment' (industry 32) did mostly best within the sector and showed a positive price/quality gap indicator in the Czech Republic, Hungary, Romania and Slovakia (see Table 11).

Importance on EU market below manufacturing-average, but growing

In 1995, CEEC(7) exports of electrical and optical equipment sector to the EU(15) had a market share of 3.5%, which increased to almost 7% in 1999, due to a three-fold increase of exports in absolute terms during that time period (all shares without intra-EU trade). When compared to total manufacturing market shares (9% in 1995 and 11% in 1999) however, the electrical and optical equipment shares lay below, thus reflecting a weaker position of the sector in foreign trade. However, between 1995 and 1999, the gap between total manufacturing market shares and the sector's shares decreased, pointing to a relatively growing importance (see Table 12). In 1999, the largest exporters to the EU were Hungary (3.2%), the Czech Republic (1.5%) and Poland (1.2%), all other countries had market shares below 1%.

[9] Average 1995-1999 values for electrical and optical equipment were however below-manufacturing average in all CEECs, except in Hungary and Poland.

Table 11

Electrical and optical equipment

Price/quality gap indicator for CEEC exports to the EU[1)]

			Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovak Republic	Slovenia
30	**Office machinery and computers**	**1999**	**-0.303**	**-0.429**	**1.061**	**-0.417**	**-0.346**	**-0.158**	**0.182**
31	**Electrical machinery & apparatus n.e.c.**	**1999**	**-0.312**	**-0.234**	**0.160**	**-0.080**	**-0.281**	**-0.195**	**-0.134**
31.1	Electric motors, generators & transformers	**1999**	-0.414	-0.283	0.020	-0.191	-0.446	-0.242	-0.194
31.2	Electricity distribution & control apparatus	**1999**	-0.368	-0.299	-0.088	-0.349	-0.599	-0.398	-0.222
31.3	Insulated wire & cable	**1999**	-0.384	-0.260	0.265	-0.308	-0.429	-0.369	0.475
31.4	Accumulators, primary cells & primary batteries	**1999**	-0.242	0.002	0.169	-0.080	0.293	-0.019	-0.190
31.5	Lighting equipment & electric lamps	**1999**	0.013	0.527	0.856	0.728	-0.191	0.319	-0.202
31.6	Electrical equipment n.e.c.	**1999**	-0.201	-0.230	0.071	-0.075	-0.088	-0.146	-0.039
32	**Radio, TV & communication equip. & apparatus**	**1999**	**-0.017**	**0.064**	**0.046**	**-0.057**	**0.383**	**0.139**	**-0.193**
32.1	Electronic valves & tubes & other electr. components	**1999**	-0.146	0.067	0.218	-0.174	-0.544	0.394	-0.259
32.2	TV & radio transmitters, app. for line teleph.& line telegraphy	**1999**	-0.037	0.208	-0.576	-0.495	0.632	-0.608	-0.338
32.3	TV & radio receivers, sound, video rec.or reprod.apparatus	**1999**	0.063	0.007	0.050	0.048	2.363	0.292	0.013
33	**Medical, precision & optical instr., watches & clocks**	**1999**	**-0.539**	**-0.438**	**-0.410**	**-0.474**	**-0.563**	**-0.345**	**-0.181**
33.1	Medical & surgical equ. & orthopaedic appliances	**1999**	0.373	-0.637	-0.723	-0.624	-0.626	-0.459	-0.653
33.2	Instr. & appliances for measuring, checking, testing, navig.	**1999**	-0.498	-0.363	-0.287	-0.411	-0.597	-0.066	-0.414
33.3	Industrial process control equipment	**1999**	.	.	.	.	.	.	.
33.4	Optical instruments & photographic equ.	**1999**	-0.610	-0.451	-0.148	-0.123	0.230	-0.788	0.009
33.5	Watches & clocks	**1999**	4.381	0.728	0.610	0.437	-0.512	-0.397	-0.345
DL	**Electrical and optical equipment**	**1995**	-0.402	-0.239	-0.087	-0.252	-0.433	-0.282	-0.237
		1996	-0.477	-0.293	-0.066	-0.288	-0.460	-0.374	-0.238
		1997	-0.432	-0.228	0.012	-0.224	-0.393	-0.313	-0.269
		1998	-0.375	-0.152	0.061	-0.044	-0.207	-0.189	-0.231
		1999	**-0.304**	**-0.219**	**0.318**	**-0.103**	**-0.262**	**-0.157**	**-0.148**
		average 1995-1999	**-0.398**	**-0.226**	**0.048**	**-0.182**	**-0.351**	**-0.263**	**-0.225**
		change in %, 1995-1999	**4.8**	**2.3**	**8.6**	**6.6**	**9.1**	**5.8**	**2.3**

Notes: 1) Defined as the unit value ratio uvr_t^c of country c, which shows the percentage deviation from the average EU import unit value.

Source: Calculations by R. Stehrer, WIIW.

Table 12

Electrical and optical equipment

CEECs' exports to the EU(15) in ECU million, market shares in %

	EU(15) extra-EU imports, ECU mn	Bulgaria		Czech Republic		Hungary		Poland	
		ECU mn	%	ECU mn	%	ECU mn	%	ECU mn	%
1995	110618.2	51.5	0.05	1043.7	0.94	1268.2	1.15	786.7	0.71
1996	119066.5	50.3	0.04	1254.7	1.05	1941.9	1.63	983.2	0.83
1997	140093.5	55.1	0.04	1567.1	1.12	3288.5	2.35	1417.8	1.01
1998	156441.1	72.1	0.05	2197.9	1.40	4416.9	2.82	1870.7	1.20
1999	180940.9	88.1	0.05	2634.4	1.46	5792.4	3.20	2166.6	1.20

	Romania		Slovak Republic		Slovenia		CEEC(7)		Total Manufacturing CEEC(7)[1)]	
	ECU mn	%	ECU mn	%	ECU mn	%	ECU mn	%	ECU mn	%
1995	135.7	0.12	209.8	0.19	413.2	0.37	3908.9	3.53	38401	8.93
1996	143.6	0.12	293.3	0.25	445.0	0.37	5111.8	4.29	40903	9.05
1997	183.7	0.13	457.7	0.33	493.7	0.35	7463.5	5.33	49447	9.48
1998	266.5	0.17	618.1	0.40	543.9	0.35	9986.1	6.38	59900	10.43
1999	398.2	0.22	751.6	0.42	590.7	0.33	12422.2	6.87	67623	10.71

Notes: 1) CEEC(7) total manufacturing exports to the EU and their market shares.

Source: Eurostat, WIIW calculations.

Trade deficit with Austria in electrical and optical equipment

Imports from the CEEC(7) had a significantly larger share on Austria's market than on the EU(15) market, accounting for 17% of Austria's non-EU electrical and optical equipment imports in 1995 and rising to 36% in 1999, after a four-fold increase in absolute terms. Half of all imports came from 'electrical machinery and apparatus' in 1999, the other half from 'radio, TV and communication equipment and apparatus'. The most important source for imports from the CEECs was Hungary, accounting for 24% of all extra-EU imports, followed by the Czech Republic with 5%. Slovenia, Slovakia and Romania held a share of about 2% (see Table 13).

Electrical and optical equipment exports from Austria to the CEECs

The CEEC(7) are a major export destination of Austria's non-EU electrical and optical equipment exports, reaching 36% of all extra-EU(15) electrical and optical equipment exports in 1995 and climbing to 42% in 1999. More than one third of export products came from 'electrical machinery and apparatus' in 1999, another third from 'radio, TV and communication equipment and apparatus' exports. Major export destinations were Hungary (22% of Austrian exports), lesser ones the Czech Republic, Poland, Slovenia and Slovakia (see Table 14).

Table 13

Electrical and optical equipment

CEECs' exports to Austria in ECU million, market shares in %

	Austria extra-EU(15) imports, ECU mn	Bulgaria ECU mn	Bulgaria %	Czech Republic ECU mn	Czech Republic %	Hungary ECU mn	Hungary %	Poland ECU mn	Poland %
1995	1772.8	2.1	0.12	66.0	3.72	167.6	9.45	13.2	0.75
1996	2088.5	1.4	0.07	77.8	3.73	422.7	20.24	16.7	0.80
1997	2517.8	2.1	0.08	90.7	3.60	683.2	27.13	24.2	0.96
1998	2785.5	3.2	0.12	126.7	4.55	684.7	24.58	33.9	1.22
1999	3371.7	3.2	0.10	165.0	4.90	796.5	23.62	44.8	1.33

	Romania ECU mn	Romania %	Slovak Republic ECU mn	Slovak Republic %	Slovenia ECU mn	Slovenia %	CEEC(7)[1] ECU mn	CEEC(7)[1] %
1995	1.7	0.10	19.3	1.09	22.7	1.28	292.7	16.51
1996	6.9	0.33	24.1	1.15	29.4	1.41	579.0	27.72
1997	9.1	0.36	40.7	1.62	40.3	1.60	890.2	35.36
1998	42.0	1.51	51.3	1.84	56.3	2.02	998.0	35.83
1999	58.2	1.73	78.7	2.33	74.0	2.20	1220.4	36.20

Note 1): Including Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic and Slovenia.

Source: Eurostat, WIIW calculations.

Table 14

Electrical and optical equipment

CEECs' imports from Austria in ECU million, market shares in %

	Austria extra-EU(15) exports, ECU mn	Bulgaria ECU mn	Bulgaria %	Czech Republic ECU mn	Czech Republic %	Hungary ECU mn	Hungary %	Poland ECU mn	Poland %
1995	1991.5	17.0	0.85	188.1	9.44	254.4	12.77	78.5	3.94
1996	2172.6	12.9	0.59	192.6	8.86	390.9	17.99	90.9	4.18
1997	2705.2	14.2	0.53	217.9	8.05	463.9	17.15	114.2	4.22
1998	2801.3	17.6	0.63	212.5	7.58	487.9	17.42	97.0	3.46
1999	3423.0	29.7	0.87	215.4	6.29	761.4	22.24	122.8	3.59

	Romania ECU mn	Romania %	Slovak Republic ECU mn	Slovak Republic %	Slovenia ECU mn	Slovenia %	CEEC(7)[1] ECU mn	CEEC(7)[1] %
1995	31.3	1.57	72.6	3.65	64.6	3.24	706.5	35.47
1996	34.0	1.57	86.6	3.99	70.7	3.26	878.6	40.44
1997	50.8	1.88	121.4	4.49	100.6	3.72	1082.9	40.03
1998	66.8	2.39	108.3	3.87	92.4	3.30	1082.5	38.64
1999	80.9	2.36	112.5	3.29	112.8	3.30	1435.5	41.94

Note: 1) Including Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic and Slovenia.

Source: Eurostat, WIIW calculations.

In fact, electrical and optical equipment exports from Austria to the CEEC(7) had been larger than imports from these countries, leading to a surplus for Austria and a trade deficit for the CEECs in this sector. The total trade surplus for Austria in the sector reached ECU 215 million in 1999. Only Hungary did register a trade surplus from 1996. In the other CEECs the deficit ranged from ECU 23 million in Romania to ECU 78 million in Poland.

Improving revealed comparative disadvantage

Revealed comparative advantage values (RCAs)[10] in relation to the EU(15) for the electrical and optical equipment sector have been negative in all countries, except Hungary, reflecting their negative sectoral trade balances (see Table 15). Also, when compared to manufacturing as a whole,[11] data indicate a comparative *dis*advantage of the electrical and optical equipment sector in all CEECs, except in Hungary again. In 1999 the disadvantage was largest in Bulgaria and Romania and smallest in Slovenia. Relative RCAs improved over time and values were better in 1999 than in 1995, only in Slovenia values slightly deteriorated during this period (see Table 16).

Table 15
Electrical and optical equipment RCAs

	1995	1996	1997	1998	1999
Bulgaria	-0.61	-0.55	-0.51	-0.57	-0.60
Czech Republic	-0.34	-0.35	-0.31	-0.20	-0.17
Hungary	-0.10	-0.04	0.08	0.10	0.12
Poland	-0.38	-0.41	-0.38	-0.35	-0.35
Romania	-0.49	-0.50	-0.57	-0.54	-0.42
Slovak Republic	-0.45	-0.41	-0.33	-0.26	-0.14
Slovenia	-0.11	-0.13	-0.18	-0.17	-0.20
Greece	-0.79	-0.80	-0.83	-0.86	-0.88
Portugal	-0.21	-0.23	-0.26	-0.31	-0.26
Spain	-0.40	-0.39	-0.39	-0.39	-0.45

Measured as:
RCA = (exports – imports) / (exports + imports).
Source: Eurostat, WIIW calculations.

Table 16
Relative position of electrical and optical equipment RCAs

	1995	1996	1997	1998	1999
Bulgaria	-0.55	-0.55	-0.59	-0.54	-0.52
Czech Republic	-0.21	-0.17	-0.17	-0.14	-0.14
Hungary	-0.03	0.03	0.11	0.12	0.10
Poland	-0.26	-0.18	-0.11	-0.08	-0.11
Romania	-0.45	-0.41	-0.52	-0.45	-0.38
Slovak Republic	-0.44	-0.35	-0.26	-0.25	-0.19
Slovenia	-0.03	-0.04	-0.05	-0.07	-0.09
Greece	-0.23	-0.26	-0.25	-0.26	-0.27
Portugal	0.00	-0.04	-0.05	-0.07	-0.02
Spain	-0.25	-0.27	-0.25	-0.24	-0.26

Measured as: RCA (sector) - RCA (total manufacturing).
Source: Eurostat, WIIW calculations.

Within the electrical and optical equipment sector, almost all industries and sub-branches showed a negative trade balance. Only some were in surplus pointing to areas of competitiveness: 'electric motors, generators & transformers' (sub-branch 31.1) and 'electrical equipment n.e.c.' (31.6) in six countries, 'lighting equipment & electrical equipment n.e.c.' (31.5) in five countries and 'electrical machinery & apparatus n.e.c.' (industry 31) in four countries (see Table 17).

[10] Measured as RCA = (exports - imports) / (exports + imports).

