11

Electrical machinery and optical equipment

This chapter covers NACE Subsection DL and is referred to as the electrical machinery and optical equipment sector. There are four NACE divisions included that cover: the manufacture of computers and office machinery (NACE Division 30); the manufacture of electrical machinery and equipment (NACE Division 31); the manufacture of radio, television and communication equipment (NACE Division 32); and instrument engineering (NACE Division 33), which includes the manufacture of medical, precision and optical equipment.

The electrical machinery and optical equipment sector is an important and strategic part of Europe's manufacturing sector, producing a wide range of mostly high-technology products (for example, computers, switchgears or semi-conductors). This sector has been cited as being at the centre of industrial development, as almost every other sector depends, at least to some degree, on the capital equipment, technology, end-products, research and innovations that are provided by the electrical machinery and optical equipment sector. It is therefore often referred to as one of the main drivers of productivity gains and central to the EU's objective of creating more and better jobs.

The goods and services made within the electrical machinery and optical equipment sector range from capital goods used in energy and primary transformation activities, transport manufacturing (motor vehicles, aeronautics and rail equipment producers) or process manufacturing sectors (agro-industries, chemicals, plastics or wood), through intermediate goods (such as electronic components or wiring) that are often used by other manufacturers, to consumer goods (such as consumer electronics, mobile phones and household appliances).

This sector operates within a long-established legislative framework that covers issues such as product safety, energy labelling, minimum efficiency requirements, eco-design and waste. Two Directives [1] on waste electrical and electronic equipment (WEEE) and the restriction of the use of certain hazardous substances in electrical and electronic equipment were introduced in 2008. The EU aims to take measures to prevent the generation of electrical and electronic waste and to promote reuse, recycling and other forms of recovery in order to reduce the quantity of such waste by encouraging manufacturers to design products with the environmental impacts in mind throughout their entire life cycle.

The potential role that may be played by the electrical machinery and optical equipment sector with respect to energy efficiency has also been highlighted in recent years. Indeed, considerable effort has gone into reducing the energy consumption of appliances, although changes in lifestyle and working practices have sometimes offset these, for example, while changes to the manufacture of domestic and office appliances has made these more energy efficient, rising equipment rates and the introduction of new technologies may result in higher overall energy consumption. Several directives cover this area of energy saving, in particular a Directive on eco-design requirements for energy-using products, a Directive on the energy labelling of domestic appliances and a Regulation on the energy efficiency labelling programme for office equipment.

Structural profile

Among the chapters covered in this publication, electrical machinery and optical equipment manufacturing (NACE Subsection DL) was the third largest industrial activity in the EU-27 in 2006 in terms of its value added generated, only behind the manufacture of basic metals and fabricated metal products (see Chapter 9) and fuel processing and the manufacture of chemicals (see Chapter 7).

The 202.6 thousand enterprises active in the electrical machinery and optical equipment manufacturing sector in 2006 together employed 3.7 million persons across the EU-27; of these, the vast majority (95.0 %) were paid employees. The EU-27's electrical machinery and optical equipment manufacturing sector generated EUR 202.9 billion of value added in 2006, contributing 3.6 % of the total value added that was generated within the non-financial business economy (NACE Sections C to I and K). This was considerably higher than the corresponding shares of this sector in the number of enterprises (1.1 %) or persons employed (2.8 %), suggesting that the electrical machinery and optical equipment manufacturing sector was characterised by relatively large enterprises that were more productive than the average.

(1) 2008/34/EC and 2008/35/EC.

Table 11.1: Manufacture of electrical and optical equipment (NACE Subsection DL)
Structural profile, EU-27, 2006

	Enterprises		Turnover		Value added		Persons employed	
	(thousand)	(% of total)	(EUR million)	(% of total)	(EUR million)	(% of total)	(thousand)	(% of total)
Electrical & optical equipment	202.6	100.0	710 431	100.0	202 905	100.0	3 668.2	100.0
Instrument engineering (1)	92.0	45.4	140 000	21.3	60 000	29.6	1 041.8	28.4
Office machinery & computers (2)	10.7	5.2	59 580	8.4	9 634	4.7	154.6	4.2
Electrical machinery & apparatus (3)	70.7	34.9	282 000	39.7	82 900	40.9	1 710.0	46.6
Radio, television & communication equipment (4)	29.4	14.5	221 437	31.2	51 847	25.6	771.6	21.1

(1) Rounded estimates based on non-confidential data; turnover, 2005.
(2) Number of enterprises, 2005.
(3) Rounded estimates based on non-confidential data.
(4) Number of persons employed, 2005.

Source: Eurostat (SBS)

Table 11.2: Manufacture of electrical and optical equipment (NACE Subsection DL)
Structural profile: ranking of top five Member States, 2006

	Highest value added (1)			Largest number of persons employed (1)			Most specialised: share in the non-financial business economy (%)	
	Country	(EUR million)	(% of EU-27)	Country	(thousand)	(% of EU-27)	Value added (2)	Persons employed (3)
1	Germany	68 450	33.7	Germany	1 023.8	27.9	Finland (9.7)	Slovakia (7.1)
2	France	24 725	12.2	Italy	412.3	11.2	Hungary (9.1)	Hungary (5.8)
3	United Kingdom	22 092	10.9	France	406.4	11.1	Ireland (9.0)	Czech Republic (5.5)
4	Italy	20 725	10.2	United Kingdom	326.9	8.9	Germany (5.9)	Finland (5.1)
5	Ireland	8 222	4.1	Czech Republic	195.0	5.3	Slovakia (5.9)	Ireland (5.0)

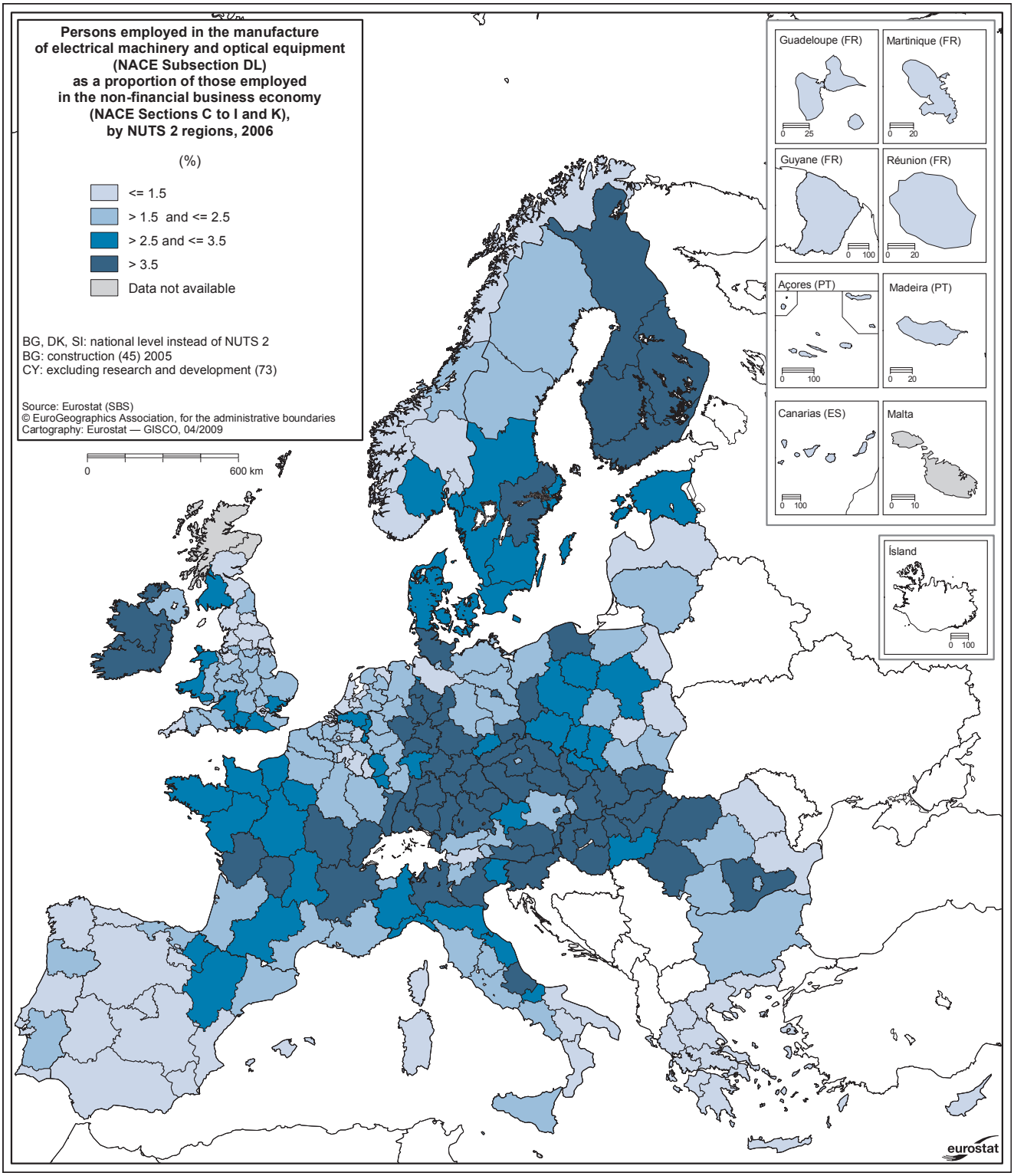
(1) Malta, not available; the Netherlands and Poland, 2005.
(2) Malta and the Netherlands, not available; Bulgaria, Cyprus, Poland and Romania, 2005.
(3) Malta, not available; Bulgaria, Cyprus, the Netherlands, Poland and Romania, 2005.

Source: Eurostat (SBS)

Among the four NACE divisions that comprise the electrical machinery and optical equipment manufacturing sector, the largest in the EU-27 was the electrical machinery manufacturing (NACE Division 31) subsector, which accounted for two fifths (40.9 %) of sectoral value added in 2006; this subsector also had the highest share of turnover (39.7 %) and persons employed (46.6 %). Instrument engineering (NACE Division 33) was the next largest subsector (in value added terms), accounting for 29.6 % of the electrical machinery and optical equipment total, closely followed by radio, television and telecommunication equipment manufacturing (NACE Division 32), with a share that was a little over one quarter (25.6 %). A relatively high proportion of enterprises reported their principal activity concentrated within the instrument engineering subsector, as these accounted for 45.4 % of all enterprises within the EU-27's electrical machinery and optical equipment manufacturing sector. In contrast, the radio, television and telecommunication equipment manufacturing subsector accounted for just 14.5 % of enterprises, suggesting that this activity was populated by considerably fewer, large enterprises. By far the smallest subsector, by any of these measures of size, was the manufacture of office machinery and computers (NACE Division 30), which contributed just 4.7 % of sectoral value added in 2006.

The electrical and optical equipment manufacturing sector was dominated by output from Germany, which provided one third (33.7 %) of the EU-27's value added in 2006, some 2.8 times as high as the next largest contribution which was made by France (12.2 %). The United Kingdom and Italy were the only other countries to report double-digit shares (10.9 % and 10.2 % respectively) of EU-27 value added, with a considerable gap thereafter, as Ireland made the next largest contribution (4.1 %).

Map 11.1 : Manufacture of electrical and optical equipment (NACE Subsection DL)
Persons employed in the manufacture of electrical machinery and optical equipment (NACE Subsection DL) as a proportion of those employed in the non-financial business economy (NACE Sections C to I and K) (%)\



Source: Eurostat (SBS)

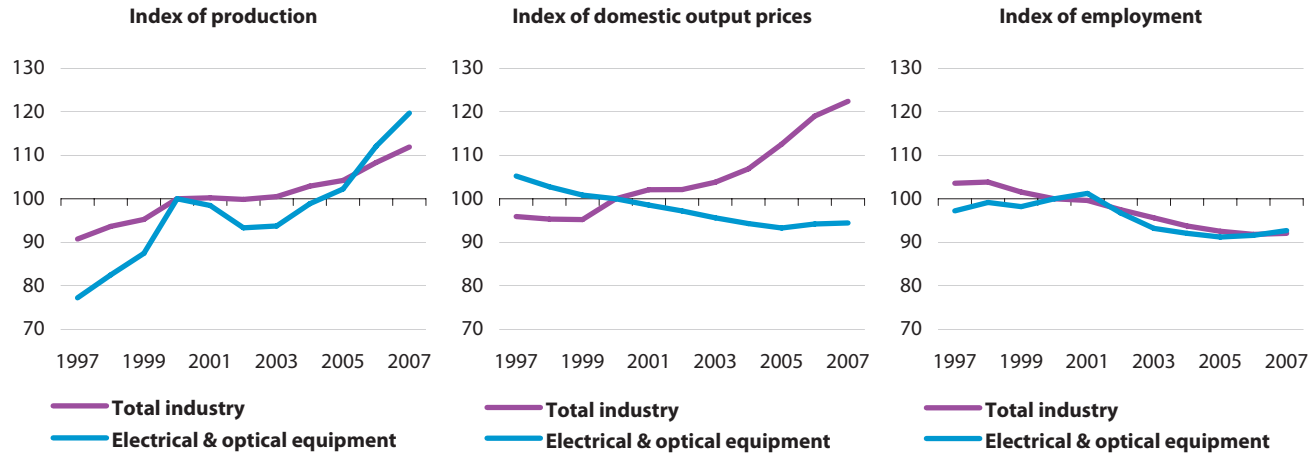
In relative terms, Finland, Hungary and Ireland were the most specialised Member States in this sector, as electrical machinery and optical equipment manufacturing provided between 9 % and 10 % of their non-financial business economy value added in 2006. Germany and Slovakia (both 5.9 % of non-financial business economy value added) were the next most specialised countries. At the other end of the range, Greece and Cyprus (2005) reported that electrical machinery and optical equipment manufacturing accounted for less than 1 % of their non-financial business economy value added or employment [2].

The map shows the regional specialisation of the electrical machinery and optical equipment manufacturing sector, which is largely concentrated within central and eastern Europe. The most specialised regions (at the level of detail shown in the map) were Zapadne Slovensko (Slovakia), Oberpfalz (Germany) and Közép-Dunántúl (Hungary), where at least one in every ten persons employed within the non-financial business economy worked in electrical machinery and optical equipment manufacturing. There were several regions in Germany that were relatively specialised in this activity, which was also the case in the Czech Republic, Hungary, Finland and Slovakia as well as Slovenia (which is considered as one region at the level of detail shown in the map).

Business investment decisions and consumer demand for electronic goods are highly influenced by broader developments in the business cycle, and production patterns for electronic machinery and optical equipment goods may therefore be expected to adapt to these changes more strongly and perhaps more quickly than is the case for many other manufactured goods. The development of the production index for EU-27 electrical machinery and optical equipment manufacturing followed, but magnified, the economic cycle for industrial (NACE Sections C to E) output between 1997 and 2007, with more rapid growth during the years to 2000, a bigger contraction through to 2003, and then a faster expansion in each subsequent year through to 2007. The average rate of growth for the EU-27 production index for electrical machinery and optical equipment manufacturing in the ten years to 2007 was, at 4.5 % per annum, more than double the average for total industry (2.1 % per annum). The growth in EU-27 output of electrical machinery and optical equipment was driven by radio, television and communication equipment manufacturing (up on average by 5.4 % per annum between 1997 and 2007), while the relatively small activity of office machinery and computer manufacturing also recorded a relatively high growth rate (averaging 5.2 % per annum). While these two activities recorded the highest rates of growth, they also displayed the greatest fluctuations in output over time – both in a positive and negative sense – suggesting that consumer expenditure on electronic items was more sensitive to the economic cycle than the investment behaviour of enterprises (as witnessed through the comparatively stable evolution of the index of production for electrical machinery and apparatus).

(2) Malta, not available.

Figure 11.1: Manufacture of electrical and optical equipment (NACE Subsection DL)
Evolution of main indicators, EU-27 (2000=100)



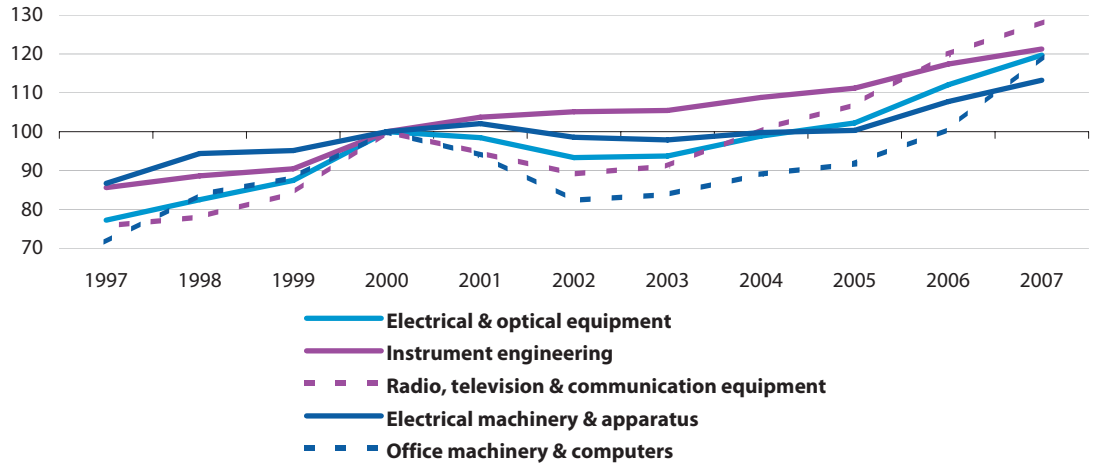
Source: Eurostat (STS)

Domestic output prices for electrical machinery and optical equipment in the EU-27 followed a steady downward trend over the period from 1997 to 2005. Indeed, this was the only industrial activity (at the level of NACE subsections) where prices fell, on average, during the most recent decade for which information is available. However, in 2006 the output price of electrical machinery and optical equipment rose by 1.0 %, which was consolidated in 2007 by a further increase of 0.2 %.

There were three distinct developments in the employment index for electrical machinery and optical equipment manufacturing in the EU-27, largely reflecting the overall economic cycle. Between 1997 and 2001 there was some growth in employment levels, which contrasted with a broad decline in the wider industrial workforce. This was followed by a relatively steep decline in the number of persons employed in electrical machinery and optical equipment manufacturing during the period from 2001 to 2003, at a pace that outstripped the industrial average. From 2004 until 2007 the employment index for electrical machinery and optical equipment manufacturing outperformed that for total industry, with the number of persons employed rising by 0.4 % in 2006 and by a further 1.2 % in 2007.

Large enterprises (employing 250 or more persons) generated 61.9 % of the value added within the EU-27's electrical machinery and optical equipment manufacturing sector in 2006, considerably more than their average contribution (42.1 %) across the whole of the non-financial business economy. The relative importance of medium-sized enterprises (employing between 50 and 249 persons), 19.9 % of sectoral value added, was also above the non-financial business economy average (17.8 % in 2005). The relative importance of micro enterprises (with fewer than ten persons employed) was particularly low within the electrical machinery and optical equipment sector, as these accounted for just 5.9 % of value added, compared with a non-financial business economy average of 21.0 % (2005).

Figure 11.2: Manufacture of electrical and optical equipment (NACE Subsection DL)
Index of production, EU-27 (2000=100)



Source: Eurostat (STS)

Table 11.3: Manufacture of electrical and optical equipment (NACE Subsection DL)
Share of value added and persons employed by enterprise size class, EU-27, 2006 (%)

	Value added		Persons employed	
	Non-financial business economy (1)	Electrical & optical equipment	Non-financial business economy	Electrical & optical equipment
1 to 9 persons employed	21.0	5.9	29.7	10.9
10 to 49 persons employed	18.9	12.1	20.7	15.2
50 to 249 persons employed	17.8	19.9	17.0	21.7
250 or more persons employed	42.1	61.9	32.6	52.5

(1) 1 to 9 persons employed and 50 to 249 persons employed, 2005.