[11] Measured as relative RCA = RCA (sector) - RCA (total manufacturing).

Table 17

Detailed RCA structure of the electrical and optical equipment sector, 1999

		Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovak Republic	Slovenia
30	**Office machinery and computers**	**-0.95**	**-0.50**	**0.23**	**-0.92**	**-0.44**	**-0.11**	**-0.85**
31	**Electrical machinery & apparatus n.e.c.**	**-0.33**	**0.04**	**0.14**	**-0.10**	**-0.07**	**0.06**	**0.02**
31.1	Electric motors, generators & transformers	0.14	0.05	0.02	-0.13	0.20	0.12	0.40
31.2	Electricity distribution & control apparatus	-0.52	-0.11	-0.12	-0.45	-0.70	-0.67	-0.29
31.3	Insulated wire & cable	-0.45	0.07	-0.14	-0.18	-0.59	-0.25	-0.54
31.4	Accumulators, primary cells & primary batteries	-0.86	0.33	-0.83	0.08	-0.57	-0.98	0.03
31.5	Lighting equipment & electric lamps	0.08	-0.17	0.53	0.22	0.23	0.24	-0.19
31.6	Electrical equipment n.e.c.	-0.61	0.20	0.45	0.17	0.17	0.41	0.13
32	**Radio, TV & communication equip. & apparatus**	**-0.70**	**-0.35**	**0.09**	**-0.32**	**-0.79**	**-0.42**	**-0.53**
32.1	Electronic valves & tubes & other electr. components	-0.13	-0.17	-0.35	-0.27	-0.87	-0.32	-0.12
32.2	TV & radio transmitters, app. for line teleph.& line telegraphy	-0.93	-0.73	-0.63	-0.88	-0.72	-0.80	-0.91
32.3	TV & radio receivers, sound, video rec.or reprod.apparatus	-0.43	-0.26	0.42	0.23	-0.89	-0.12	-0.41
33	**Medical, precision & optical instr., watches & clocks**	**-0.54**	**-0.38**	**-0.31**	**-0.67**	**-0.77**	**-0.74**	**-0.05**
33.1	Medical & surgical equ. & orthopaedic appliances	-0.93	-0.52	-0.33	-0.63	-0.88	-0.47	-0.53
33.2	Instr. & appliances for measuring, checking, testing, navig.	-0.50	-0.44	-0.32	-0.69	-0.76	-0.81	0.07
33.4	Optical instruments & photographic equ.	0.01	0.04	-0.20	-0.87	-0.37	-0.62	0.24
33.5	Watches & clocks	0.24	-0.18	-0.71	-0.31	-0.74	-0.98	-0.24
DL	**Electrical and optical equipment**	**-0.60**	**-0.17**	**0.12**	**-0.35**	**-0.42**	**-0.14**	**-0.20**

Source: Eurostat, WIIW calculations.

4 Foreign direct investment

The electrical and optical equipment sector is among the most important and attractive sectors for foreign investors in most countries, especially in Hungary. Foreign investors were drawn by several factors: a qualified labour force at low labour costs for labour-intensive processes, growth prospects of the domestic economies in consumer electronics, export possibilities (Hungary) and particularly generous incentives, including special tax preferences and subsidies (especially for large investments). In addition, foreign direct investment occurred as follow-up investments to FDI in the automotive industry.

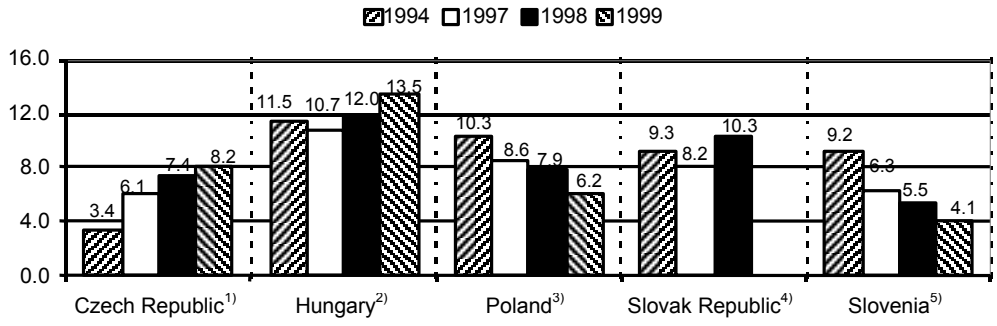
Figure 7

Electrical and optical equipment

A. Position of the sector in the distribution of foreign capital

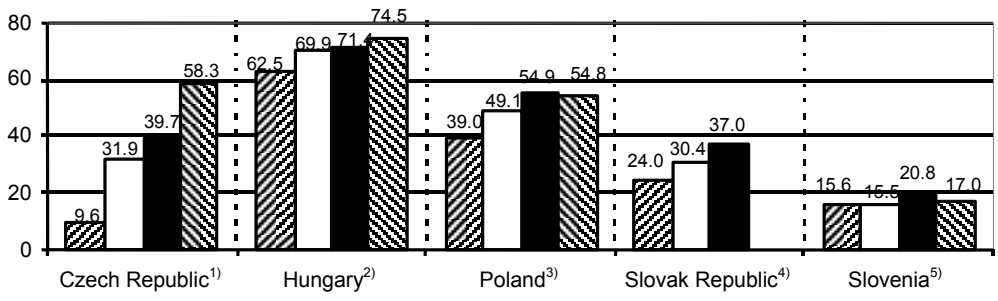
Percentage share of the sector in total manufacturing's nominal capital of foreign investment enterprises (FIEs)

Manufacturing = 100



B. Foreign penetration of the sector

Share of nominal capital of leather FIEs in the nominal capital of all leather companies (FIEs + all others)



Notes: 1) 1994 own capital, 1997-1999 equity capital.- 2) Nominal capital.- 3) Equity capital.- 4) Output of companies; 1995 data instead of 1997, 1996 data instead of 1998, all data without office equipment.- 5) Nominal capital; 1995 data instead of 1994, 1997-1999 data without office equipment due to confidentiality (industry with less than 3 FIEs).

Source: WIIW, FIE Database.

Looking at the shares of the electrical and optical equipment sector in the *distribution* of nominal capital of foreign investment enterprises (FIEs)[12] in total manufacturing, shares were of medium size, ranging between 4% in Slovenia and 14% in Hungary in 1999. While the sector gained relative importance for foreign investment in Hungary and the Czech and the Slovak Republics, its has lost relative importance in Poland and Slovenia (see Figure 7).

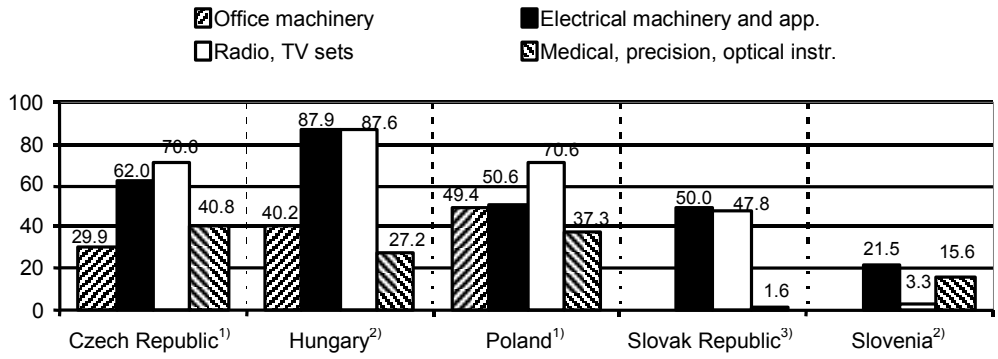
Foreign *penetration* of the electric and optical equipment sector (as measured by the share of nominal capital of the sector's FIEs in the nominal capital of all electrical and optical equipment companies) was above the levels of foreign penetration for total manufacturing in all CEECs over most of the time period, with the only exception of Slovenia. Here, foreign penetration was also the lowest in the region in 1999 with only 17%, while in the other countries it was very high, reaching 75% in Hungary, 58% in the Czech Republic and 55% in Poland (see Figure 7). However, levels of foreign penetration varied somewhat among industries: The highest levels were reached in 'radio, TV and communication equipment' (industry 32), followed by 'electrical machinery and apparatus' (31). The foreign penetration was lower for 'office machinery and computers' (30) and 'medical, precision & optical instruments' (33). In absolute terms, 'electrical machinery and apparatus' came first (Figure 8).

Figure 8

Electrical and optical equipment

Foreign penetration of individual industries in 1999

Share of nominal capital of FIEs in
the nominal capital of all companies (FIEs + all others)



Notes : 1) Equity capital.- 2) Nominal capital.- 3) Output of companies, 1996 data instead of 1999.
Source: WIIW, FIE Database

[12] Firms with any share of foreign ownership, including minority stakes.

5 Prospects

In general, after a marked downturn at the beginning of the decade, the electrical and optical equipment sector of the Central and Eastern European countries experienced an astounding revival. Production surged in a U-shaped upturn from 1993/1994, the sector became one of the major winners of manufacturing in the region and its importance grew in all countries (except in *Bulgaria*). Structural change was accompanied by a reduction of employment and was strongly influenced by the inflow of foreign direct investment. The sector shows above-average export orientation and strong export growth on the one hand, but also large imports on the other, resulting in sectoral trade deficits and a comparative disadvantage of the sector. Exports were mainly based on low-price/low-quality products. Only in *Hungary* did the sector record a trade surplus and exports were of higher prices/quality.

Strong specialization on the electrical and optical equipment sector was observed in ***Hungary***; this country showed the highest production and exports of electrical and optical equipment products in the region and the highest growth in both terms. The extraordinary performance of the sector was due to the large inflow of foreign direct investment, promoting exports and increasing efficiency and productivity (exceeding even the Austrian level). In addition, unit labour costs were the lowest among all CEECs. Production and export structure differed considerably from the other countries. High dependence on foreign markets (86% of production is exported), on foreign investors, and specialization on labour-intensive sub-branches are the other side of the coin.

In the ***Czech Republic, Poland, Slovenia and Slovakia*** the electrical and optical equipment sector also held an important position in the economy in terms of production, employment and export shares. Especially the *Czech Republic* exhibited some specialization in the electrical and optical equipment sector. It showed dynamic output growth and high foreign penetration, and exports to the EU were even higher than Polish exports to the EU, possibly due to the importance of outward processing (see Part II). In *Poland*, the electrical and optical equipment sector grew strongly as well but recorded a large and growing sectoral trade deficit. In *Slovenia* and *Slovakia* production still was more labour-intensive than in the other CEECs, as employment shares were still higher than production shares. In *Slovenia* this might be due to the greater importance of the 'medical, precision and optical instruments' industry. Also, the sector was the best performing in total manufacturing and showed a low comparative disadvantage and price/quality gap.

In ***Romania and Bulgaria***, the two economically least advanced countries in the region, the electrical and optical equipment sector was of less importance than in the other countries of the region; production and employment shares were relatively small. In *Romania*, the sector experienced an upturn until 1997 but faced a decline again thereafter. The share of exports to the EU was relatively large in this country. In *Bulgaria*, the former

specialization on the electrical and optical equipment sector has vanished, production of the sector stagnated and the share of exports to the EU was small, making the sector the tail-light in the region.

The future prospects of the electrical and optical equipment sector will be largely determined by demand developments on **external markets**, because of the strong export orientation of the sector. The current outlook is quite good: EU market shares in electrical and optical equipment products have increased in recent years and the product quality and relative RCAs have improved. However, sectoral trade deficits still prevail in the region (except in Hungary). In addition, the high dependence on foreign markets makes the sector vulnerable to fluctuations in external demand, where the boom in information and communication technology is currently weakening (e.g. mobile phones). Also in the automotive industry, a major downstream customer of the electrical and optical equipment sector, excess capacities exist world-wide and are now closed or reduced.

On the **domestic market**, growth potentials for the sector still exist as the equipment of consumer goods is still below Western levels e.g. for telephone lines, mobile phones or PCs (see Appendix, Figure A3 and Table A4). However, it seems more likely that growing demand for high-technology products will be met by high-quality imports. Domestic developments in GDP and gross industrial production are however quite favourable and forecasts are positive for all CEECs in 2001 and 2002: The trends in industrial production are most promising in Hungary, followed by Slovakia and the Czech Republic. The growth rates for Poland, Slovenia, Bulgaria and Romania are smaller but still pronounced (see most recent WIIW forecasts, Appendix Table A5). Generally, the growing output and exports in the electrical and optical equipment sector of the CEECs in the last years and continuous growth in 2000 may point to an overall positive trend in the future as well, although it might be somewhat weakened by the above-mentioned factors.

Part II: COMPANY PROFILES

This part sets out to describe a more detailed micro-analysis of the electrical and optical equipment sector and contains the following information for each country, as far as available:[13]

- Structure of the sector and development trends
- Profitability and investment
- Number and size structure of companies
- Description of selected companies or a list of major companies

At a more detailed level, the electrical and optical equipment sector of the CEECs is characterized by a large share of the 'electrical machinery and apparatus' industry in total production, followed by the 'radio, TV and communication equipment and apparatus' industry. Only Hungary displays a completely different production structure: here 'office machinery and computers' as well as 'radio, TV and communication equipment and apparatus' hold about one third of the sector's production (see Table 18).

Table 18

Production shares of individual industries in the electrical and optical equipment sector (at current prices)

1999, in %

		Bulgaria[1)]	Czech Rep.	Hungary	Poland	Romania[1)]	Slovak Rep.	Slovenia[2)]
30	Office machinery and computers	13.5	1.6	35.6	4.1	9.7	.	9.1
31	Electrical machinery & apparatus n.e.c.	62.3	66.0	24.3	50.1	57.7	.	45.1
32	Radio, TV & communication equip. & apparatus	10.8	17.6	35.8	33.1	23.7	.	25.1
33	Medical, precision & optical instr., watches & clocks	13.4	14.8	4.4	12.8	9.0	.	20.6
DL	**Electrical and optical equipment**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**.**	**100.0**

Notes: 1) 1998. - 2) Total revenues 2000.

Source: National statistics.

Bulgaria

In the 1970s and 1980s the high-tech and electronics industry enjoyed priority in Bulgaria: the country acquired a remarkable reputation as a producer of mid-quality, inexpensive electronic consumer goods which were sold in the CMEA region. After the collapse of the communist system, the electrical and optical equipment sector suffered heavily from the

[13] The coverage of data is limited by the vast number of companies in the sector – hence only selected companies can be described – and by the fast changing nature of the sector. In addition, special attention should be paid to the definition of production statistics comprising enterprises with different numbers of employees.

loss of these markets, both for exports and imports (raw materials). The development of the sector was further hampered by the decline of the domestic economy, import competition, slow inflow of FDI and an enormous brain drain. Today, some companies of the sector have yet to be privatized, such as several branches of INCOMS TELECOM HOLDING ('Information and Communication Systems'), including a plant for radio-relay equipment, a plant for telephone equipment, for telephone components etc.

In the structure of the sector, 'electrical machinery and apparatus n.e.c.' accounted for the major part (62%) of the sector's production volume in 1998, with 'insulated wire and cable', 'electric motors, generators and transformers', 'accumulators, primary cells and batteries' and 'electricity distribution and control apparatus' being the most important sub-branches (see Table 19). The ranking of the largest companies reflects this structure, as most companies operate in these branches (see Table 20). Only one company (Orgtehnika) belongs to the 'office machinery and computers' industry, the second largest segment (14%) of the Bulgarian electrical and optical equipment sector. 'Medical, precision and optical instruments, watches & clocks' accounted for 13% and 'radio, TV and communication equipment and apparatus' for 11% of the sector's production (see Table 19).

Table 19

Bulgaria: Gross output of the electrical and optical equipment sector

BGL million, distribution in %

		1997	1998	1998 in %
30	**Office, accounting and computing machinery**	**81322**	**79498**	**13.5**
31	**Electrical machinery and apparatus n.e.c.**	**343247**	**365736**	**62.3**
311	Electric motors, generators and transformers	89248	87901	15.0
312	Electricity distribution and control apparatus	42742	60110	10.2
313	Insulated wire and cable	82471	90021	15.3
314	Accumulators, primary cells and primary batteries	66199	61246	10.4
315	Lighting equipment and electric lamps	21391	29036	4.9
319	Other electrical equipment n.e.c.	41196	37422	6.4
32	**Radio, TV & communication equipment and apparatus**	**43822**	**63572**	**10.8**
321	Electronic valves and tubes and other electronic components	22457	26697	4.5
322	Television & radio transmitters, apparatus for line telephony, line telegraphy	14166	28925	4.9
323	Television & radio receivers, sound or video recording	7199	7950	1.4
33	**Medical, precision & optical instruments, watches and clocks**	**55992**	**78521**	**13.4**
331	Medical appliances & inst, instr. for measuring testing, navig.	40244	58687	10.0
332	Optical instruments and photographic equipment	15430	19728	3.4
333	Watches and clocks	318	106	0.0
DL	**Electrical and optical equipment**	**524383**	**587327**	**100.0**

Notes: ISIC rev.3 classification system.

Source: UNIDO (2001).

Table 20

The largest Bulgarian electrical and optical equipment companies[1)], ranked by 2000 net sales

Name, location	Net sales in ths. BGN	Net sales in ths. EUR[2)]	Employees	Main activity
Elcable, Bourgas	89018	45510	1203	Cables and wires
Energocable, Sofia	44110	22551	350	Wires
Sparky-Eltos, Lovetch	34882	17833	1400	Electronic tools, motors for electronic tools, appliances
Energy-Targovishte, Targovishte	22096	11297	620	Batteries and components
Elma-Troyan, Troyan	22034	11265	1430	Motors, consumer goods
Emka, Sevlievo	15774	8064	700	Wires
Gamacable, Smolyan	15725	8039	258	Electric devices, engineering
Elchim-Iskra, Pazardzhik	13987	7151	527	Electric devices, spare parts
Orgtehnika, Silistra	12613	6448	1163	Electronic calculators, cash registers
Svetlina-Sliven, Sliven	6472	3309	938	Light source, light fittings, etc.

Notes: 1) Branch selection: Industry, Branch group: Electrotechnical and electronic industry. - 2) Converted with average exchange rate Bulgarian lev BGN/EUR 1.956.

Source: Bulgarian Enterprises Information System BEIS (http:// www.bic.bia-bg.com).

Major foreign investors in the electrical engineering industry in Bulgaria include Asea Brown Boveri (Switzerland), Festo (Austria), Hyundai (Korea), Kostra Development (Israel), Liebherr (Germany), Michigan Magnetics (USA), Pramet (Czech Republic), Schneider Electric (France), Siemens (Germany), Sigma Delta (Belgium), Silway Technology (France), Sparky Trading (Germany) and Videoton Holding (Hungary).

Czech Republic[14]

Until 1993, the Czech electrical and optical equipment sector experienced a steep decline in output, mainly due to a fall in the production of electronics. This development can be attributed to the liberalization of trade, leading to severe competition from imported products, to the decline in forward-linked engineering branches such as automobiles, and to changes in ownership. Since then, however, the sector has grown dynamically benefiting from steadily growing domestic and foreign demand. Today, the Czech electrical and optical equipment sector is characterized by a large share of foreign direct investment, a high share of outward processing trade (70% of total exports in 1999) and high information, telecommunications and radio communications technology imports. The privatization of enterprises is practically complete, while specialization and restructuring of the sector still proceeds.

[14] Based on Ministry of Industry and Trade (2000).

Table 21

Czech Republic: Sales revenues of the electrical and optical equipment sector

CZK million, distribution in %

		1994	1996	1999[1)]	1999	1999 level
			CZK million		in %	in % of 1994
30	**Office machinery and computers**	**2495**	**1831**	**2170**	**1.6**	**87.0**
31	**Electrical machinery and apparatus n.e.c.**	**38763**	**58067**	**88950**	**66.0**	**229.5**
311	Electric motors, generators and transformers	9856	14672	15200	11.3	154.2
312	Electricity distribution and control apparatus	10561	15548	26600	19.7	251.9
313	Insulated wire and cable	6364	7413	10450	7.8	164.2
314	Accumulators, primary cells and primary batteries	1433	2391	3500	2.6	244.2
315	Lighting equipment and electric lamps	2549	3516	4700	3.5	184.4
316	Electrical equipment n.e.c.	7991	14527	28500	21.1	356.7
32	**Radio, TV & communication equipment and apparatus**	**9016**	**14894**	**23691**	**17.6**	**262.8**
321	Electronic valves and tubes and other electronic components	4024	6015	9316	6.9	231.5
322	Television & radio transmitters, apparatus for line telephony, line telegraphy	3441	6815	10442	7.7	303.5
323	Television & radio receivers, sound or video recording	1551	2064	3933	2.9	253.6
33	**Medical, precision & optical instruments, watches and clocks**	**11950**	**17229**	**19950**	**14.8**	**166.9**
331	Medical & surgical equ. and orthopaedic appliances	3639	4145	4495	3.3	123.5
332	Instr. and appl. for measuring, testing, navig. except opt. instr.	4999	8110	7208	5.3	144.2
333	Industrial process control equipment	1846	2683	5700	4.2	308.8
334	Optical instruments and photographic equipment	1078	1814	2520	1.9	233.8
335	Watches and clocks	389	478	27	0.0	6.9
DL	**Electrical and optical equipment**	**62224**	**92021**	**134761**	**100.0**	**216.6**

Notes: 1) Estimate.

Source: Ministry of Industry and Trade (2000).

In the structure of the Czech electrical and optical equipment sector, 'electrical machinery and apparatus' accounted for 66% of the sector's sales revenues in 1999, 'radio, TV and communication equipment and apparatus' for 18%, 'medical, precision & optical instruments' for 15% and 'office machinery and computers' only for 2% (see Table 21). The largest sub-branches were 'electrical equipment n.e.c.' (21%), 'electricity distribution and control apparatus' (20%) and 'electric motors, generators and transformers' (11%). Growth was most vigorous in 'radio, TV and communication equipment and apparatus' (160%) and in more detail in 'electric equipment n.e.c.' (260%), 'industrial process control equipment' (210%) and 'TV & radio transmitters' (200%).

Table 22

Foreign direct investment in the Czech electrical and optical equipment sector, 1994 to May 2000

Investor	Country	Type of investment	Investment (USD mn)	Announcement of project	Location (country)
Philips	Netherlands	project on green meadow	5	June 94	České Budějovice
Draka	Netherlands	project on green meadow	n/a	November 94	Žďár nad Sázavou
Lefevere	Belgium	joint venture/acquisition	1.5	February 95	Blansko
Denon	Japan	production cooperation	1	July 95	Liberec
Matsushita El. Ind.	Japan	project on green meadow	100	January 96	Plzeň
Rhode Schwarz	Germany	production cooperation	n/a	October 96	Brno
EURO-Matsushita	Japan	project on green meadow	1.7	October 97	Tachov
FIC	Taiwan	project on green meadow	100	December 97	Praha - západ
Eichenauer	Germany	second phase-expansion	1	December 97	Pardubice
AVX	Great Britain (Japan)	project on gr. mead. with granting incentive	54	January 98	Ústí nad Orlicí
Dll Group	Ireland	project on gr. mead. with granting incentive	18.9	September 98	Brno
AEG	Germany	project on gr. mead. with granting incentive	25.2	September 98	Jičín
Lexmark	USA	project on green meadow	10	May 99	Brno
Sagem	France	project on green mead. with granting incentive	10.3	July 99	Kladno
Celestica	Great Britain	project on green mead. with granting incentive	70	July 99	Blansko
Ohmega Electronic	Great Britain	project in existing hall	1	August 99	Mělník
Barco	Belgium	project on gr. mead. with granting incentive	14	November 99	Slaný
Gramofonové závody	Czech Republic	project in existing hall with granting incentive	13.7	December 99	Beroun
Siemens-Matsushita	Germany	project on gr. mead. with granting incentive	43.2	December 99	Šumperk
Invensys	Luxembourg	project in existing hall with granting incentive	16.6	January 00	Štenberk
Philips	Netherlands	project on gr. mead. with granting incentive	624	March 00	Přerov
Tyco	USA	second phase-expans. with gran. incent.	35.5	March 00	Brno-venkov
Matsushita	Japan	project on gr. mead. with granting incentive	72.65	March 00	Plzeň

Source: ASPEKT (2000) based on CzechInvest.

In 1999, there were about 700 companies with more than 20 employees in the Czech electrical and optical equipment sector, of which 34% employed more than 100 persons

(only three companies had more than 2000 employees). The sector was among the manufacturing branches with high investment outlays that totalled about EUR 300 million in 1999, representing 9% of total manufacturing investment. The electrical and optical equipment sector registered profits in the last few years (EUR 80 million in 1999), only 'office machinery and computers' made a small loss, which turned into a small surplus in 1999.

Office machinery and computers.[15] With only 2% of sales revenues, this industry is the smallest part of the Czech electrical and optical equipment sector. *Office machinery,* which has always comprised only a small assortment, experienced a steep downturn and was discontinued in 1999. Since 1997, when foreign direct investment started flowing in, *computer technology* is showing an upward trend. It is mainly focused on assembling various computer configurations and the production of parts and components. The sub-branch is characterized by high imports. Foreign investors include First International Computer (FIC) from Taiwan, Lexmark Electronics and the DII Group.

Electrical machinery and apparatus.[16] With two thirds of sales revenues, this industry forms the major part of the Czech electrical and optical equipment sector and features large serial production. It has a good competitive position and export performance, producing world standard quality products. The key product groups include electric motors, generators and transformers; electric distribution and switching equipment; and cables and insulated wires. They are complemented by other electrical equipment, particularly for motor cars, which are based on the inflow of foreign direct investment due to the successful development of transport equipment in the Czech Republic. Large enterprises include Škoda ETD, s.r.o., ČKD Elektrotechnika Praha, Siemens Elektromotory, s.r.o., ABB Elektro Praga Jablonec, ABB EJF Brno, Kablo Velké Meziříčí, Teslamp Praha etc. Foreign investors invested in all sub-branches of the electrical machinery and apparatus industry except 'electric lighting equipment and lamps' (sub-branch 31.5) and were mainly attracted by 'electricity distribution and control apparatus' (31.2), 'accumulators, primary cells and primary batteries' (31.4) and 'electrical equipment n.e.c.' (31.6) – all sub-branches that are becoming high-growth segments (see Table 21). Major foreign investors include:

Sub-branch	Company
31.1	Siemens AG, JULI Motorenwerk, LEROY-SOMER
31.2	ABB, Schrack Energietechnik, Schneider Electric, Hensel, Kopp etc.
31.3	NKT Cables GmbH, Siemens AG, Schwechater Kabelwerke
31.4	Varta, Hoppecke, Saft, FIAMM SpA
31.6	Ford, Siemens, Bosch, Lucas, Hella etc.

[15] For more details see Ministry of Industry and Trade (2000), p. 299.

[16] For more details see Ministry of Industry and Trade (2000), p. 313.

Outward processing plays a major role in this industry, but initial contract work is already advancing to the production of more complicated components with higher value added. Major drawbacks of the industry are low labour productivity, low innovation ability, and low investment into human capital.

Radio, television and communication equipment.[17] Accounting for 18% of the sector's sales, it is a high-growth segment and characterized by highly automated production in large lots. The key products of this industry include telecom equipment and electronic components. The former is benefiting from fast growth of domestic consumption and features a high intensity of research and development. Foreign direct investment started flowing in only recently, while foreign capital inflow into consumer electronics is at the sideline of interest and does not correspond to the dynamic development of this branch in the world. Major foreign investors in the industry include AVX Kyocera Group, Matsushita, Motorola, Philips, AEG, and SAGEM SA. Domestic companies are mainly parts of the former production combine of VJH Tesla. Major companies producing electronic components include AVX CZ Lanškroun, TESLA SEZAM, TEROSIL Rožnov pod Radhoštěm, TESLA Lanškroun, TCT Rožnov pod Radhoštěm, UNIT Expert Přelouč, PCB Benešov at Prague, TESLA Vršovice, TESLA Jihlava, TRIMEX Rožnov pod Radhoštěm, Elektronické součástky Ostrava and Polovodiče Praha. Main companies producing communication technology are TTC TESLA Telekomunikace, s.r.o. Praha, TESLA Karlín, Siemens Telekomunikace, and TESLA Hloubětín. The industry's competitiveness vis-à-vis multinational companies, especially in terms of prices, is rather low. The restructuring process in terms of production capacities and production programme has yet to continue.