Source: Eurostat (SBS)

This relatively important presence of large enterprises was apparent for three of the four NACE divisions that make up this chapter, with large enterprises accounting for more three fifths of the EU-27's value added in 2006. The only exception was instrument engineering, where large enterprises contributed 46.0 % of the total value added, which was still considerably more than the 24.0 % share of medium-sized enterprises, which were also relatively important within this subsector.

Employment characteristics

The gender profile of the EU-27's electrical machinery and optical equipment workforce in 2007 was very similar to that for the whole of the non-financial business economy, with 65.0 % of workers in this sector male compared with an average of 64.9 %. Among the Member States, however, there were considerable differences, as less than half the electrical machinery and optical equipment workforce were male in Slovakia and the three Baltic Member States [3], while men accounted for upwards of 70 % of those employed in Cyprus (2006), Greece, the Netherlands, the United Kingdom and Austria.

The age profile of the electrical machinery and optical equipment workforce in 2007 also resembled closely that of the non-financial business economy as a whole, with persons aged less than 30 accounting for 23.1 % of those employed in the EU-27 (compared with a non-financial business economy average of 24.3 %). The proportion of those aged 50 or more (20.2 %) was also slightly lower in the electrical machinery and optical equipment sector than across the non-financial business economy (21.9%). As a result, some 56.3 % of those employed in this sector were aged 30 to 49 (2.6 percentage points higher than the non-financial business economy average). Among the Member States, a majority (54.9 %) of those employed in the Maltese electrical machinery and optical equipment sector in 2007 were aged less than 30, while this age group also accounted for a relatively high proportion of the workforce in a number of central and eastern European Member States, principally Slovakia (37.7 %), Poland (34.3 %) and Hungary (31.7 %). In each of these countries the proportion of persons aged less than 30 working in the electrical machinery and optical equipment sector was at least 6 percentage points higher than the corresponding share of this age group within the whole of the non-financial business economy, a pattern that was also repeated in the Czech Republic, Estonia and Romania.

While the gender and age breakdowns of the EU-27's electrical machinery and optical equipment workforce were generally in line with those of the non-financial business economy, the prevalence of part-time employment in the electrical machinery and optical equipment sector (6.7 % of those employed in 2007) was much lower than the corresponding average for the non-financial business economy (14.3 %), and was also somewhat lower than the industrial average (7.3 %). The high prevalence of full-time employment was particularly evident in the central and eastern Europe and despite part-time work being generally less common in many of these countries (in terms of its importance within the whole of the non-financial business economy), the proportion of persons working part-time in the electrical machinery and optical equipment sector was even less common, and the incidence of full-time employment reached or exceeded 97.5 % in 11 of the 27 Member States.

Expenditure, productivity and profitability

The level of gross investment in tangible goods within the EU-27's electrical machinery and optical equipment sector was EUR 20.5 billion in 2006. This was equivalent to 2.0 % of non-financial business economy total, and resulted in an investment rate (gross tangible investment as a percentage of value added) of 10.1 %, which was considerably lower than the non-financial business economy average (18.4 %) and was the second lowest investment rate across all of the industrial chapters covered in this publication (higher only than for machinery and equipment, see Chapter 10).

Across the four NACE divisions that make up the EU-27's electrical machinery and optical equipment sector only the manufacture of radio, television and communication equipment recorded an investment rate (15.1 %) above the sectoral average in 2006, with rates falling below 8 % for both the manufacture of office machinery and computers and instrument engineering.

[3] Cyprus, 2006; Luxembourg, not available.

Table 11.4: Manufacture of electrical and optical equipment (NACE Subsection DL)
Expenditure, productivity and profitability, EU-27, 2006 (1)

	(EUR million)			(EUR thousand per person)		(%)	
	Personnel costs	Purchases of goods & services	Investment in tangible goods	Apparent labour productivity	Average personnel costs	Wage adjusted labour productivity	Gross operating rate
Electrical & optical equipment	135 005	521 162	20 481	55.3	38.7	142.8	9.6
Instrument engineering (2)	40 000	90 000	4 395	57.6	41.5	138.8	12.8
Office machinery & computers (3)	6 139	50 182	710	62.3	42.6	153.0	5.9
Electrical machinery & apparatus	59 500	207 000	7 535	48.5	36.1	134.4	8.3
Radio, television & communication equipment (4)	31 496	173 680	7 841	62.5	43.3	143.1	9.2

(1) Rounded estimates based on non-confidential data.
(2) Gross operating rate, 2005.
(3) Average personnel costs and wage adjusted labour productivity, 2005.
(4) Apparent labour productivity and wage adjusted labour productivity, 2005.

Source: Eurostat (SBS)

The electrical machinery and optical equipment sector reported a slightly higher than average share of personnel costs in total operating expenditure: some 20.6 % for the EU-27 in 2006, higher than the 16.1 % share of personnel costs in operating expenditure within the whole of the EU-27's non-financial business economy. Within the manufacture of instrument engineering, the relative importance of labour as an input in the manufacturing process rose considerably, such that personnel costs accounted for 30.8 % of operating expenditure.

Average personnel costs for the EU-27's electrical machinery and optical equipment sector were EUR 38.7 thousand per employee in 2006 and apparent labour productivity was EUR 55.3 thousand per person employed. Average personnel costs were 34.4 % higher than the non-financial business economy average, while the corresponding ratio for apparent labour productivity showed a difference of 27.1 % in favour of the electrical machinery and optical equipment sector.

These differences feed through into the wage adjusted labour productivity ratio, which stood at 142.8 % for the EU-27's electrical machinery and optical equipment sector in 2006, compared with a non-financial business economy average of 151.1 %. The only one of the four NACE divisions included within this chapter to report a wage adjusted labour productivity ratio above the non-financial business economy average was the manufacture of office machinery and computers (153.0 % in 2005 compared with a non-financial business economy average of 146.5 % for the same year).

Among the Member States [4], the apparent labour productivity of those employed within the electrical machinery and optical equipment sector rose well above the national non-financial business economy average in Finland and Ireland (by 88.4 % and 79.7 % respectively), while average personnel costs were relatively high in Portugal (59.7 % more than the non-financial business economy average) and Germany (45.3 % higher). A similar analysis shows that Finland (38.6 %), Hungary (37.6 %), Greece (24.3 %) and Sweden (21.5 %) were the only Member States (no information for Ireland) where the wage adjusted labour productivity ratio for electrical machinery and optical equipment was significantly higher than the non-financial business economy average. In most of the Member States the opposite was true, with Germany, Luxembourg and the Baltic Member States reporting wage adjusted labour productivity ratios that were around 14-20 % lower than their national non-financial business economy averages.

(4) Bulgaria, Cyprus, Poland and Romania, 2005; Malta and the Netherlands, not available.

Profitability for the EU-27's electrical machinery and optical equipment sector, as measured by the ratio of the gross operating surplus to turnover, was 9.6 % in 2006, slightly below the non-financial business economy average of 10.8 %. Among the four NACE divisions covered within this chapter, the lowest gross operating rate was recorded for the manufacture of office machinery and computers (5.9 %), with only instrument engineering reporting a rate above the sectoral average (12.8 % in 2005).

External trade

Among the Member States, Germany recorded the largest trade surplus (EUR 20.0 billion) in electrical and optical equipment in 2007, followed by Ireland (EUR 8.9 billion); only eight of the Member States exported more electrical and optical goods than they imported in 2007. The largest deficits were recorded by the United Kingdom (EUR 28.2 billion), Spain (EUR 22.3 billion) and France (EUR 12.3 billion). In relative terms, electrical and optical equipment exports and imports often accounted for a considerable share of total industrial exports and imports. In 2007, these goods accounted for more than half (57.9 %) of all Maltese industrial exports, for more than a third of industrial exports from Luxembourg and Hungary, and for around a quarter of the total from the Czech Republic, Ireland, the Netherlands and Finland.

The EU-27 imported electrical and optical equipment (CPA Subsection DL) to the value of EUR 267.8 billion in 2007, which represented 20.1 % of all industrial (CPA Sections C to E) imports. These imports of electrical and optical equipment from non-member countries accounted for 42.5 % of the total (intra- and extra-EU) trade of these products by EU-27 Member States in 2007, some 6.9 percentage points higher than the industrial average (35.7 %). Exports of electrical and optical equipment to non-member countries were valued at EUR 200.0 billion in 2007 (17.2 % of all industrial exports), resulting in a trade deficit of EUR 67.8 billion. The overall EU-27 trade deficit could be attributed to considerable imports of office machinery and computers (CPA Division 30) and radio, television and communication equipment (CPA Division 32), which led to deficits of EUR 45.1 billion and EUR 44.3 billion respectively for these products in 2007. In contrast, the EU-27 ran a trade surplus for electrical machinery and apparatus (EUR 14.3 billion, CPA Division 31) and for instrument engineering (EUR 7.3 billion, CPA Division 33).

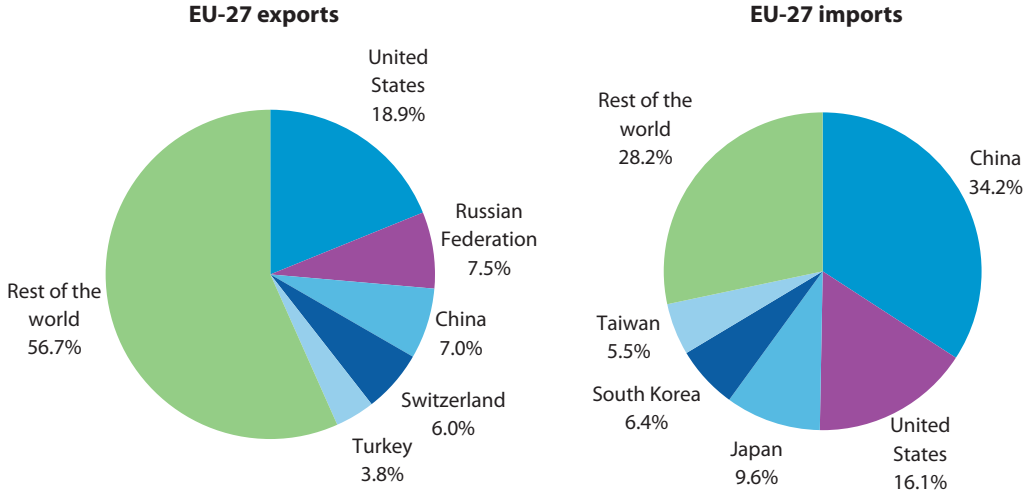
By far the largest share of EU-27 imports of electrical and optical equipment from non-member countries originated from China (34.2 % in 2007). This share was more than double that of the second most important trade partner, the United States (16.1 %), while south-east Asian economies accounted for the vast majority of the remaining imports. The importance of Chinese imports was particularly concentrated with respect to office machinery and computers, where China accounted for almost half (48.0 %) of the imports from non-member countries. Instrument engineering was the only one of the four CPA divisions covered within this chapter where China (12.6 %) did not account for the largest proportion of EU-27 imports, as both the United States (36.7 %) and Switzerland (17.3 %) recorded higher shares. The largest single export market for EU-27 electrical and optical equipment in 2007 was the United States (18.9 %); the Russian Federation, China and Switzerland each accounted for between 7.5 % and 6.0 % of the EU-27's exports.

Table 11.5: Electrical and optical equipment (CPA Subsection DL)
External trade, EU-27, 2007

	Value (EUR million)			Share of	Share of
	Extra-EU exports	Extra-EU imports	Trade balance	industrial exports (%)	industrial imports (%)
Electrical & optical equipment	199 992	267 821	-67 829	17.2	20.1
Instrument engineering	54 901	47 604	7 297	4.7	3.6
Office machinery & computers	27 896	73 045	-45 149	2.4	5.5
Electrical machinery & apparatus	56 974	42 680	14 294	4.9	3.2
Radio, television & communication equipment	60 221	104 492	-44 271	5.2	7.8

Source: Eurostat (Comext)

Figure 11.3: Electrical and optical equipment (CPA Subsection DL)
Main trading partners, EU-27, 2007 (% share of exports/imports in value terms)



Source: Eurostat (Comext)

11.1: Instrument engineering

The manufacture of medical, precision and optical instruments, watches and clocks (NACE Division 33) includes activities related to the manufacture of instruments, industrial process control equipment, watches, clocks and photographic equipment (while photo-chemical products, flashbulbs or television cameras are not included). Together these activities are referred to here as instrument engineering manufacturing.

Medical instruments manufacturing is one of the largest subsectors of the instrument engineering sector and may be expected to continue growing in the coming years as a result of Europe's slowly ageing society leading to increased demand, while scientific breakthroughs translate into new products, more complex treatments, and new ways of curing certain conditions. However, with pressure on budgets, many healthcare providers are trying to reduce the length of hospital stays and promote homecare treatment, while at the same time healthcare policy increasingly stresses prevention-orientated, consumer-driven healthcare models. Medical devices are regulated by three main Directives that cover active implantable medical devices, medical devices and in vitro diagnostic medical devices [5], while similar legislation exists for other subsectors, such as a Directive on measuring instruments [6].

Structural profile

Almost three tenths (29.6 %) of the value added generated within the electrical machinery and optical equipment (NACE Subsection DL) sector in the EU-27 in 2006 came from instrument engineering (NACE Division 33). There were and estimated 92.0 thousand enterprises in the EU-27's instrument engineering sector in 2006, employing just over one million persons. In relative terms, these enterprises accounted for close to half (45.4 %) of the total number of enterprises within the electrical machinery and optical equipment sector, suggesting that the size of instrument engineering enterprises was well below the average.

The manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment (NACE Group 33.2) and the manufacture of medical and surgical equipment and orthopaedic appliances (NACE Group 33.1) together accounted for more than three quarters of the enterprises, turnover, value added or employment in the EU-27's instrument engineering sector. There were, however, some considerable differences between these two subsectors, as almost two thirds (64.1 %) of instrument engineering enterprises in 2006 were classified as producing medical and surgical equipment and orthopaedic

(5) 90/385/EEC, 93/42/EEC and 98/79/EC.
(6) 2004/22/EC.

Table 11.6: Manufacture of medical, precision and optical instruments, watches and clocks (NACE Division 33) Structural profile, EU-27, 2006

	Enterprises (thousand)	Turnover (EUR million)	Value added (EUR million)	Persons employed (thousand)	Share in total (%)	
					Value added	Persons employed
Instrument engineering (1)	92.0	140 000	60 000	1 041.8	100.0	100.0
Medical & surgical equipment & orthopaedic appliances (2)	59.0	55 696	22 906	445.5	38.2	42.8
Instruments & appliances for measuring, checking, testing, navigating & other purposes, except industrial process control equipment (3)	16.4	60 000	22 600	369.5	40.4	35.5
Industrial process control equipment	7.6	13 520	4 745	95.8	7.9	9.2
Optical instruments & photographic equipment	7.8	16 477	6 814	118.5	11.4	11.4
Watches & clocks	1.2	1 562	575	12.5	1.0	1.2

(1) Rounded estimates based on non-confidential data; turnover, 2005.
(2) Rounded estimates based on non-confidential data.
(3) Rounded estimates based on non-confidential data; value added, 2005.

Source: Eurostat (SBS)

Table 11.7: Manufacture of medical, precision and optical instruments, watches and clocks (NACE Division 33) Structural profile: ranking of top five Member States in terms of value added and persons employed, 2006

	Highest value added (1)			Largest number of persons employed (2)			Most specialised: share in non-financial business economy (%) (3)	
	Country	(EUR million)	(% of EU-27)	Country	(thousand)	(% of EU-27)	Country	Value added
1	Germany	20 129	33.5	Germany	327.0	31.4	Ireland	3.1
2	France	8 440	14.1	France	136.8	13.1	Germany	1.7
3	United Kingdom	8 350	13.9	Italy	132.3	12.7	Denmark	1.3
4	Italy	6 839	11.4	United Kingdom	111.1	10.7	Sweden	1.3
5	Ireland	2 787	4.6	Poland	50.4	4.8	Italy	1.1

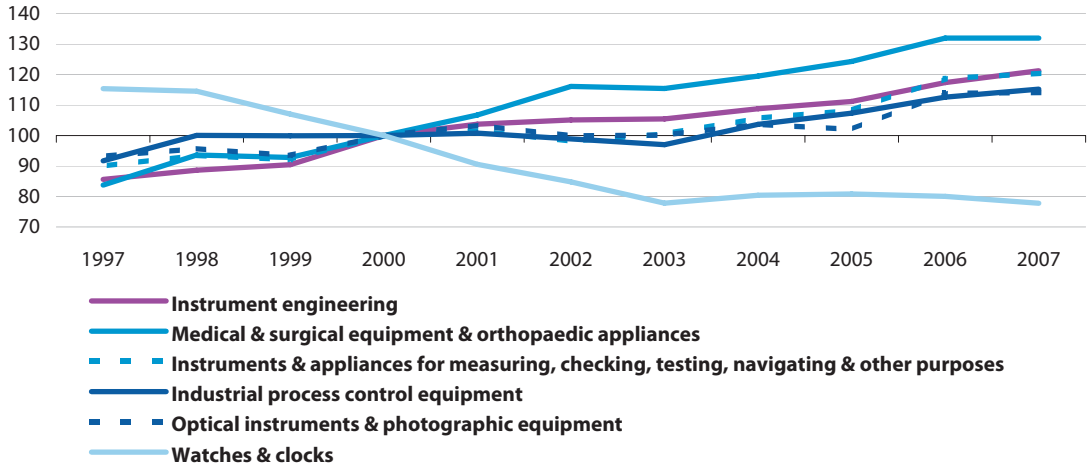
(1) Malta and the Netherlands, not available; Greece, Poland and Portugal, 2005.
(2) Malta, not available; Greece, the Netherlands, Poland and Portugal, 2005.
(3) Malta and the Netherlands, not available; Bulgaria, Greece, Cyprus, Poland, Portugal and Romania, 2005.

Source: Eurostat (SBS)

appliances, while the manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes accounted for less than one fifth (17.8 %). In value added terms, their relative importance was similar, with the manufacture of medical and surgical equipment and orthopaedic appliances accounting for a 38.2 % share in 2006, while the corresponding share for the manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes was 40.4 % in 2005. Of the three remaining subsectors, the only other activity to record a double digit share of EU-27 instrument engineering value added in 2006 was the manufacture of optical instruments and photographic equipment (11.4 %); industrial process control equipment accounted for a 7.9 % share, while the manufacture of watches and clocks was particularly small (1.0 %).

The EU-27's instrument engineering sector was dominated by Germany, where value added in 2006 reached EUR 20.1 billion or one third (33.5 %) of the EU-27 total. This was well above the next highest levels of value added recorded in France and the United Kingdom (14.1 % and 13.9 % respectively of the EU-27 total). The instrument engineering sector in Germany accounted for 1.7 % of German non-financial business economy value added, the second highest proportion among the Member States, behind Ireland (3.1 %).

Figure 11.4: Manufacture of medical, precision and optical instruments, watches and clocks (NACE Division 33)
Index of production, EU-27 (2000=100)



Source: Eurostat (STS)

The production index for instrument engineering in the EU-27 followed a fairly smooth upward development during the period from 1997 to 2007, with a slowdown in activity (albeit with positive rates) in 2002 and 2003. Average growth of 3.5 % per annum was recorded for the output of instrument engineering during the ten years to 2007, which was slower than the corresponding rate for electrical machinery and optical equipment manufacturing (4.5 % per annum). Among the NACE groups covered by this subchapter, the fastest expansion in activity was recorded for medical and surgical equipment and orthopaedic appliances manufacturing, where average growth of 4.7 % per annum was registered. Three of the four remaining activities reported average growth of between 2 % and 3 % per annum, while the manufacture of watches and clocks registered a fall in production, on average by 3.9 % per annum.