Medical, precision and optical instruments, watches and clocks.[18] Accounting for 15% of the sector's sales, the industry is characterized by small series production, a wide assortment of products and a high R&D intensity. It has experienced a steady and stable increase in production and a high emergence of small new enterprises. Key products include electric and non-electric measuring instruments, regulation and automation devices and medical technology; selected products are competitive – mainly with the participation of a foreign partner. Foreign direct investment inflow however has been small. 'Industrial process control equipment' underwent a pronounced upward trend, based on modernization of existing technology and launching of new capacities. 'Watches and clocks' were squeezed out by cheaper and more efficient imports, especially from South-East Asia.[19]

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[17] For more details see Ministry of Industry and Trade (2000), p. 331.

[18] For more details see Ministry of Industry and Trade (2000), p. 347.

[19] Since 1997 classification in wholesale services in division 51 has been increasing and is hence another reason for the decline here.

Hungary

After the collapse of communism, the Hungarian electrical and optical equipment sector faced a severe crisis. This was due to the loss of CMEA export markets, the strong competition from competitive foreign firms leading to a shrinking of domestic sales, and a sharp decline of purchases from the military industry. The crisis was especially pronounced in 'medical, precision & optical instruments', formerly strongly oriented towards Eastern markets. However, since 1994 the sector has experienced vigorous growth based on foreign direct investment and the strong export performance of foreign investment companies. Foreign investors are attracted by the highly skilled Hungarian labour force and concentrate in the following areas, which have become the new growth segments of Hungarian manufacturing: components for telecommunication products, consumer electronics, computers and peripherals, and electronic components for the automotive industry. The boom in the electrical and optical equipment sector is continuing: in the first quarter of 2001 high growth rates were achieved again, more and more foreign investors also establish research and development centres in Hungary (e.g. Nokia, Ericsson, General Electric). Recently a new major project has been announced by Flextronics: in July 2001 this company will commence with the production of Micorsoft's game console Xbox. Flextronics, the Number Two electronic contract manufacturer worldwide (outsourcing from Microsoft, Ericsson, Philips etc.), already produces and develops electronic articles in five Hungarian plants and now intends to manufacture one third of the total world production of the Xbox game console, which amounts to six to ten million pieces per year. The project will be one of largest investments made since the start of the transition to a market economy.[20]

In the structure of the Hungarian electrical and optical equipment sector today, both 'radio, TV and communication equipment and apparatus' and 'office machinery and computers' held about 36% of the sector's output in 1999, followed by 'electrical machinery and apparatus' with 24% and 'medical, precision & optical instruments' with only 4% (see Table 23). The largest sub-branches were 'computing machinery' (35%), 'television & radio receivers, sound or video recording' (22%) and 'electronic valves and tubes and other electric components' (11%). Somewhat smaller sub-branches were 'electric equipment n.e.c.' (9%) and 'electric lamps and lighting equipment' (8%). Growth was extremely vigorous in the first three largest segments, as well as in electrical machinery for the automotive industry (included in 31.6). In all sub-branches foreign direct investment, targeting at exports, played a decisive role. The export ratio in 'computing machinery' is close to 100%, in 'television & radio receivers, sound or video recording' and 'electronic valves and tubes and other electric components' exports account for more than 90% of total sales and in 'electric lamps and lighting equipment' (89%) and 'electric equipment n.e.c.' (84%) the export ratio is also very high. Generally computers, audio and

[20] *Ost-West-Contact* (2001), No. 4/2001 and *New Europe* (2001), 29 April to 5 May.

Table 23

Hungary: Gross output, total sales and export sales in the electrical and optical equipment sector

Code[1)]		Gross output 1999 HUF mn	Gross output 1999 in %	Total sales 1999 HUF mn	Export sales 1999 HUF mn	Export sales/ Total sales 1999 in %	1999 level in % of 1993
30	**Office, accounting and computing machinery**	**661622**	**35.6**	**645498**	**633063**	**98.1**	**7527**
3001	Office and accounting machinery	3150	0.2	3153	1281	40.6	208
3002	Computing machinery	658472	35.4	642345	631782	98.4	9050
31	**Electrical machinery and apparatus and repair**	**451920**	**24.3**	**448944**	**352808**	**78.6**	**737**
311	Electric motors, generators and transformers	36442	2.0	38941	24382	62.6	388
312	Electricity distribution and control apparatus	48563	2.6	48276	30039	62.2	1153
313	Insulated wire and cable	37708	2.0	37743	24709	65.5	300
314	Accumulators, primary cells and primary batteries	8037	0.4	7917	1329	16.8	262
315	Electric lamps and lighting equipment	149581	8.0	144902	128935	89.0	628
316	Electric equipment n.e.c.	171588	9.2	171165	143414	83.8	2233
32	**Radio, TV & communication equipment and apparatus**	**666416**	**35.8**	**656120**	**550322**	**83.9**	**2068**
321	Electronic valves and tubes and other electronic components	198211	10.7	196805	179367	91.1	6028
322	Television & radio transmitters, apparatus for line telephony, line telegraphy	67671	3.6	67820	5819	8.6	396
323	Television & radio receivers, sound or video recording	400533	21.5	391495	365136	93.3	3381
33	**Medical, precision & optical instruments, watches and clocks**	**81114**	**4.4**	**81606**	**39485**	**48.4**	**366**
331	Medical & surgical equ. and orthopaedic appliances	26746	1.4	27168	13081	48.1	.
332	Instr. and appl. for measuring, testing, navig. except opt. instr.	36644	2.0	37138	16489	44.4	.
333	Industrial process control equipment	6252	0.3	6283.0	1758	28.0	.
334	Optical instruments and photographic equipment	11236	0.6	10780	8153	75.6	.
335	Watches and clocks	237	0.0	237	4	1.7	.
DL	**Electrical and optical equipment**	**1861073**	**100.0**	**1832169**	**1575677**	**86.0**	**1494**
D	**TOTAL MANUFACTURING**	**7886728**	**.**	**7852234**	**4478972**	**57.0**	**458**

Notes: Data of companies with 5 or more employees. - 1) TEAOR'98 (Standard Industrial Classification of All Economic Activities) was introduced on 1 January 1998.

Source: Yearbook of Industrial and Construction Statistics Hungary (2000).

video apparatus and electronic components are research-intensive industries but not qualified as 'quality-elastic'. They have now reached a stage of development at which production of standard products has been shifted to low-cost suppliers, as competition takes place on the basis of prices and globalization is high.[21] It seems that Hungary has become the production basis for these products, which are generally simple and labour-intensive.

At the end of 1999, there were about 2350 companies with legal entity active in the Hungarian electrical and optical equipment sector, representing 11% of all manufacturing corporations in Hungary. Of these, 72% had less than 10 employees, 24% employed between 10 and 249 persons, and 4% had more than 250 employees. In terms of legal form, 94% of all active corporations were private limited companies, only 4% were public limited companies. At the level of industries, 36% of active companies were operating in 'medical, precision & optical instruments', 31% in 'electrical machinery and apparatus', 25% in 'radio, TV and communication equipment and apparatus' and 8% in 'office machinery and computers'. The largest companies of the sector are listed in Table 24.

Table 24

The largest companies of the Hungarian electrical and optical equipment sector, ranked by 1999 net sales

Name	Net sales in mn HUF	Net sales in mn EUR[1)]	Employees	Export Share	Main activity
IBM Storage Products Kft.	529,274	2,094	1,610	100	Disk drivers
Philips Group	391,422	1,548	9,500	90	Monitors, vidos[2)]
GE Lighting Tungsram Rt.	122,694	485	10,898	96	Lightbulb production
Flextronics International Kft.	110,632	438	2,946	81	HP printers, others
Siemens Nemzeti Vállalat	69,167	274	1,478	4	Teleph. exchanges
Visteon Hungary Kft.	64,499	255	1,232	63	Automotive parts
Nokia Monitor Magyarország Kft.	52,019	206	1,276	100	Monitors
Samsung Elektronics Magyar Rt.	52,011	208	531	83	TV sets
Videoton Holding Rt.	45,422	180	15,999	45	Electronics
Ericsson Magyarország Rt.	35,848	142	564	12	Teleph. exchanges

Notes: 1) Preliminary average exchange rate Hungarian forint HUF/EUR 252.80. - 2) Combi-videos, spare parts.
Source: Figyelö TOP 200 (2000), October.

Office machinery and computers.[22] Accounting for about 36% of the Hungarian electrical and optical equipment sector in 1999, this industry consists almost entirely of computing machinery (30.02) today. Formerly handicapped by import restrictions due to the COCOM but also enjoying high profits out of it, the industry has revived after the closing-down of former companies since 1989 and is today the major growth segment of the Hungarian

[21] European Commission (2000b), p. 74.

[22] For more details see Hungarian Ministry of Economic Affairs (2000c).

electrical and optical equipment sector. The backbone of industry is made up of foreign investors, such as IBM (disk drivers), Philips (PC monitors), and Nokia (PC monitors). Domestic Hungarian companies mostly assemble imported modules, e.g. Albacomp.

Electrical machinery and apparatus. A special role in this industry takes the production of 'electric parts for vehicles' (31.61). It accounted for 8% of the production of the electrical and optical equipment sector in 1999 or 85% of 'electric equipment n.e.c.' (36.1). In the 1990s, 'electric parts for vehicles' experienced fast growth due to the rapid development of the Hungarian automotive industry, based on the arrival of multinational car companies and their automotive part suppliers. These companies featured a strong export performance but also large import needs. A two-tier system emerged, with companies under foreign control enjoying a rich supply of capital and producing high-quality products on the one hand and traditional manufacturers facing financial limitations and hence concentrating on low-quality products on the other hand. In addition, local sourcing of foreign car manufacturers is still relatively small.[23]

– General Electric Lighting Tungsram: The Hungarian lightbulb manufacturer Tungsram was established in 1896. It represented a special case in communist Hungary as it exported 80% of its production to Western Europe thus earning hard currency in return. In 1989, General Electric took over the highly indebted, nearly bankrupt company[24]; it invested about USD 850 million between 1989 and 1999. Initially production fell due to the elimination of the machine manufacturing business and the loss of CMEA markets, but after 1992 it rose sharply. GE then transferred production from Britain to Hungary and Tungsram became GE's main European base for lightbulb production. It is also the American company's centre for development in this branch and an integral part of its multinational structure. GE Lighting Tungram is a major exporting company and user of local supplies.[25]

Radio, television and communication equipment.[26] Also termed communication engineering, this industry holds about 36% of the Hungarian electrical and optical equipment sector today. Major sub-branches and growth segments are electronic components and consumer goods (TV sets, car audio and video devices, see Table 25). After the collapse of communism, the industry slid into a severe crisis and was significantly rearranged in the early 1990s: some areas of production discontinued or were substantially reduced (e.g. military telecommunications equipment). From 1993 growth resumed in the industry, benefiting from a favourable change in demand (households and companies), successful adjustment of companies to the new circumstances, and the important role of

[23] For more details see Hungarian Ministry of Economic Affairs (2000a).

[24] In 1989 General Electric acquired 50% plus one share in the company, five years later it gained full control.

[25] Ballai, J. et al. (1997), p. 18 and *Business Central Europe* (1998), April, p. 44.

[26] For more details see Hungarian Ministry of Economic Affairs (2000b).

foreign capital. Important investors and major companies in the market include Samsung, Philips, Ericsson, Nokia, Siemens, Sony, TDK, Matsushita-Bosch etc. (see list of largest companies above).

Table 25

Hungary: Selected products of the 'radio, television and communication equipment' industry

			1996	1997	1998	1999
321010	Capacitors	pieces	26506	24899	21325	26628
321020	Resistors (excl. electric heating resistors)	pieces	14229	13228	18652	15617
321030	Printed circuits	pieces	13892	16461	36357	12375
32202020	Telephone sets, videophones	pieces	226994	285094	174312	166679
32202040	Switching apparatus for telex and telephone	pieces	1285	1016	1002	1455
		1000 lines	638	678	528	452
323010	Radio receivers	pieces	310093	528086	2328360	2700433
323020	TV sets (incl. video recorders and video players)	pieces	706586	963390	1702957	2520987

Note: From 1998 the observation of contract work and the scope of data suppliers changed.

Source: Yearbook of Industrial and Construction Statistics Hungary (2000).

– Videoton: Founded in 1938, the Hungarian company engaged in three fields: military equipment, consumer electronics and computer technology. Each field employed about 6000 persons, with the military pillar accounting for slightly higher sales and higher profits by far than the other two divisions. Under communism, about half of sales were exported to the Soviet Union and right up to 1989 Videoton was a major supplier of defence electronics to the CMEA countries. After the collapse of communism and the loss of East European markets, the company faced a severe crisis and production virtually stopped. After ownership was changed in 1991/1992, Videoton was transformed into a conglomerate of more than 20 independent limited liability companies, and an industrial park was created on the premises of the company, which commissioned manufacturing for foreign companies. Hence, a number of foreign investors, including Philips, Nokia, IBM, Ford and Siemens and one of the biggest Hungarian computer manufacturer (Albacomp), established manufacturing capacities within this industrial park.[27] Thus, Vidoeton made a successful turn towards becoming a sub-contractor. However, as wages are rising the company faces leaner times. In order to contain labour costs and to outsource the more labour-intensive stages of production, Videoton bought the Bulgarian electronics-maker DZU in 1999.[28]

[27] Penyigey, K. and Török, A. (1997), p. 24

[28] *Business Central Europe* (2000), February, p. 23 and *Business Central Europe* (2001), May, p. 28.