Expenditure and productivity

The EU-27's instrument engineering sector recorded gross tangible investment valued at approximately EUR 4.4 billion in 2006, some 0.4 % of the total for the non-financial business economy. The investment rate (calculated as the ratio of investment to value added) was particularly low (7.3 %) for the EU-27's instrument engineering manufacturing sector in 2006; this was the lowest rate among any of the NACE divisions within the non-financial business economy for which data are available for 2005 or 2006.

Personnel costs accounted for a high proportion (30.8 %) of operating expenditure in the EU-27's instrument engineering sector in 2006. This was approximately 50% more than the electrical machinery and optical equipment average (20.6 %). This pattern was repeated across all five subsectors that make up instrument engineering, as the relative importance of personnel costs in operating expenditure ranged from 28.6 % to 30.7 %.

While personnel costs accounted for a high proportion of operating expenditure, this could to some extent be explained by relatively high average personnel costs per employee, which stood at EUR 41.5 thousand in the EU-27's instrument engineering sector in 2006, almost 50 % above the non-financial business economy average (EUR 28.8 thousand per employee). The apparent labour productivity (EUR 57.6 thousand per person employed) of those working in the instrument engineering sector was about a third higher than the non-financial business economy average (EUR 43.5 thousand). Combining these two ratios, the wage adjusted labour productivity ratio of the EU-27's instrument engineering sector stood at 138.8 %, somewhat below the non-financial business economy average (151.5 %).

Among the Member States for which data are available [7], the apparent labour productivity of the instrument engineering sector was highest in Ireland (EUR 107.3 thousand per person employed) in 2006. Ireland also featured among a group of Member States that reported labour productivity

[7] Greece, Poland and Portugal, 2005; Malta and the Netherlands, not available.

Table 11.8: Medical, precision and optical instruments; watches and clocks (CPA Division 33)
Production of selected products, EU-27, 2007 (1)

	Prodcom code	Production value (EUR million)	Rounding base (EUR million)	Volume of sold production (million)	Unit of volume	Rounding base (million)
Design & assembly of industrial process control equipment & automated production plants	33.30.10.00	10 440	90	-	-	-
Contact lenses	33.40.11.30	6 073	-	2 722	units	-
Radar apparatus	33.20.20.30	3 879	-	0.550	units	0.05
Instruments & appliances for aeronautical or space navigation (excluding compasses)	33.20.11.55	3 061	-	30	units	30
Apparatus based on the use of X-rays, for medical, surgical, dental or veterinary uses (including radiography & radiotherapy apparatus)	33.10.11.15	2 940	-	0.276	units	-
Needles, catheters, cannulae & the like used in medical, surgical, dental or veterinary sciences (excluding tubular metal needles & needles for sutures)	33.10.15.17	2 754	-	10 927	units	-
Dental fittings (including dentures & part dentures, metal crowns, cast tin bars, stainless steel bars) (excluding individual artificial teeth)	33.10.17.59	2 126	-	-	-	-
Artificial joints	33.10.17.35	2 100	300	8.101	units	-

(1) Excluding products of a generic nature (other), sales of services such as repair, maintenance and installation; estimates; threshold of production value set at EUR 2 billion; the rounding base indicates the magnitude of the rounding employed to protect confidential cells (in the case of PRODCOM code 33.30.10.00, the value lies within the range +/- EUR 90 million of the reported value).

Source: Eurostat (PRODCOM)

Table 11.9: Manufacture of medical, precision and optical instruments, watches and clocks (NACE Division 33)
Expenditure, productivity and profitability, EU-27, 2006

	(EUR million)			(EUR thousand per person)	
	Personnel costs	Purchases of goods & services	Investment in tangible goods	Apparent labour productivity	Average personnel costs
Instrument engineering (1)	40 000	90 000	4 395	57.6	41.5
Medical & surgical equipment & orthopaedic appliances	13 379	33 450	1 771	51.4	34.1
Instruments & appliances for measuring, checking, testing, navigating & other purposes, except industrial process control equipment (2)	16 397	37 000	1 617	60.7	45.7
Industrial process control equipment	3 645	9 112	248	49.5	40.5
Optical instruments & photographic equipment	4 089	9 882	716	57.5	36.8
Watches & clocks (1)	408	995	43	46.0	35.2

(1) Rounded estimate based on non-confidential data.
(2) Rounded estimate based on non-confidential data; apparent labour productivity, 2005.

Source: Eurostat (SBS)

within the instrument engineering sector at least 20 % above the national non-financial business economy average – the other countries were Denmark, Italy, Sweden and the United Kingdom, as well as Greece and Romania (both 2005). Ireland and Greece (2005) also reported the highest gross operating rates within the instrument engineering sector, with rates close to 30 %, while Latvia was the only other country (additionally no information for the Czech Republic) to record a gross operating rate in excess of 20 %.

11.2: Computers and office equipment

This subchapter covers the manufacture of office machinery, computers and peripherals, such as printers and terminals (as covered by NACE Division 30). Note that the manufacture of electronic games is classified under toys and is covered within Subchapter 13.2.

The i2010 strategy is the EU's policy framework for the information society and media. It promotes the positive contribution that information and communication technologies (ICT) can make to the economy, society and personal quality of life. Fundamental to these objectives is the use of personal computers in the workplace, at home, or in the form of mobile devices (laptops and netbooks). From a manufacturing perspective, one of the most important priorities of i2010 is a focus on the EU's research and development instruments to promote innovation and technological leadership. Actions implemented under this priority aim to strengthen European innovation and research in ICT through initiatives such as the seventh research framework programme (FP7), European technology platforms, or joint technology initiatives (JTIs).

As noted in the overview to this chapter, there have in recent years been increasing calls to use the potential of ICTs to improve energy efficiency as part of an effort to combat climate change and drive economic recovery. ICTs can be used to improve monitoring and management of energy use in factories, offices and public spaces, as well as helping to make people more aware of how they use energy at home (through metering systems that identify where energy is being used). The energy efficiency of information technology (IT) products – computers and peripherals – is covered by the EU's energy star label which is a voluntary standard that differentiates between efficient and less efficient IT products [8].

Structural profile

There were 10.7 thousand enterprises within the EU-27's computer and office equipment (NACE Division 30) manufacturing sector in 2005, employing 154.6 thousand persons in 2006, while value added reached EUR 9.6 billion from a turnover of EUR 59.6 billion in the same year. The computer and office equipment manufacturing sector was by a considerable margin the smallest activity among the four NACE divisions that comprise the electrical machinery and optical equipment (NACE Subsection DL) manufacturing sector; this was the case for each of the main indicators used to measure the size of an activity. In relative terms, the computer and office equipment sector generally accounted for around 5 % of the electrical machinery and optical equipment manufacturing sector; this share rising as high as 8.4 % for turnover and falling as low as 4.2 % for the number of persons employed.

Within the activity of computer and office equipment manufacturing, the biggest subsector was clearly the manufacture of computers and other information processing equipment (NACE Class 30.02), which accounted for more than three quarters of both the EU-27's value added (77.3 %) and number of persons employed (77.5 %), the remainder being accounted for by the manufacture of office machinery (NACE Class 30.01).

[8] http://www.eu-energystar.org/.

Table 11.10: Manufacture of office machinery and computers (NACE Division 30)
Structural profile, EU-27, 2006

	Enterprises (thousand)	Turnover (EUR million)	Value added (EUR million)	Persons employed (thousand)	Share in total (%)	
					Value added	Persons employed
Office machinery & computers (1)	10.7	59 580	9 634	154.6	100.0	100.0
Office machinery	1.1	6 903	2 191	34.7	22.7	22.4
Computers & other information processing equipment	9.1	52 676	7 444	119.8	77.3	77.5

(1) Number of enterprises, 2005.

Source: Eurostat (SBS)

Table 11.11: Manufacture of office machinery and computers (NACE Division 30)
Structural profile: ranking of top five Member States in terms of value added and persons employed, 2006

	Highest value added (1)			Largest number of persons employed (2)			Most specialised: share in non-financial business economy (%) (3)	
	Country	(EUR million)	(% of EU-27)	Country	(thousand)	(% of EU-27)	Country	Value added
1	Germany	3 692	38.3	Germany	39.2	25.4	Ireland	2.2
2	Ireland	2 009	20.9	United Kingdom	25.3	16.3	Hungary	0.6
3	United Kingdom	1 613	16.7	Italy	14.7	9.5	Germany	0.3
4	Italy	430	4.5	Ireland	12.9	8.3	Bulgaria	0.2
5	France	387	4.0	Czech Republic	10.4	6.7	Sweden	0.2

(1) Malta, not available; Greece, the Netherlands, Poland and Portugal, 2005.
(2) Malta and the Netherlands, not available; Greece, Poland and Portugal, 2005.
(3) Cyprus, Malta and the Netherlands, not available; Bulgaria, Greece, Poland, Portugal and Romania, 2005.

Source: Eurostat (SBS)

Table 11.12: Computers and office equipment (CPA Division 30)
Production of selected products, EU-27, 2007 (1)

	Prodcom code	Production value (EUR million)	Rounding base (EUR million)	Volume of sold production (million)	Unit of volume	Rounding base (million)
Digital data processing machines: presented in the form of systems	30.02.14.00	11 416	-	20.161	units	-
Laptop PCs & palm-top organisers	30.02.12.00	8 712	-	13.165	units	-
Central storage units	30.02.17.30	2 400	800	0.593	units	-
Input or output units whether or not containing storage units in the same housing (including mouses) (excluding printers and keyboards)	30.02.16.70	1 706	-	11.607	units	-
Desk top PCs	30.02.13.00	1 626	-	2.174	units	-

(1) Excluding products of a generic nature (other), sales of services such as repair, maintenance and installation; estimates; threshold of production value set at EUR 1.5 billion; the rounding base indicates the magnitude of the rounding employed to protect confidential cells (in the case of PRODCOM code 30.02.17.30, the value lies within the range +/- EUR 800 million of the reported value).