Poland

In 1999, there were about 530 companies with more than 50 employees in the Polish electrical and optical equipment sector, accounting for 6% of total manufacturing enterprises (with more than 50 employees). Looking at the sold production of these companies, the sector was dominated by 'electrical machinery and apparatus n.e.c.' (50%), followed by 'radio, TV & communication equipment' (33%). 'Medical, precision and optical instruments' ranked third with 13%, 'office machinery and computers' accounted for only 4% of the total sector's sold production. The sub-branches of 'insulated wire and cable', 'electrical equipment n.e.c.', 'TV & radio transmitters' and 'TV & radio receivers' played an important overall role and dominated their industries as well (see Table 26). Between 1994 and 1999, growth was most vigorous in 'radio, TV & communication equipment' (32) especially in 'TV & radio transmitters' (32.2). Other sub-branches with high growth included 'instruments and apparatus for measuring, testing, navigating', 'TV & radio receivers', 'electrical equipment n.e.c.' and 'lighting equipment and electric lamps'.

Table 26

Poland: Sold production of the electrical and optical equipment sector[1)]

PLN million, distribution in %

		1994	1996	1999	1999	1999 level
		PLN million			in %	in % of 1994
30	**Office machinery and computers**	**55**	**.**	**865**	**4.1**	**1580.4**
31	**Electrical machinery and apparatus n.e.c.**	**3309**	**6264**	**10528**	**50.1**	**318.2**
311	Electric motors, generators and transformers	541	972	1126	5.4	208.1
312	Electricity distribution and control apparatus	577	975	1550	7.4	268.6
313	Insulated wire and cable	1023	1971	2970	14.1	290.4
314	Accumulators, primary cells and primary batteries	205	315	623	3.0	303.8
315	Lighting equipment and electric lamps	423	1002	1711	8.1	404.9
316	Electrical equipment n.e.c.	540	1030	2548	12.1	471.9
32	**Radio, TV & communication equipment and apparatus**	**1620**	**3378**	**6953**	**33.1**	**429.3**
321	Electronic valves and tubes and other electronic components	197	286	375	1.8	190.0
322	Television & radio transmitters, apparatus for line telephony, line telegraphy	466	1280	2573	12.2	552.6
323	Television & radio receivers, sound or video recording	957	1812	4005	19.0	418.6
33	**Medical, precision & optical instruments, watches and clocks**	**801**	**1679**	**2684**	**12.8**	**335.1**
331	Medical & surgical equ. and orthopaedic appliances	173	268	456	2.2	263.2
332	Instr. and appl. for measuring, testing, navig. except opt. instr.	332	900	1531	7.3	461.4
333	Industrial process control equipment	247	452	618	2.9	250.3
DL	**Electrical and optical equipment**	**5784**	**11321**	**21029**	**100.0**	**363.6**

Notes: 1) Companies with more than 50 employees.

Source: Polish Statistical Yearbook, Polish Industrial Yearbook, various issues.

Table 27

Poland: Net profitability in the enterprise[1] sector and real growth rates of investment outlays

in %

		Net profitability[2]				Investment growth			
		1997	1998	1999	2000	1997	1998	1999	2000
31	Electrical machinery and apparatus	5.2	5.0	2.3	2.1	43.6	8.7	27.4	3.6
32	Radio, TV & communication equ. and apparatus	4.5	1.5	2.9	1.3	34.2	48.1	-8.2	8.7
33	Medical, precision & optical instr., watches and clocks	4.6	3.2	2.5	-0.2	59.3	8.6	6.6	3.8
D	Total manufacturing	2.3	1.2	0.1	0.7	38.2	30.9	1.2	-4.1

Note: 1) Firms with 50 or more employees. - 2) Ratio of net profits to all revenue.

Source: Podkaminer, L. (1998) and Central Statistical Office (1998, 1999, 2000, 2001).

Table 28

The largest companies of the Polish electrical and optical equipment sector, ranked by 2000 revenues

NACE Code[1]	Name, Location	Revenues[2] PLN mn	Revenues EUR mn[3]	Employees	Share of exports[4]	Gross profit, in %	Owner-ship[5]
3230	Thomson Polkolor, Piaseczno	2235	557	5,520	66	-1.76	E, A
3230	Philips CEI Poland, Kwidzyn	1897	473	2,053	91	2.49	E, D
3130	Elektrim Kable SA, Warszawa	1785	445	.	.	-1.45	D, A
3150	Philips Lighting PL SA, Pila	1366	341	.	.	4.62	E, D
3220	ZWUT SA, Warszawa	1352	337	800	0.29	4.69	E, D
3220	Lucent Technologies PL, Bydgoszcz	1049	262	.	.	.	E
3150	Duo SA, Szczecin	1045	261	137	.	0.62	D
3320	Alcatel Polska SA, Warszawa	850	212	663	0.28	-3.81	E, A
3002	Optimus SA, Nowy Sacz	745	186	599	7	-0.65	D
3230	Panasonic Polska, Warszawa	729	182	97	0.02	0.23	E

Notes: 1) NACE Codes: 3002 Manufacture of computers and other information processing equipment; 3130 Manufacture of insulated wire and cable; 3150 Manufacture of lighting equipment and electric lamps; 3220 Manufacture of TV, radio transmitters and apparatus for line telephony and line telegraphy; 3230 Manufacture of TV and radio receivers, sound or video recording or reproducing apparatus and associated goods; 3320 Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment. - 2) Total revenues. - 3) Preliminary average exchange rate Polish zloty PLN/EUR 4.01. - 4) As per cent of revenues of main activity. - 5) Ownership defined as State treasury (A), State or state agency (B), communal ownership (C), private ownership (D), foreign ownership (E).

Source: *Rzeczpospolita* (2001).

In the electrical and optical equipment sector, the financial standing of companies is very good: net profitability of individual industries was above that of total manufacturing between 1997 and 2000 (except for 'medical, precision & optical instruments' in 2000) and usually highest for 'electrical machinery and apparatus'. Investment activity was quite strong too, but varied over time and different industries (see Table 27). Foreign investment does play an important role in the sector and contributes to the technological upgrading process. The largest foreign investors in the sector include Daewoo (Korea), ABB Ltd. (International), Philips (Netherlands), General Electric Corporation (USA), Alstom (France) and Thomson Multi Media (France), all among the 50 largest investors in Poland as of 31 December 2000.

Electrical machinery and apparatus.[29] This industry is the largest segment within the Polish electrical and optical equipment sector, accounting for 50% of total sales in 1999. Leading products of the industry include power and light cables, and electric motors and electrical transformers. A total of 6650 companies were operating in the sector in 1998,[30] of which only 1% was still in public ownership. Production is strongly dispersed – about 81% of these companies employ up to five persons, only 1.3% more than 250 (103 companies). The companies with more than 50 employees (270 in 1998) showed a very good financial standing in 1998: net profitability amounted to 5%. Within the sector, 'electrical equipment n.e.c.' and 'lighting equipment and electric lamps' showed the best ratios, 'electric motors, generators and transformers' the worst, assuming even a negative ratio then.

– Elektrim: Since the appointment of the new chief-executive Barbara Lundberg in February 1999, the former conglomerate Elektrim has turned into a telecom and power group. Focusing on telecom as a top priority activity, Elektrim followed an aggressive acquisition tour in this field (e.g. cable television operator Bresnan Poland). When Ms Lundberg took over, the group had more than 100 subsidiaries with a wide range of activities, from producing yoghurt to even building bridges. She defined telecom, power and cables as the core business then and planned the disposal of non-core divisions and companies, such as Elektrim-Motor, which held 50% of Polish motor production then, and Elektrim-Volt, which accounted for over 40% of the domestic electrical equipment market.[31,32] In the cables division, Bydgoska Fabryka Kabli (BFK, producer of high-quality cables) was renamed to Elektrim Polish Cables and then merged with the two cables subsidiaries Ozarow and Zalom in 1999. The new company held 52% of the Polish market then. At the beginning of 2001, Elektrim signed a letter of intent to sell its entire 70.5% stake in Elektrim Kable to the local Krakowska Fabryka Kabli.[33]

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[29] For detailed information see PAIZ (1999).

[30] Latest figures availalbe.

[31] ABN-AMRO (1999), May.

[32] See also *Business Central Europe* (1997), October, p. 32 for information on the former company structure.

[33] *Business Eastern Europe* (2001), 9 April.

Electronic industry (including 'office machinery and computers' and 'radio, television and communication equipment').[34] The Polish electronic industry is dominated by small companies employing five or less persons that account for roughly 95% of all enterprises. Large enterprises with more than 50 employees cover 5% of all firms but generate as much as 90% of total sales revenues. The number of total companies reached about 1900 in 1999, of which only 1% were still state-owned. Large companies are normally owned by foreign investors, while domestic companies lack access to the capital resources needed for exports or the expansion of production to survive on the domestic markets. Foreign investors in the industry include Alcatel, Lucent Technologies, Ericsson, Philips, Thompson and Daewoo, which have become the leading companies in the industry. Demand for the industry's products is rising both from households and companies, but is increasingly met by imports. In *consumer electronics* (TV sets, VCRs, radio sets, etc., sub-branch 'TV & radio receivers, sound or video recording' 32.3) TV sets form the largest group, with 45% of all sales, followed by audio equipment (40% of sales) and video equipment (15%). This sub-branch is dominated by imports: only imported audio- and video-equipment is available in Poland. About 60% of TV sets are produced domestically. Foreign companies have established assembly plants in Poland, the largest TV companies include Philips, Daewoo, Thomson and LG (see also List of largest Polish companies, Table 28).

– Optimus SA: Founded in 1990, Optimus SA is the largest Polish computer maker and listed on the Polish Stock Exchange. Because of strong competition and tight margins, it formerly moved into other fields, including the production of cash registers under licence of Asian brands[35], computer games and software translations. Today it is operating – apart from the hardware business – in systems integration and has built up a strong internet business arm. Optimus has a strong focus on the Polish internet with its internet portal Onet. In 2000, ITI Holdings, the third largest Polish media and internet group, announced to step in as majority shareholder with plans to restructure the company and spin off Optimus's internet assets into a separate company.[36] Optimus has always been quite successful in attracting strategic partners: In 1996 it signed a co-operation agreement with Philips Electronics (Netherlands) to distribute monitors. At the beginning of 1997 it formed a partnership with Microsoft (USA) to produce a joint-branded PC. In the same year it signed a deal with Microcom (USA) to distribute modems. At the beginning of 1998 Opitmus agreed to form a joint-venture with Lockheed Martin (USA) and later signed an agreement with Sequent Computers (USA).

[34] For detailed information see PAIZ (2000).

[35] Assembling cash registers is very lucrative, after a law passed in 1996 making computerized sales compulsory for large retailers.

[36] ABN-AMRO (2000), December.

Romania

Since the beginning of transition, the Romanian electrical and optical equipment sector has experienced large fluctuations in its industrial production structure, while the employment structure has been quite stable. In terms of production, 'electrical machinery & apparatus' was the largest industry in the sector in 1998, accounting for 58%. 'Radio, TV and communication equipment' held about 24%, 'office machinery and computers' and 'medical, precision & optical instruments' both around 10% (see Table 29). The widest fluctuations of production shares is observed for 'radio, TV and communication equipment', which was the largest industry with a share of more than 60% between 1993 and 1995, probably due to the upswing of TV sets production then. Pointing to little active restructuring, the employment structure has been very stable over time. In 1998 'electrical machinery & apparatus' accounted for 60%, 'medical, precision & optical instruments' for 20%, 'radio, TV and communication equipment' for 18% and 'office machinery and computers' for 2% of the sector's employment. Between 1994 and 1999, 'electrical machinery & apparatus' did relatively best within the sector, with the highest production increase and the lowest employment decline.

Table 29

Romania: Industrial production and employment in the electrical and optical equipment sector

		Industrial production			Employment		
		1994	1998	1998	1994	1998	1998
			SIT mn	in %	ths. persons		in %
30	Office machinery and computers	56	994	9.7	3	2	2.2
31	Electrical machinery & apparatus n.e.c.	779	5931	57.7	75	55	60.4
32	Radio, TV & communication equip. & apparatus	1431	2435	23.7	24	16	17.6
33	Medical, precision & optical instr., watches & clocks	135	925	9.0	26	18	19.8
DL	**Electrical and optical equipment**	**2400**	**10285**	**100.0**	**128**	**91**	**100.0**

Source: Statistical Yearbook Romania, various issues.

According to Mereuta (1999), only 'electrical machinery and apparatus' had a global comparative advantage in 1998, while the other three industries developed weakly due to the absence of a specific policy aimed at attracting foreign investors.[37] In 2001 still, the only sub-branch in the sector with modern technology was 'engines, electric generators and transformers'.[38]

Starting in 1999, after the liberalization of the market, many companies in the electronics industry went bankrupt as they were not able to compete with the large companies from

[37] Mereuta (1999).

[38] *Nino O'Clock* (2001), 15 May.

Europe and the US. In addition, there were huge imports of second-hand electronic products: out of 360,000 TV sets sold in 1999 200,000 were second-hand. Thus, the Association of Electronic and Electro-technical Industry (APREL) asked for an improvement of governmental programmes for the sector, for a reduction of customs taxes on electronic components, for limitations on second-hand imports and for export promotion and the creation of industrial parks in order to stimulate the sector.[39]

- Electroputere: Founded in 1949, Electroputere Craiova produces engines, generators and power transformers, power-driven equipment apparatus, railway vehicles and rolling stock parts and accessories for vehicles and engines. In 1999, it made a turnover of EUR 49 million, a gross profit of EUR 2.3 million and employed 5650 persons. About 40% of the turnover is exported to the US, France, Syria, Pakistan and Germany. Electroputere is a sub-contractor for General Electric and agreed also on a partnership with German AVK. In 2000, a restructuring programme included the lay-off of 300 employees. The company was also listed in the RICOP programme implying EU financial allocations for restructuring.[40] In 2001, the sale of a 62.5% stake held by the state attracted foreign interest from General Electric, General Motors (both US), Karsdorfer Eisenbahngesellschaft and Siemens (both Germany).[41]
- Electroaparataj: Founded more than 50 years ago, Electroaparataj is the main producer of electrotechnic equipment in Romania. Its main activities include industrial low-voltage equipment, household appliances, lighting fixtures, electric installation equipment, spare parts and car electric accessories. In 1999, the company made a turnover of EUR 17 million, a profit of EUR 2.2 million and employed 1700 persons. Electroaparataj is 100% in private ownership, of which about 75% are currently owned by financial funds. With the collapse of the CMEA it lost its main export market. Today Germany and France account for 80% of the company's exports.[42]

- ABB: In 1992, the Swiss-Swedish ABB started investing in Romania by establishing the joint venture Energoraparatii Romania SRL. Today, the group has three companies in the country, which will be comprised into a holding soon: ABB SRL, ABB Transformatoare SRL, a producer of transformers, and ABB Rometrics SRL for assembling electric power electronic meters and electric power metering and billing systems, which is the Number One for measuring instruments in Romania.[43]
- Lisa Draxlmaier: The German company is one of the largest sub-suppliers for the automotive industry and has 38 companies worldwide. In Romania, it employs about 6500 persons at four locations (Satu Mare, Timisoara, Pitesti and Codlea/Brasov) and

[39] *Romanian Economic Daily* (2000), 17 October.

[40] *Romanian Economic Daily* (2000), 28 March.

[41] *Business Eastern Europe* (2001), 18 June.

[42] *Romanian Economic Daily* (2000), 3 November.

[43] *Ost-West-Contact* (2001), No. 2001/4.

produces electrical wires. The company quoted cheap labour, the geographical location and skilled workforce as the major reasons for investing in Romania.[44] Lisa Draxlmaier exports 100% of its products and imports all material.[45]

– Manufacturers of telecoms equipment include Alcatel Network Systems Romania (digital exchanges, GSM equipment, 51% owned by Alcatel), Emcom (Siemens digital exchanges and PCM systems, 44% owned by EBRD, 36% by Siemens), Intrarom (digital switches, affiliate of Greece's Intracom), Electromagnetica (until the early 1990s the only electromechanical exchanges producer; a restructuring process is going on), ICME Ecab (cable manufacturer, acquired by the Greek company Hellenic Cables SA in September 1999) and Ericsson.[46]

Slovak Republic

After the collapse of communism, the Slovak electrical and optical equipment sector was hit hard, with output and employment declining significantly. An even larger decline was recorded only by the armaments industry, which had a negative influence on the electrotechnical sector in turn.[47] The slump was also due to increased competition from foreign producers and the lack of modern technology in domestic companies. In addition, high indebtedness of companies and bad payment discipline of customers led to the liquidation of a quarter of companies.[48] Large companies were split up and small new companies emerged. For instance, Tesla, a flagship electronics firm during communism, burst apart into a myriad of companies at the start of the decade, which were then prime acquisition and joint venture targets. The inflow of foreign investors included Siemens, Sony, Alcatel, SEL, Motorola, Bull, ABB, Osram, etc., which contributed to the growth of the sector after 1995.

Privatization of the Slovak electrical and optical equipment sector started in 1995. At the end of 2000, only 1% of the sector's companies was still in public ownership, 99% in private ownership. About 940 companies were operating in the sector then, representing 10% of all manufacturing companies. Of these, 9.7% were under total foreign ownership (above-manufacturing-average), another 9.7% in mixed ownership (domestic and foreign; around manufacturing average). In the size structure, small companies with less than 20 employees dominated, accounting for 80% of all companies and contributing 23% of production. (The share of small enterprises, <20, in total manufacturing production was

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44 *Ost-West-Contact* (2001), No. 2001/4.

45 *Bucharest Business Week Online* (2001), 5 February.

46 *Romanian Economic Daily* (2000), 14 November.

47 According to Fath (1993), about two thirds of the defence industry was located in Slovakia in the former CSFR, according to Žilínková and Blaskova (1999) about 80%.

48 SNAZIR a.s. (1997), p. 32.

15%.) About 15% of companies had between 20 and 249 employees, 5% had more than 250 employees. Foreign investment did not play a major role in manufacturing but was nevertheless of some importance: in the stock of foreign direct investment as of end-1999, the electrical and optical equipment sector accounted for 6% in total manufacturing (USD 63.2 million).

In the employment structure of companies with more than 20 employees, 'electrical machinery and apparatus' was the largest industry (56%) in 1998, followed by 'radio, TV and communication equipment and apparatus' (21%) and 'medical, precision & optical instruments' (20%). 'Office machinery and computers' accounted for only 3% of the sector's employees. The largest sub-branch was 'electrical equipment n.e.c.' with 25% (electric parts for the automotive industry).[49]

Between 1996 and 1999, the electrical and optical equipment sector registered a loss before taxation (1999: EUR 19 million). 'Office machinery and computers' and 'electrical machinery and apparatus' had a profit in that year, 'radio, TV and communication equipment and apparatus' and especially 'medical, precision & optical instruments' a loss.

Table 30

The largest companies of the Slovak electrical equipment industry, ranked by 2000 net revenues

Name, location	Net revenues in SKK mn	Net revenues in EUR mn[1)]	Employees	Export share	Main activity
BSH Drives and Pumps, s.r.o., Michalovce[3)]	3,510	82	960	98	Power supplies for househ. appliances
Sony Slovakia, s.r.o., Trnava	3,429	81	891	96	TV components, TV sets
VW Elektrické systémy, s.r.o., Nitra[3)]	3,057	72	2,797	100	Cable harnesses
Kablo, s.r.o, Bratislava	2,187	51	363[2)]	72[2)]	Electric cables
Alcatel Slovakia, a.s., Liptovský Hrádok	1,803	42	620	51	Switching, transm. telecom. systems
Leoni Autokabel Slowakia s.r.o., Trenčín	1,589	37	1,018	100	Cables, wires
Leoni Slowakia, s.r.o., Nová Dubnica	1,521	36	815	97	Plugs
EZ Elektrosystémy, a.s., Bratislava	1,335	31	1,015	1[2)]	Electronics, regulation measurm.
Osram Slovakia, a.s., Nové Zámky[3)]	1,259	30	1,471	90	Car light bulbs
OVP Orava, s.r.o., Trstená	1,002	24	350	23	TV sets

Notes: 1) Average exchange rate SKK/EUR 42.59. - 2) 1999. - 3) Belonging to the Siemens Group.
Source: *Trend Top 200* (2001), 13 June.

– Siemens: The German company has been very active in Slovakia, buying out struggling companies and reviving them. As a result, about 7000 persons are employed by the Siemens Group now, which produces a wide range of products from motors for

[49] UNIDO (2001).

washing machines to wire and cable harnesses. The group has controlling stakes in the following companies: Siemens s.r.o., Siemens Automotive Michalovce, BSH Drives and Pumps Michalovce, VW Electrické Systémy Nitra, Osram Nové Zámky, SWH Siemens Business Services Bratislava, Siemens Building Technologies Slovenso Divízia Cerberus Bratislava, Landis & Staefa Division Bratislava, SIPRIN Bratislava and Reaktortest Trnava.[50] Electric parts for the automotive industry (cable harnesses) are produced by Siemens Automotive Michalovce[51] and VW Electrické Systémy Nitra.

Generally, foreign investors have so far allocated activities predominantly in the western part of the country with its better-developed infrastructure; problems arise in the eastern regions Presov and Kosice. To fight this trend and to attract more FDI, the parliament approved the Act on Support of Industrial Parks Establishment, which took effect on 1 June 2001. The law allows municipalities to ask the government to cover up to 70% of costs needed to set up an industrial park. The state will cover costs for building infrastructure (access roads, water, electricity and gas supplies) and the purchase and renting of land. The Slovak government has reserved SKK 500 million (over USD 10 million) for the support of industrial parks this year. The law should promote poor regions with a high unemployment rate. Furthermore, those municipalities that have already launched such a park or are in the process of doing so, or have already a potential investor, are to be favoured.

Slovenia

In the structure of the Slovenian electrical and optical equipment sector, 'electrical machinery and apparatus n.e.c.' was the largest segment in 2000, accounting for 45% of the sector's total revenues then. 'Radio, TV & communication equipment and apparatus' and 'medical, precision & optical instruments' followed with 25% and 21% respectively, while 'office machinery and computers' was rather small and held only a 9% share (see Table 31). In terms of employment, the size distribution was rather similar to that of total revenues for the first two largest industries; 'medical, precision & optical instruments' held a larger share (26%), 'office machinery and computers' a smaller one (4%) than in total revenues. Between 1995 and 2000, 'office machinery and computers' as well as 'radio, TV & communication equipment and apparatus' were growth segments, while the sub-branches of electronic components and medical equipment experienced a crisis.

[50] Internet-Homepage www.slovensko.com/investor/german.htm.

[51] In 1999, the fourth largest electrical equipment company with net revenues of EUR 46 million and 1155 employees.

Table 31

Slovenia: Total revenues and employment in the electrical and optical equipment sector

		Total revenues			Employment		
		1995	2000	2000	1995	2000	2000
		SIT mn		in %	persons		in %
30	Office machinery and computers	14622	30939	9.1	761	986	3.8
31	Electrical machinery & apparatus n.e.c.	81450	152782	45.1	13720	11923	45.8
32	Radio, TV & communication equip. & apparatus	35232	85073	25.1	5492	6337	24.3
33	Medical, precision & optical instr., watches & clocks	38695	69655	20.6	6574	6812	26.1
DL	**Electrical and optical equipment**	**169999**	**338449**	**100.0**	**26547**	**26058**	**100.0**

Source: APP Agency for Payments of the Republic Slovenia.

In 2000, there were about 750 companies operating in the Slovenian electrical and optical equipment sector, generating a net profit of EUR 68 million. In 1996, the sector had still recorded a loss. The largest number of companies, and the highest net profits, were observed in 'electrical machinery and apparatus n.e.c.', followed by 'medical, precision & optical instruments', 'radio, TV & communication equipment and apparatus' and 'office machinery and computers'.

Table 32

The largest companies of the Slovenian electrical and optical equipment sector, ranked by 1999 income

Name, location	Total income in SIT mn	Total income in EUR mn[1)]	Employees	Export share	Main activity[2)]
Iskratel, d.o.o., Kranj	30,824	159	1,038	60-80	32.2
Iskraemeco, d.d., Kranj	17,720	90	2,061	80+	33.2
Iskra Avtoelektrika, d.d., Šempeter	13,882	71	1,407	80+	31.61
Kolektor, d.o.o., Idrija	13,830	71	834	80+	31.10
Rotomatika, d.o.o., Spodnja Idrija	.	.	706	80+	31.10
Domel, d.d. Železniki	9,568	49	789	.	Electric motors
Elektronika, d.d., Velenje	8,941	46	488	80+	32.30
ETI Elektroelement, d.d., Izlake	7,497	39	987	.	Fuses, circuit brakers, safety switches
Saturnus Avtooprmea, d.o.o., Ljubljana	7,020	36	609	80+	31.61
Iskra Kondenzatorji, d.d., Semič	5,132	26	1,214	80+	32.10
Iskra Ero, d.o.o., Kranj	4,086	21	242	80+	31

Notes: 1) Converted with average exchange rate SIT/EUR 193.63. - 2) 32.2. Manufacture of TV, radio transmitters, apparatus for line telephony; 33.2 Manufacture of instruments & appliances for measuring, etc.; 31.61 Manufacture of electrical equipment for engines and vehicles n.e..c.; 31.10 Manufacture of electric motors, generators and transformers; 32.30 Manufacture of TV & radio receivers, sound or video recording apparatus; 32.10 Manufacture of electronic valves, tubes and other electronic components; 31 Manufacture of electrical machinery and apparatus n.e.c.

Source: *Slovenian Business Report* (2000), Fall; SLO Export Internet-Homepage www.gzs.si/sloexporta/default.htm.

- Iskratel: Iskratel is the largest switchboard manufacturer in Slovenia. In 1989 Iskratel formed a joint venture with German Siemens, the initial investment was made mostly in the form of technology transfer. Now Siemens holds 47.7% of equity. The original impetus for Siemsens' investing in Iskratel had been better access to the Yugoslav market – which became obsolete with that country's disintegration – and to the Russian market. The Russian crisis led to some difficulties and to the penetration of new markets. In 2000 a reorganization of the company began and a new affiliate called Iskratel Electronics was founded.[52, 53]
- Iskraemeco: This company is one of the most successful and important Slovenian energy measuring equipment producers. It is the third largest manufacturer of electricity meters in Europe and the fifth largest in the world. In 1999, it had a total income of EUR 90 million, being the 45th largest Slovenian company as ranked by income. With a net profit of EUR 2.4 million, it is 62nd by profit ranking, while with 2000 employees it is the 15th largest employer. In 1999 it was the 14th biggest exporter in Slovenia, with sales reaching EUR 81 million and Germany being the most important market where it was confronted with falling prices. In 2000, the company managed to enter three new markets, Libya, Estonia and Pakistan. Iskraemeco also has several subsidiaries abroad.
- Elektronika Velenje: The company is involved in the development, production and marketing of TV sets. It was established in April 1993 after the bankruptcy of Gorenje Elektronika, following the loss of the former Yugoslav market which had accounted for 95% of all sales. With the help of the Development Fund, financial restructuring and privatization took place in 1995. Sales yet decreased in that year. Elektonika Velenje is mostly export-oriented with 80% of its products distributed Europe-wide. The most important customer in Germany and Austria is Quelle, which resells the sets under its own brand name. Inputs are mostly imported (80% and more) and came formerly from Nokia, then from Thomson, Panasonic and Tesco.
- Fotona: In the 1960s, Fotona started as a laboratory of technical optics at the Iskra research institute. It was partly privatized in 1990 as Iskra Elektrooptika. Because of its heavy orientation towards defence the company faced a severe crisis after the break-up of Yugoslavia, particularly when UN sanctions, including an embargo on weapons and military equipment, were imposed on former Yugoslavia in 1991. In 1994, Fotona was created and a major reorganization of manufacturing divisions took place. It now

[52] See also the Iskratel Internet Homepate ww.iskratel.si.