Source: Eurostat (PRODCOM)

The production of computers and office equipment was highly concentrated in three of the Member States, which together accounted for just over 75 % of the EU-27's value added in 2006. Germany was the leading producer, with a 38.3 % share of EU-27 value added (considerably higher than its corresponding share of the workforce, which stood at 25.4 %). The second highest level of output was recorded in Ireland (20.9 % of EU-27 value added), while one sixth (16.7 %) of the total was generated in the United Kingdom. To give some idea of the extent to which these three countries dominated EU-27 production, the fourth highest share in EU-27 value added was recorded in Italy at just 4.5 %. The contribution of the computer and office equipment sector to non-financial business economy value added was highest in Ireland (2.2 %), which may be attributed to Ireland often being used as a hub by large international manufacturers before distributing their computers across Europe. The next most specialised country was Hungary (where the manufacture of computers and office equipment accounted for 0.6 % of non-financial business economy value added), while Germany (0.3 %) was the third most specialised Member State.

As with many technology-related activities, EU-27 output from computer and office equipment manufacturing followed an erratic development, rising at a rapid pace through to the peak of the dot.com boom in 2000, before falling in the period from 2001 to 2003. Annual short-term statistics show that the index of production for the computer and office equipment manufacturing thereafter rose at a particularly fast pace (on

average by 9.2 % per annum) between 2003 and 2007. Having also peaked in 2000 the EU-27 index of employment for computer and office equipment manufacturing started to follow a downward path and fell in successive years through to 2007, losing an average of 4.5 % of the workforce each year; this trend was likely to be endemic of a gradual shift in assembly operations to lower labour cost regions.

Price comparisons over time are particularly difficult because computer specifications are constantly increasing, while the price of computers tends to fall. Indeed, in contrast to the majority of industrial NACE divisions, the domestic output price index for the manufacture of computers and office equipment in the EU-27 fell between 1997 and 2007 at an average rate of 8.1 % per annum.

Expenditure and productivity

Gross investment in tangible goods of the EU-27's computer and office equipment manufacturing sector in 2006 was particularly low at EUR 710 million. Computer and office equipment manufacturing accounted for 3.5 % of the total investment made in the electrical machinery and optical equipment sector in 2006. The investment rate (defined here as the ratio of investment to value added) of the computer and office equipment manufacturing sector in the EU-27 was 7.4 % in 2006, which was the second lowest ratio among all of the NACE divisions within the non-financial business economy for which data are available in 2005 or 2006 (higher only than for instrument engineering – see the previous subchapter). The Czech Republic and Greece (2005) were the only Member States among those for which data are available [9] to report an investment rate for computer and office equipment manufacturing that was above their non-financial business economy average.

The relative importance of personnel costs in relation to operating expenditure was 10.9 % in the EU-27's computer and office equipment manufacturing sector in 2006. This was almost half the average share recorded within the electrical machinery and optical equipment sector (20.6 %) and was the lowest share among the four NACE divisions that are covered in this chapter.

In productivity terms, each person employed in the EU-27's computer and office equipment manufacturing sector generated an average of EUR 62.3 thousand of value added in 2006, which was well above the EUR 55.3 thousand average for electrical machinery and optical equipment. Average personnel costs were also somewhat higher, at EUR 42.6 thousand per employee in 2005 for computer and office equipment manufacturing, when compared with the average for electrical machinery and optical equipment (EUR 39.6 thousand per employee in the same year). Apparent labour productivity more than covered average personnel costs, as the wage adjusted labour productivity ratio for computer and office equipment manufacturing stood at 153.0 % in 2005, which was above the average for the whole of electrical machinery and optical equipment sector (130.9 % in the same year), as well as being the highest wage adjusted labour productivity ratio among the four NACE divisions covered within this chapter.

In the majority of the Member States [10], average personnel costs were considerably higher within the computer and office equipment manufacturing sector than across the whole of the non-financial business economy. This was particularly true in Germany, where they were 83.4 % above the average in 2006. These relatively high personnel costs per employee were to some extent reflection of a high level of apparent labour productivity, as each person employed in the German computer and office equipment manufacturing sector generated 75.7 % more added value than the national average within the non-financial business economy. This relative performance was only bettered in Latvia (where apparent labour productivity among the computer and office equipment workforce was 212.1 % higher than the average), Ireland (87.1 %) and in Hungary (82.9 % higher).

([9]) Greece, Poland and Portugal, 2005; Ireland, Cyprus, Luxembourg, Malta and the Netherlands, not available.

([10]) Bulgaria, Greece, Poland, Portugal and Romania, 2005; Cyprus, Luxembourg, Malta and the Netherlands, not available.

11.3: Electrical machinery and equipment

This subchapter covers NACE Division 31 which includes the manufacture of electric motors, generators, transformers, electricity distribution equipment, insulated wires and cables, optical fibres for coded data transmission, batteries, lighting equipment, and other electrical equipment. Note that the manufacture of domestic appliances is covered within Subchapter 10.5.

The electrical machinery and equipment sector is composed of a diverse range of activities that are mainly supplied to professional downstream users in the form of electro-technical equipment and less frequently to consumer markets. Many of the activities within the electrical machinery and equipment sector, in contrast to those in the other subchapters covered by this chapter, may be considered to be quite mature. This may explain why there are relatively low research and development budgets in some of these activities, while many producers focus on their key products and make increasing recourse to outsourcing.

Structural profile

The 70.7 thousand enterprises that were operating within the EU-27's electrical machinery and equipment manufacturing sector (NACE Division 31) in 2006 made the largest contribution of the four NACE divisions covered within this chapter to the value added of the electrical machinery and optical equipment (NACE Subsection DL) manufacturing sector, accounting for two fifths of the total (40.9 %), and just under half (46.6 %) of all those employed. The electrical machinery and equipment manufacturing sector in the EU-27 generated EUR 82.9 billion of value added in 2006 from sales of EUR 282.0 billion.

Table 11.13: Manufacture of electrical machinery and apparatus n.e.c. (NACE Division 31) Structural profile, EU-27, 2006

	Enterprises (thousand)	Turnover (EUR million)	Value added (EUR million)	Persons employed (thousand)	Share in total (%)	
					Value added	Persons employed
Electrical machinery & apparatus (1)	70.7	282 000	82 900	1 710.0	100.0	100.0
Elec. motors, generators & transformers (2)	20.9	50 000	15 000	300.1	18.1	17.5
Electricity distribution & control apparatus	13.2	101 767	33 098	580.6	39.9	34.0
Insulated wire & cable	2.4	32 934	5 768	130.0	7.0	7.6
Accumulators, primary cells & batteries	0.7	6 951	1 617	35.7	2.0	2.1
Lighting equipment & electric lamps	8.7	22 283	7 582	164.9	9.1	9.6
Electrical equipment n.e.c.	24.7	62 895	19 707	503.5	23.8	29.4

(1) Rounded estimates based on non-confidential data.
(2) Rounded estimates based on non-confidential data; turnover, 2005.

Source: Eurostat (SBS)

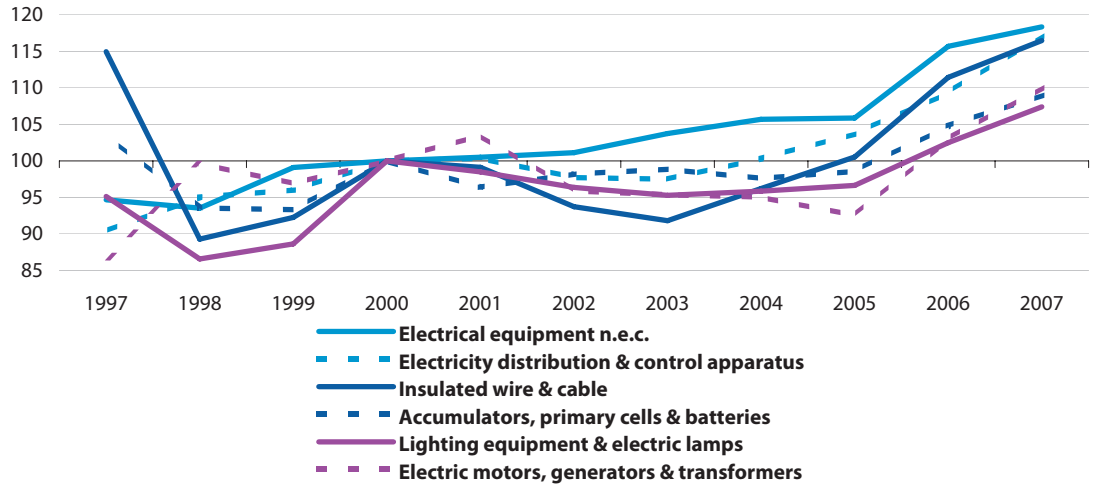
Table 11.14: Manufacture of electrical machinery and apparatus n.e.c. (NACE Division 31) Structural profile: ranking of top five Member States in terms of value added and persons employed, 2006

	Highest value added (1)			Largest number of persons employed (1)			Most specialised: share in non-financial business economy (%) (2)	
	Country	(EUR million)	(% of EU-27)	Country	(thousand)	(% of EU-27)	Country	Value added
1	Germany	33 785	40.8	Germany	519.1	30.4	Hungary	4.1
2	Italy	9 522	11.5	Italy	184.7	10.8	Czech Republic	3.0
3	France	8 975	10.8	France	150.7	8.8	Germany	2.9
4	United Kingdom	7 262	8.8	United Kingdom	125.0	7.3	Slovakia	2.8
5	Spain	5 352	6.5	Czech Republic	115.5	6.8	Slovenia	2.7

(1) Luxembourg and Malta, not available; the Netherlands and Poland, 2005.
(2) Cyprus, Luxembourg, Malta and the Netherlands, not available; Bulgaria, Poland and Romania, 2005.

Source: Eurostat (SBS)

Figure 11.5: Manufacture of electrical machinery and apparatus n.e.c. (NACE Division 31)
Index of production, EU-27 (2000=100)



Source: Eurostat (STS)

Looking in more detail, the largest activity in the EU-27 in terms of the NACE groups which compose the electrical machinery and equipment sector was the manufacture of electricity distribution and control apparatus (NACE Group 31.2) which contributed EUR 33.1 billion of value added (39.9 % of the electrical machinery and equipment manufacturing total), followed by the manufacture of electrical equipment not elsewhere classified (NACE Group 31.6) which contributed EUR 19.7 billion (23.8 %) and the manufacture of electric motors, generators and transformers (NACE Group 31.1) which provided EUR 15.0 billion (18.1 %). In employment terms, these three subsectors together accounted for more than four fifths (80.9 %) of the 1.7 million persons employed in the EU-27's electrical machinery and equipment manufacturing sector.

As with most of the activities covered within this chapter, the electrical machinery and equipment sector was dominated by Germany, which contributed a little over two fifths (40.8 %) of the EU-27's value added in 2006 – more than three times as high as the next biggest shares recorded by Italy and France (11.5 % and 10.8 % respectively). In relation to the non-financial business economy value added of each Member State, the electrical machinery and equipment manufacturing sector in Hungary contributed the highest share (4.1 %) in 2006, while the Czech Republic (3.0 %) and Germany (2.9 %) were the next most specialised Member States, with ratios that were about double the EU-27 average (1.5 %).

The development of the index of production for the manufacture of electrical machinery and equipment in the EU-27 during the ten years between 1997 and 2007 was similar to that observed for the whole of electrical machinery and optical equipment manufacturing (NACE Subsection DL), albeit with less pronounced fluctuations both when expanding and contracting. Furthermore, the downturn in electrical machinery and equipment manufacturing output in 2002 and the subsequent upturn in 2004 lagged, by one year, a similar development for electrical machinery and optical equipment manufacturing as a whole. Over the ten years through to 2007, the index of production for the manufacture of electrical machinery and equipment grew at an average rate of 2.7 % per annum, a lower figure than that recorded for the whole of electrical machinery and optical equipment manufacturing (4.5 % per annum).

Expenditure and productivity

The EU-27's electrical machinery and equipment manufacturing sector recorded an investment rate (the ratio of investment to value added) of 9.1 % in 2006, about half the average for the whole of the non-financial business economy (18.4 %). The relatively low level of capital intensity of this activity is evident when looking at its share of total investment within the EU-27's non-financial business economy (0.7 %), which was less than half its corresponding share of non-financial business economy value added (1.5 %).

Table 11.15: Electrical machinery and equipment (CPA Division 31)
Production of selected products, EU-27, 2007 (1)

	Prodcom code	Production value (EUR million)	Rounding base (EUR million)	Volume of sold production (million)	Unit of volume	Rounding base (million)
Insulated ignition wiring sets & other wiring sets of a kind used in vehicles, aircraft or ships	31.61.10.00	7 575	-	817	kg	-
Generating sets including turbo-generators, generating sets for welding equipment without heads/appliances excluding with compression, internal & spark-ignition combustion piston engines	31.10.32.50	5 349	-	0.022	units	-
Chandeliers & other electric ceiling or wall lighting fittings (excluding those used for lighting public open spaces or thoroughfares)	31.50.25.30	5 176	-	324	units	-
Electrical apparatus for switching electrical circuits for a voltage ≤ 1 kV (including push-button & rotary switches) (excluding relays)	31.20.25.00	4 800	800	3 200	units	800.0
Insulated electric conductors for voltage >1 000V excluding winding wire, coaxial cable & other coaxial electric conductors, ignition & other wiring sets used in vehicles, aircraft, ships	31.30.14.00	3 879	-	788	kg	-
Programmable memory controllers for a voltage ≤ 1 kV	31.20.31.50	3 850	-	63	units	-
Electrical lighting or visual signalling equipment for motor vehicles (excluding electric filament or discharge lamps, sealed beam lamp units, ultraviolet, infrared & arc lamps)	31.61.23.30	3 784	-	201	kg	-
Connections & contact elements for wires and cables for a voltage ≤ 1 kV	31.20.27.70	3 708	-	36 128	units	-
Plugs & sockets for a voltage ≤ 1 kV (excluding for coaxial cables, for printed circuits)	31.20.27.50	3 479	-	24 000	units	2 000
Boards, panels, consoles, desks, cabinets & other bases for apparatus for electric control or the distribution of electricity (excluding those equipped with their apparatus)	31.20.40.30	3 450	50	464	units	-

(1) Excluding products of a generic nature (other), sales of services such as repair, maintenance and installation; estimates; threshold of production value set at EUR 3 billion; the rounding base indicates the magnitude of the rounding employed to protect confidential cells (in the case of PRODCOM code 31.20.25.00, the value lies within the range +/- EUR 800 million of the reported value).

Source: Eurostat (PRODCOM)

Table 11.16: Manufacture of electrical machinery and apparatus n.e.c. (NACE Division 31)
Expenditure, productivity and profitability, EU-27, 2006

	(EUR million)			(EUR thousand per person)	
	Personnel costs	Purchases of goods & services	Investment in tangible goods	Apparent labour productivity	Average personnel costs
Electrical machinery & apparatus (1)	59 500	207 000	7 535	48.5	36.1
Electric motors, generators & transformers (1)	10 000	40 000	1 370	50.0	35.3
Electricity distribution & control apparatus	26 787	72 989	2 455	57.0	47.1
Insulated wire & cable	3 740	27 808	677	44.4	28.8
Accumulators, primary cells & batteries	1 221	5 470	190	45.3	34.9
Lighting equipment & electric lamps	4 554	15 171	751	46.0	29.1
Electrical equipment n.e.c.	13 494	44 164	2 092	39.1	28.3

(1) Rounded estimates based on non-confidential data.

Source: Eurostat (SBS)

In contrast, the relative importance of personnel costs in the electrical machinery and equipment sector's operating expenditure was relatively high, at 22.3 % for the EU-27 in 2006, compared with an average of 16.1 % for the whole of the non-financial business economy. This share was based on average personnel costs in the EU-27 of EUR 36.1 thousand per employee, which was well above the non-financial business economy average of EUR 28.8 thousand, while being the lowest level among the four NACE division covered by this chapter.

The EU-27's electrical machinery and equipment manufacturing sector recorded an apparent labour productivity of EUR 48.5 thousand per person employed in 2006, which was also the lowest level among the four NACE divisions within this chapter, but was again higher than the non-financial business economy average (EUR 43.5 thousand per person employed). Combining these two ratios into the wage adjusted labour productivity ratio shows the relationship between value added and personnel costs per head, and indicates that value added per person employed in the EU-27's electrical machinery and equipment manufacturing sector was equivalent to 134.4 % of the average personnel costs in 2006, the lowest ratio for this indicator among the four NACE divisions that are treated in this chapter, and also below the non-financial business economy average (151.1 %).

Among the NACE groups that make up the electrical machinery and equipment manufacturing sector, none were particularly capital-intensive, with the highest investment rates for the EU-27 being recorded for two relatively small subsectors that concern the manufacture of insulated wires and cables (11.7 %) and the manufacture of accumulators, primary cells and batteries (11.8 %). The least capital-intensive subsector – using this measure of the investment rate – was the manufacture of electricity distribution and control apparatus (7.4 %), which also recorded the highest share of personnel costs in operating expenditure (26.8 %) among the six NACE groups covered by this subchapter, as well as the highest level of apparent labour productivity (EUR 57.0 thousand per person employed) and the highest level of average personnel costs per employee (EUR 47.1 thousand).

However, when adjusting labour productivity to take account of personnel costs, the highest wage adjusted labour productivity ratios within the EU-27's electrical machinery and equipment manufacturing sector were recorded for the manufacture of insulated wire and cable (154.2 %) and the manufacture of lighting equipment and electric lamps (158.2 %); both of which were characterised by relatively low average personnel costs per employee that were close to the non-financial business economy average.

Among the Member States[11], high average personnel costs were recorded in Germany, at EUR 54.7 thousand per employee in 2006, the highest level among the Member States. Average personnel costs in the German electrical machinery and equipment manufacturing sector were 53.4 % higher than the national average for the non-financial business economy, once again the highest value. Using a similar measure, the relative apparent labour productivity of the electrical machinery and equipment manufacturing sector (in relation to the non-financial business economy average) was at around 50 % above average in Spain, Greece and Hungary.

(11) Bulgaria, Greece, Poland and Romania, 2005; Ireland, Cyprus, Luxembourg, Malta and the Netherlands, not available.

11.4: Radio, television and communication equipment

This subchapter covers the manufacture of radio, television and communication equipment, which are classified as NACE Division 32. Electronic components, including active, passive and printed circuit boards (PCBs) are included within NACE Group 32.1; the manufacture of television cameras, transmission apparatus for radio and television, telephonic switching apparatus (including LANs and modems), telephones and fax machines are found under NACE Group 32.2 (note that Chapter 22 deals with information, communication and media content that makes use of this equipment); while NACE Group 32.3 covers the manufacture of audio-visual equipment and related appliances, such as loudspeakers, headphones and aerials, as well as other electronic consumer appliances, such as telephone answering machines.

The main downstream customers for manufacturers of electronic components include the computer and office equipment sector, communications manufacturers, as well as motor vehicles manufacturing and manufacturers of consumer electronics/household appliances, with electronic components forming the technology backbone on which PCs, wireless handsets, navigation and ABS systems, set-top boxes and camcorders are based. Technological innovation has led to miniaturisation, digitalisation and convergence in terms of radio, television and communication equipment, as witnessed through multifunctional, digital products (such as third generation mobile phones that incorporate high-speed Internet access and video telephony, or MP3 players that can also be used to surf the Internet, or view photographs).