[53] Historical background information based on Lorentzen et al. (1997), p. 17 and Polenec and Tepina (1997): Iskratel produced two kinds of switching devices for telecommunication systems: One under the licence of Siemens, the other as an entirely own development. In the case of the Siemens switching device, the German mother company supplied 90% of all inputs. Siemens charged its subsidiaries different input prices, which made inputs more expensive for the Slovenian firm (e.g. in comparison to the Czech subsidiary). Two thirds of Iskratel's sales were realized outside Slovenia: 81% were going to Russia, Ukraine and Belarus, the rest to Germany (buy-back arrangements), Turkey, Israel and Macedonia. Iskratel did not export to the European Union or the CEFTA countries because it could not compete with large multinational companies such as AT&T, Ericsson, Siemens and Alcatel. Despite free market declarations, domestic telecommunication equipment producers were protected in most countries in one way or another. However, on the Slovenian market, Iskratel enjoyed a privileged position.

produces electroptics, again mainly for the army, lasers for medical and industrial purposes, and optical communications equipment such as optical fibres and cables. In 1998, Fotona was included in the government restructuring programme, the second stage of which it concluded in 2000 by getting fresh capital (the state owns 49% of the company now). The company wants both to preserve the military programme (products mainly exported to Sweden and Norway) and to expand the civil line (optical communications mainly sold to Russia and Ukraine).[54]

[54] *Slovenian Business Week* (2000), 25 April.

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APPENDIX OF TABLES AND FIGURES

Table A1

Key data on total manufacturing

		1989	1992	1993	1997	1998	1999	Average annual growth in % 1993-1999	Average annual growth in % 1995-1999
BULGARIA									
Industrial production (at current prices)	in BGN mn	59320	177335	201870	13510638	13501353	12529000	.	
Industrial growth (at constant prices)	in %	.	-17.2	-12.7	-12.0	-12.0	-9.2	.	
Employment	in 1000	1420	883	767	720	690	616	.	
Employment growth	in %	.	-16.3	-13.2	-2.7	-4.2	-10.7	.	
Wage growth (ECU basis)	in %	.	46.0	44.5	-1.6	25.9	5.0	.	
Productivity growth	in %	.	-1.0	0.6	-9.5	-8.1	1.7	.	
ULC growth (ECU basis)	in %	.	-86.1	47.5	-17.4	8.7	37.0	.	
Total exports to EU	in ECU mn	445	809	855	1940	2095	2099	13.8 EU(12)	25.0 EU(15)
Total imports from EU	in ECU mn	1275	1029	1240	1674	2225	2480	11.5 EU(12)	31.1 EU(15)
Trade balance with EU	in ECU mn	-830	-220	-385	266	-130	-381	.	.
Exports to the EU: Market shares	in %	0.13	0.21	0.23	0.37	0.36	0.33	.	.
CZECH REPUBLIC									
Industrial production (at current prices)	in CZK mn	558351	652893	655289	1330877	1442259	1438096	.	
Industrial growth (at constant prices)	in %	.	-8.0	-8.4	7.6	4.4	-1.5	2.6	
Employment	in 1000	1658	1181	1098	1173	1143	1078	.	
Employment growth	in %	.	-13.2	-7.0	-2.6	-2.6	-5.7	-3.8	
Wage growth (ECU basis)	in %	.	20.0	33.7	8.1	9.3	4.5	11.2	
Productivity growth	in %	.	6.0	-1.5	10.4	7.1	4.5	D	
ULC growth (ECU basis)	in %	.	13.2	35.7	-2.0	2.0	0.0	8.0	
Total exports to EU	in ECU mn	.	.	4460	10989	13899	16023	21.2 [1)]	92.6
Total imports from EU	in ECU mn	.	.	5612	14617	15854	17177	17.8 [1)]	58.4
Trade balance with EU	in ECU mn	.	.	-1152	-3628	-1955	-1154	.	.
Exports to the EU: Market shares	in %	.	.	1.18	2.11	2.42	2.54	.	.
HUNGARY									
Industrial production (at current prices)	in HUF mn	1461100	1497321	1721479	5197367	6615642	7886728	.	
Industrial growth (at constant prices)	in %	.	-17.5	3.0	15.9	17.4	18.6	0.0	
Employment	in 1000	1171	857	747	637	659	743	.	
Employment growth	in %	.	-14.5	-12.9	0.7	3.4	1.2	-3.5	
Wage growth (ECU basis)	in %	.	14.5	18.4	10.8	2.3	10.4	6.2	
Productivity growth	in %	.	-3.5	18.2	15.2	13.6	17.2	14.4	
ULC growth (ECU basis)	in %	.	18.6	0.2	-3.8	-9.9	-5.8	-7.1	
Total exports to EU	in ECU mn	2245	3620	3616	11007	13791	16710	21.5	135.7
Total imports from EU	in ECU mn	2713	3785	4621	11819	14317	16022	19.1	95.6
Trade balance with EU	in ECU mn	-468	-165	-1004	-812	-527	688	.	.
Exports to the EU: Market shares	in %	0.67	0.96	0.96	2.11	2.40	2.65	.	.
POLAND									
Industrial production (at current prices)	in PLN mn	.	78975	104441	299825	334887	367025	.	
Industrial growth (at constant prices)	in %	.	4.9	10.2	13.3	5.3	5.6	10.7	
Employment	in 1000	3326	2767	2700	2821	2801	2611	.	
Employment growth	in %	.	-13.1	-2.4	0.7	-0.7	-6.8	-11.3	
Wage growth (ECU basis)	in %	.	2.6	13.8	11.1	8.5	3.8	16.7	
Productivity growth	in %	.	20.7	12.9	12.5	6.1	13.2	14.0	
ULC growth (ECU basis)	in %	.	-15.0	0.0	7.3	7.3	-1.3	0.0	
Total exports to EU	in ECU mn	2924	6070	6616	12772	14763	16239	13.9	49.1
Total imports from EU	in ECU mn	3308	7103	8785	22634	25527	26642	18.8	91.6
Trade balance with EU	in ECU mn	-384	-1033	-2169	-9863	-10764	-10403	.	.
Exports to the EU: Market shares	in %	0.87	1.61	1.75	2.45	2.57	2.57	.	.

Table A1 (continued)

Table A1 (continued)

		1989	1992	1993	1997	1998	1999	Average growth in % 1993-1999	
ROMANIA									
Industrial production (at current prices)	in ROL bn	.	5484	15302	171363	205445	341484	.	
Industrial growth (at constant prices)	in %	.	-23.1	-1.2	-6.6	-11.4	-14.5	-3.0	
Employment	in 1000	.	2811	2590	2032	1907	1684	.	
Employment growth	in %	.	-12.5	-7.9	-5.4	-6.2	-11.7	-9.8	
Wage growth (ECU basis)	in %	.	-37.0	35.5	-7.1	24.7	-9.9	8.5	
Productivity growth	in %	.	-18.8	-12.1	4.2	-1.2	-5.6	8.1	
ULC growth (ECU basis)	in %	.	-11.2	-28.3	1.5	-6.0	32.0	0.0	
Total exports to EU	in ECU mn	2502	1355	1625	4297	4991	5534	21.3	69.6
Total imports from EU	in ECU mn	603	1592	2003	4709	5956	5950	19.2	67.2
Trade balance with EU	in ECU mn	1898	-237	-378	-412	-965	-416	.	.
Exports to the EU: Market shares	in %	0.74	0.36	0.43	0.82	0.87	0.88	.	.
SLOVAK REPUBLIC									
Industrial production (at current prices)	in SKK mn	.	.	266525	419028	545700	708367	.	
Industrial growth (at constant prices)	in %	.	-15.7	-11.9	2.6	7.5	3.4	2.0	
Employment	in 1000	.	527	472	439	516	501	.	
Employment growth	in %	.	-12.6	-10.4	-3.6	-4.4	-2.9	-3.8	
Wage growth (ECU basis)	in %	.	11.3	23.6	13.0	3.9	-3.2	10.9	
Productivity growth	in %	.	-3.6	-1.6	6.5	11.1	6.5	13.7	
ULC growth (ECU basis)	in %	.	0.0	15.4	10.7	6.1	-6.5	4.8	
Total exports to EU	in ECU mn	.	.	1092	3846	5230	5797	28.7 [1)]	94.7
Total imports from EU	in ECU mn	.	.	1089	4446	5347	5217	26.1 [1)]	74.0
Trade balance with EU	in ECU mn	.	.	3	-601	-117	581	.	.
Exports to the EU: Market shares	in %	.	.	0.28	0.74	0.91	0.92	.	.
SLOVENIA									
Industrial production (at current prices)	in SIT mn	.	809602	998161	1868671	2077927	.	.	
Industrial growth (at constant prices)	in %	.	-13.9	-4.0	-2.6	4.5	0.2	0.9	
Employment	in 1000	370	282	257	229	227	224	.	
Employment growth	in %	-1.4	-10.1	-9.0	-3.2	-0.8	-1.4	-4.7	
Wage growth (ECU basis)	in %	.	-4.8	14.6	5.3	7.5	5.0	8.8	
Productivity growth	in %	.	-4.2	5.5	0.7	5.3	1.6	6.0	
ULC growth (ECU basis)	in %	.	-0.6	8.6	4.6	2.1	3.3	3.3	
Total exports to EU	in ECU mn	.	1549	2798	4596	5132	5222	16.0	24.8
Total imports from EU	in ECU mn	.	1323	2902	5922	6318	6499	22.1	32.6
Trade balance with EU	in ECU mn	.	226	-104	-1326	-1186	-1277	.	.
Exports to the EU: Market shares	in %	.	.	0.74	0.88	0.89	0.83	.	.

Notes: 1) 1994-1999.

EU: European Union (12), from 1997 European Union (15).

Bulgaria: 1989-1995: Total manufacturing excluding petroleum refineries.

Czech Republic: Up to 1996 enterprises with 100 employees or more, from 1997 enterprises with 20 employees or more.
Industrial production at constant prices: 1997 and 1998 industrial output index calculated from production statistics of businesses with 20 employees or more.

Hungary: Industrial production: Enterprises with more than 20, from 1996 enterprises with more than 10 employees, 1999 enterprises with more than 5 persons.
Employment and wages: Enterprises with more than 20 employees, 1999 enterprises with more than 5 persons.

Poland: Industrial production at current prices: From 1993 excluding VAT; including import duties; from 1996 basic prices, the years before producer prices. Average monthly gross wages: Enterprises with more than 5 employees.

Slovak Republic: Enterprises with 25 and more employees, 1997 enterprises with 20 and more employees, from 1998 all enterprises.

Slovenia: Employment in enterprises, companies and organizations: 1989-1996 private enterprises are included only if they have 3 or more persons in paid employment and armed forces staff, from 1997 all enterprises.
Wages in enterprises, companies and organizations.

Source: WIIW Industrial Database

Table A2

Electrical and optical equipment sector

Estimated ranges for Unit Labour Costs in 1999, Austria 1999 = 100[1)]

	Bulgaria	Czech Republic	Hungary	Poland	Romania	Slovak Republic	Slovenia
PPP for GDP (lower range)	26	27	10	34	15	40	92
PPP for fixed capital formation (upper range)	63	41	16	45	36	62	109

Notes: 1) Defined as wages in ECU divided by productivity (measured as output at constant prices 1996 converted with ECU-based purchasing power parities (PPPs) divided by employees); gross wages used for calculation.
Source: WIIW

Table A3

Exports of individual industries in total manufacturing exports to the EU(15), 1999, in %

		Bulgaria	**Czech Republic**	**Hungary**	**Poland**	**Romania**	**Slovak Republic**	**Slovenia**
D	Manufacturing total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DA	Food products; beverages and tobacco	8.4	1.3	4.3	5.8	1.3	0.8	1.5
DB	Textiles and textile products	30.4	7.3	7.6	13.9	40.0	9.0	9.9
DC	Leather and leather products	5.7	1.2	2.1	1.4	12.6	3.6	1.7
DD	Wood and wood products	2.6	3.2	1.3	5.8	3.6	2.4	4.5
DE	Pulp, paper & paper products; publishing and printing	1.1	2.6	1.0	2.6	0.3	2.6	3.9
DF	Coke, refined petroleum products & nuclear fuel [1)]	0.7	1.1	1.2	1.4	0.5	2.0	0.0
DG	Chemicals, chemical products & man-made fibres	7.4	4.6	3.6	4.8	2.6	4.9	4.8
DH	Rubber and plastic products	1.2	5.0	2.4	3.1	1.1	2.5	3.8
DI	Other non-metallic mineral products	2.4	4.5	1.3	3.0	2.1	2.9	3.1
DJ	Basic metals and fabricated metal products	24.4	13.6	5.8	14.3	12.0	11.8	12.9
DK	Machinery and equipment n.e.c.	7.3	13.0	6.5	6.4	5.7	9.0	14.6
DL	**Electrical and optical equipment**	**4.2**	**16.4**	**34.7**	**13.3**	**7.2**	**13.0**	**11.3**
DM	Transport equipment	2.2	20.8	26.0	14.1	4.0	33.1	18.9
DN	Manufacturing n.e.c.	2.2	5.4	2.3	10.1	6.9	2.5	9.2

Source : Eurostat, WIIW calculations

Table A4

Selected indicators: cellular subscribers and internet indicators

	Cellular moblie subscribers			Estimated PCs		Internet users
	in ths.	in ths.	per 100 inhabitants	in ths.	per 100 inhabitants	per 10,000 inhabitants
	1995	2000	**2000**	**2000**	**2000**	**2000**
Austria	383.5	6450.0	78.55	2270	27.65	2557.54
Germany	3725.0	48145.0	58.59	27640	33.64	2920.57
United States	33785.7	110040.5	40.00	161000	58.52	3465.78
Bulgaria	20.9	738.0	8.97	220 [1)]	2.66 [1)]	283.36 [1)]
Czech Republic	48.9	4321.1	42.18	1250	12.20	976.18
Hungary	265.0	3000.4	29.34	870	8.51	699.06
Poland	75.0	7030.0	18.13	2670	6.89	722.3
Romania	9.1	2499.0	11.19	600 [1)]	2.68 [1)]	267.84 [1)]
Slovak Republic	12.3	1293.0	23.92	590 [1)]	10.93 [1)]	1111.52 [1)]
Slovenia	27.3	1085.6	54.66	500 [1)]	25.14 [1)]	1257.02 [1)]

Notes: 1) 1999.
Source: International Telecommunication Union Internet-Homepage (www.itu.int/industryoverview/index.htm).

Table A5

Developments in GDP and gross industrial prduction

real change in % against preceding year

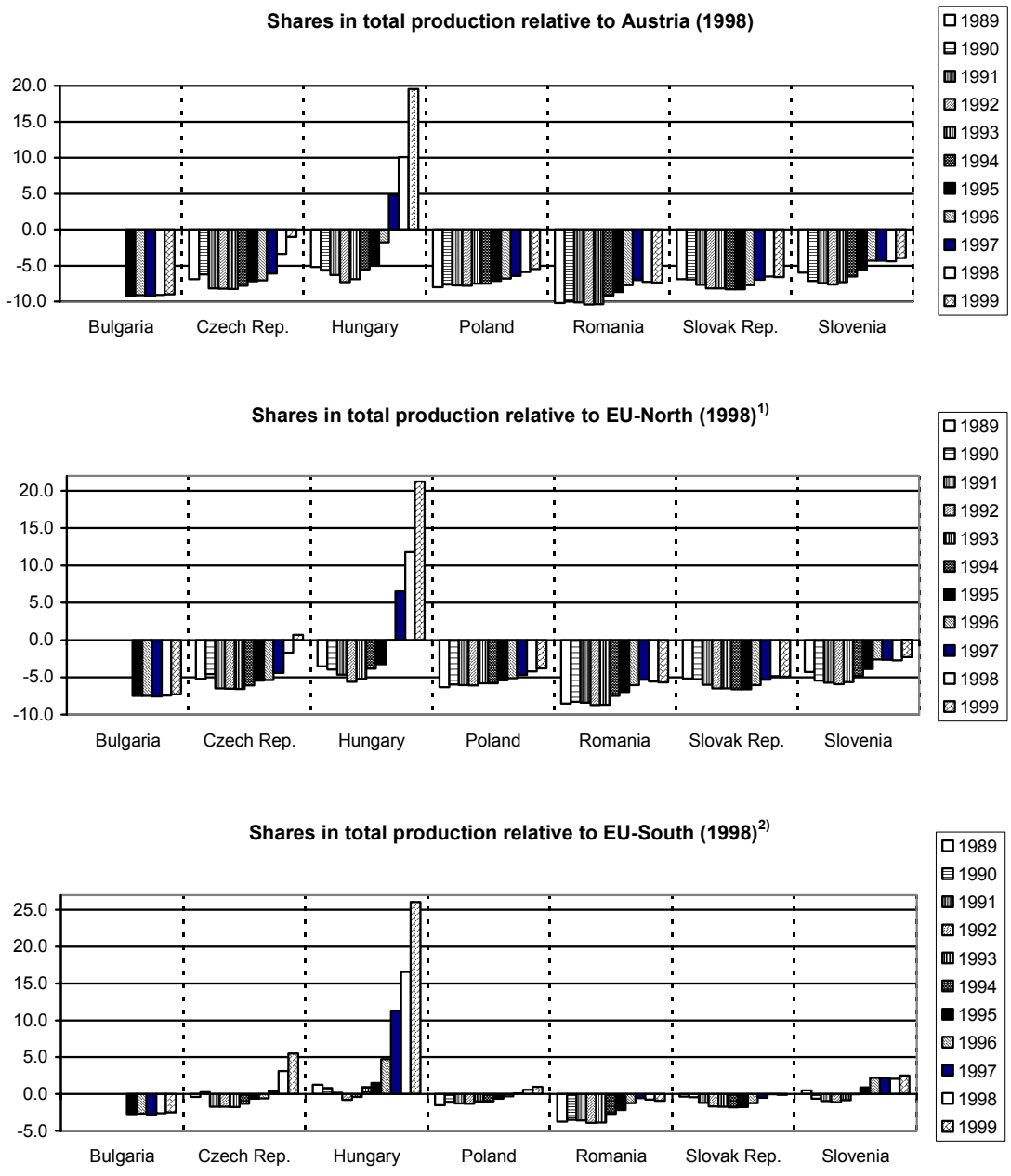
	Gross domestic product				Gross industrial production				
	1999	2000[1)]	2001	2002	1999	2000[1)]	2001	2002	2000
			forecast			forecast			1989=100
Czech Republic	-0.4	2.9	3.5	3.5	-3.1	5.7	6	6	81.3
Hungary	4.2	5.2	4.8	5	10.4	18.3	13	13	136.1
Poland	4.1	4.0	2	4	4.8	4.3	4	5	128.1
Slovak Republic	1.9	2.2	3	4	-3.6	9.1	7	7	89.0
Slovenia	5.2	4.6	4	4.5	-0.5	6.2	4	4	80.3
Bulgaria	2.4	5.8	4	4	-9.3	5.8	4	4	49.6
Romania	-3.2	1.6	4	2	-8.0	8.2	5	2	47.3

Notes: 1) Preliminary.
Source: WIIW (June 2001).

Figure A1

Electrical and optical equipment

Shares of CEECs (at constant prices 1996) relative to other countries



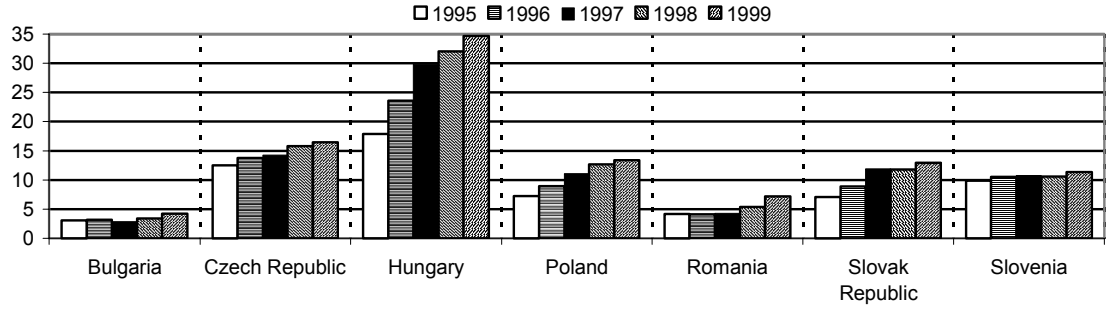
Notes: 1) Including UK, France, Germany and Belgium.- 2) Including Greece, Portugal, Spain.

Source : WIIW Industrial Database, Eurostat.

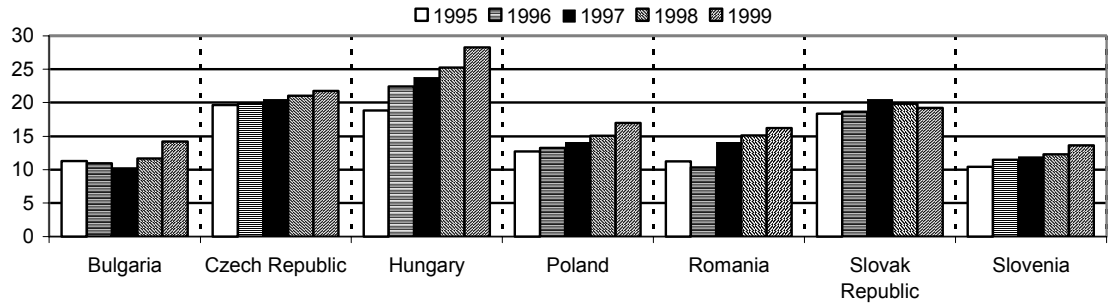
Figure A2

Electrical and optical equipment

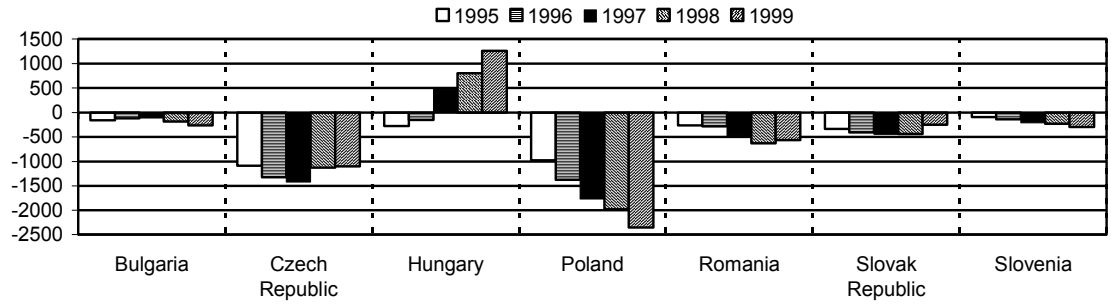
Share in manufacturing exports to the EU(15), in %



Share in manufacturing imports from the EU(15), in %

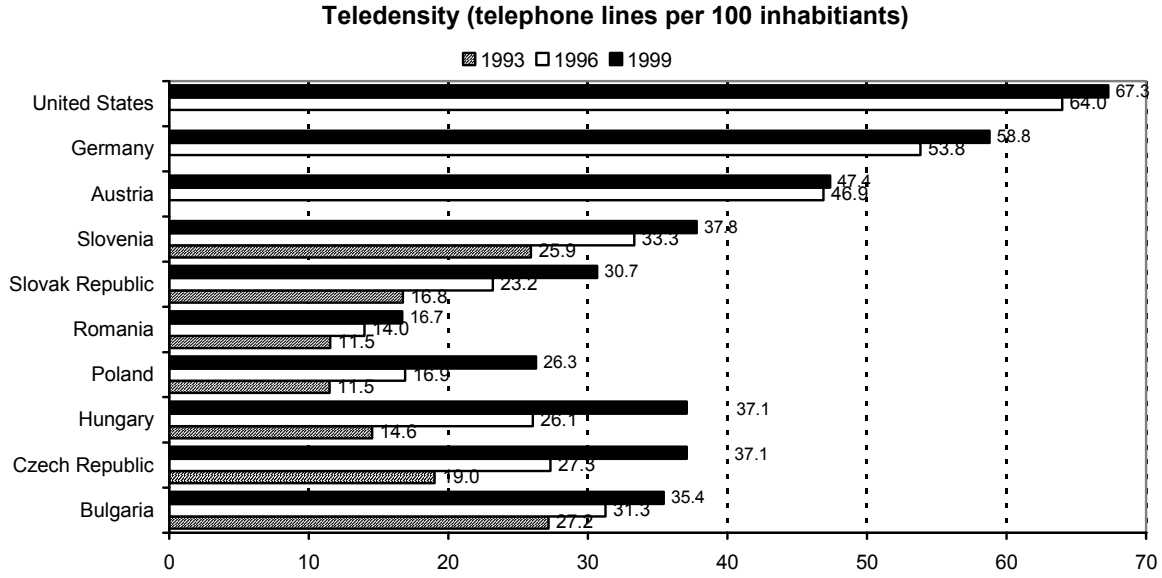


CEECs trade balance with the EU(15), ECU mn



Source: Eurostat, WIIW calculations

Figure A3



Source: International Telecommunication Union Internet-Homepage (www.itu.int/industryoverview/index.htm).

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Production structure (current prices), manufacturing = 100
Industrial production (constant prices), national currency million
Production structure (constant prices), manufacturing = 100
Production growth, annual changes in %
Employment, thousand persons
Employment structure, manufacturing = 100
Employment growth, annual changes in %
Average monthly gross wages (national currency)
Average monthly gross wages (ECU)
Average monthly gross wages (DEM)
Average monthly gross wages (USD)
Average monthly gross wages, manufacturing = 100
Average monthly gross wages, annual changes, real (deflated with CPI)
Labour productivity, manufacturing = 100
Labour productivity, annual changes in %
Unit Labour Costs (national currency), manufacturing = 100
Unit Labour Costs (national currency), annual growth rates in %
Unit Labour Costs (ECU), annual growth rates in %
Unit Labour Costs (DEM), annual growth rates in %
Unit Labour Costs (USD), annual growth rates in %
Unit Labour Costs ECU, Austria = 100
Exports to the EU, 1000 ECU
Imports from the EU, 1000 ECU
Foreign trade with the EU, Balance, 1000 ECU

WIIW Industrial Database Eastern Europe

Tables contained in the database:

	By NACE industries	**Dimension**
D	Manufacturing total	Countries X 1989-00
DA	Food products; beverages and tobacco	Countries X 1989-00
DB	Textiles and textile products	Countries X 1989-00
DC	Leather and leather products	Countries X 1989-00
DD	Wood and wood products	Countries X 1989-00
DE	Pulp, paper & paper products, publishing & printing	Countries X 1989-00
DF	Coke, refined petroleum products & nuclear fuel	Countries X 1989-00
DG	Chemicals, chemical products and man-made fibres	Countries X 1989-00
DH	Rubber and plastic products	Countries X 1989-00
DI	Other non-metallic mineral products	Countries X 1989-00
DJ	Basic metals and fabricated metal products	Countries X 1989-00
DK	Machinery and equipment n.e.c	Countries X 1989-00
DL	Electrical and optical equipment	Countries X 1989-00
DM	Transport Equipment	Countries X 1989-00
DN	Manufacturing n.e.c.	Countries X 1989-00

By country	**Dimension**
Czech Republic	NACE X 1989-2000
Hungary	NACE X 1989-2000
Poland	NACE X 1989-2000
Romania	NACE X 1989-2000
Slovak Republic	NACE X 1989-2000
Slovenia	NACE X 1989-2000
Bulgaria	NACE X 1989-2000

By year	**Dimension**
1989	NACE X Countries
1990	NACE X Countries
1991	NACE X Countries
1992	NACE X Countries
1993	NACE X Countries
1994	NACE X Countries
1995	NACE X Countries
1996	NACE X Countries
1997	NACE X Countries
1998	NACE X Countries
1999	NACE X Countries
2000	NACE X Countries

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