This area of the economy is highly intensive in terms of research and development (R&D), underlining its important role as a driver for innovation. Much of the research is conducted in knowledge-based clusters that are centred on the proximity of universities, research and design centres and manufacturing facilities, such as Dresden (Germany), Dublin (Ireland), Grenoble (France), Catania (Italy), the Nijmegen-Eindhoven-Leuven axis (Netherlands/Belgium) or around Helsinki (Finland).

In this context, the seventh Framework Programme (FP7) on research and development may provide a platform to share ideas and innovate. Among the technology platforms established for this purpose are the networked and electronic media platform which looks to focus on generalised broadband access, increased mobility, the availability of richer media formats and contents, as well as new home networks and communications platforms, and the mobile and wireless communications technology platform that looks to build on GSM and DECT [12] technologies.

The radio, television and communication equipment sector faces intense competition from the Far East, which further underlines the need for European manufacturers to continually innovate. At the same time, many product markets are characterised by imitation and it is often difficult to protect intellectual property.

Structural profile

Just over a quarter (25.6 %) of the value added generated within the EU-27's electrical machinery and optical equipment (NACE Subsection DL) manufacturing activities in 2006 came from the manufacture of radio, television and communication equipment (NACE Division 32) sector. The EUR 51.8 billion of value added that was generated in the EU-27 by 29.4 thousand enterprises that reported radio, television and communication equipment manufacturing as their principal activity in 2006, represented just 14.5 % of the total number of enterprises within the electrical machinery and optical equipment total. The radio, television and communication equipment sector employed 771.6 thousand persons in 2005.

Due to scarce data availability, the most complete measure of the relative importance of the subsectors that compose the EU-27's radio, television and communication equipment sector is presented in terms of employment shares. The manufacture of electronic valves and tubes and other electric components (NACE Group 32.1) was the largest subsector, employing 309.9 thousand persons in 2006 (40.9 % of the radio, television and communication equipment manufacturing total), which was only slightly more than the 36.9 % share recorded for television and radio transmitters and apparatus for line telephony and line telegraphy manufacturing (NACE Group 32.2), with the

[12] Global system for mobile communication; digital enhanced cordless telecommunications.

Table 11.17: Manufacture of radio, television and communication equipment and apparatus (NACE Division 32) Structural profile, EU-27, 2006

	Enterprises (thousand)	Turnover (EUR million)	Value added (EUR million)	Persons employed (thousand)	Share in total (%)	
					Value added	Persons employed
Radio, television & communication equipment (1)	29.4	221 437	51 847	771.6	100.0	100.0
Electronic valves & tubes & other electronic components (2)	8.9	64 505	20 000	309.9	38.6	40.9
Television & radio transmitters & apparatus for line telephony & line telegraphy (2)	14.0	:	:	271.3	:	36.9
Television & radio receivers, sound or video recording or reproducing apparatus & associated goods (1)	6.4	:	:	171.6	:	22.2

(1) Number of persons employed, 2005.
(2) Rounded estimates based on non-confidential data.

Source: Eurostat (SBS)

Table 11.18: Manufacture of radio, television and communication equipment and apparatus (NACE Division 32) Structural profile: ranking of top five Member States in terms of value added and persons employed, 2006

	Highest value added (1)			Largest number of persons employed (2)			Most specialised: share in non-financial business economy (%) (3)	
	Country	(EUR million)	(% of EU-27)	Country	(thousand)	(% of EU-27)	Country	Value added
1	Germany	10 844	20.9	Germany	138.5	18.1	Finland	7.0
2	France	6 923	13.4	France	111.1	14.9	Hungary	3.6
3	Finland	5 786	11.2	Italy	80.5	11.0	Ireland	2.9
4	United Kingdom	4 867	9.4	United Kingdom	65.6	8.6	Sweden	2.5
5	Sweden	4 093	7.9	Hungary	49.7	7.0	Slovakia	2.2

(1) Luxembourg, Malta and the Netherlands, not available; Poland and Portugal, 2005.
(2) Luxembourg, Malta and the Netherlands, not available; number of persons employed: Poland and Portugal, 2005; share of EU-27: all data are for 2005.
(3) Luxembourg, Malta and the Netherlands, not available; Bulgaria, Cyprus, Poland, Portugal and Romania, 2005.

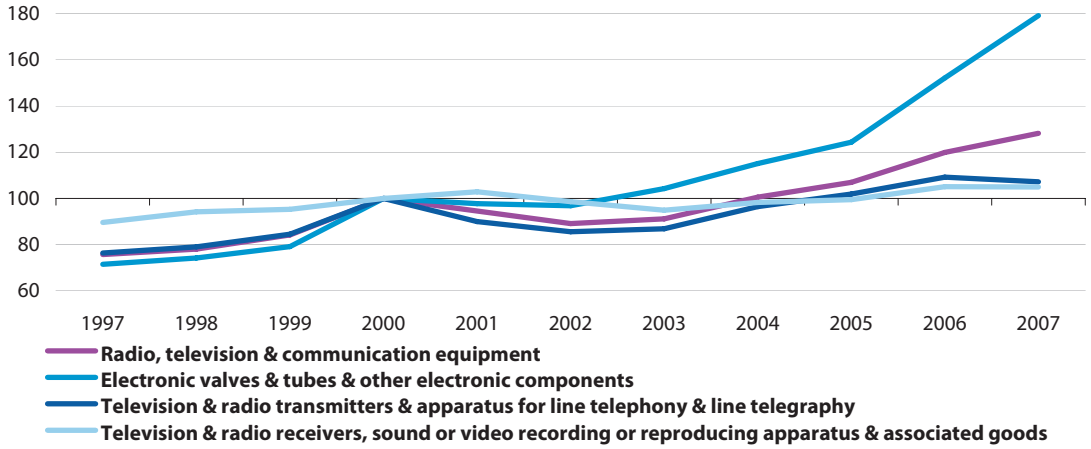
Source: Eurostat (SBS)

remainder of the workforce (22.2 % in 2005) employed within the manufacture of television and radio receivers, sound or video recording and reproducing apparatus (NACE Group 32.3).

Just over a fifth (20.9 %) of the value added generated by the EU-27's radio, television and communication equipment sector came from Germany in 2006, while there were two other Member States that recorded a double digit share of EU-27 value added – namely, France (13.4 %) and Finland (11.2 %). Finland was by far the most specialised Member State for the manufacture of radio, television and communication equipment (largely due to mobile telephony), as this sector accounted for 7.0 % of its non-financial business economy value added (compared with an EU-27 average of 0.9 %). The specialisation ratio for Finland was approximately double that recorded in the second most specialised country, Hungary (3.6 %), while Ireland and Sweden were also relatively specialised.

The development of the EU-27 production index for the manufacture of radio, television and communication equipment in the ten years between 1997 and 2007 followed a similar but slightly more amplified development when compared with the production index for the whole of electrical machinery and optical equipment manufacturing. The index of production for radio, television and communication equipment manufacturing followed a very cyclical pattern, with average growth of 7.5 % per annum during the period 2002 to 2007, following on from average losses of 5.6 % per annum between 2000 and 2002. Despite the fluctuations in output, the overall expansion in EU-27 output of radio,

Figure 11.6: Manufacture of radio, television and communication equipment and apparatus (NACE Division 32)
Index of production, EU-27 (2000=100)



Source: Eurostat (STS)

television and communication equipment manufacturing between 1997 and 2007 outstripped all other industrial (NACE Sections C to E) divisions for which data are available, averaging 5.4 % per annum over the ten-year period.

Expenditure and productivity

Gross tangible investment made by the EU-27's radio, television and communication equipment manufacturing sector in 2006 was valued at EUR 7.8 billion, which was 0.8 % of the non-financial business economy total. The investment rate of the radio, television and communication equipment manufacturing sector was 15.1 %, slightly below the non-financial business economy average of 18.4 %, but relatively high for one of the electrical machinery and optical equipment sectors. Among the Member States [13], the investment rate for the radio, television and communication equipment manufacturing sector climbed to over 20 % in ten of the Member States in 2005 or 2006. However, the investment rate of the radio, television and communication equipment manufacturing sector was only above the non-financial business economy average in four of the Member States for which data are available. Among these, Germany (77 % above average) clearly stood out, while the Czech Republic, Poland (2005) and Italy (22 % to 14 % higher) also reported relatively high investment rates for radio, television and communication equipment manufacturing.

The structure of operating expenditure within the radio, television and communication equipment manufacturing sector was such that personnel costs accounted for 15.4 % of the total, the remainder being made up of purchases of goods and services. This share was lower than the average proportion of operating expenditure accounted for by personnel costs within the whole of the electrical and optical equipment sector (20.6 %), despite the fact that average personnel costs were EUR 43.3 thousand per employee – the highest level among the four NACE divisions covered by this chapter. In a similar vein, apparent labour productivity was also relatively high for the EU-27's radio, television and communication equipment manufacturing sector (EUR 62.5 thousand per person employed in 2005). Nevertheless, when productivity was adjusted to take account of personnel costs, the wage adjusted labour productivity ratio for the EU-27's radio, television and communication equipment manufacturing sector was 143.1 % in 2005, above the average for the whole of electrical and optical equipment (130.9 %) in the same year, but still slightly below the non-financial business economy average (146.5 %) in the same year.

The most productive workforce among the Member States [14] for radio, television and communication equipment manufacturing was in Ireland, where each person employed generated an average of EUR 318.9 thousand of added value in

[13] Poland and Portugal, 2005; Luxembourg, Malta and the Netherlands, not available.

[14] Bulgaria, Cyprus, Poland, Portugal and Romania, 2005; Luxembourg, Malta and the Netherlands, not available.

Table 11.19: Radio, television and communication equipment (CPA Division 32)
Production of selected products, EU-27, 2007 (1)

	Prodcom code	Production value (EUR million)	Rounding base (EUR million)	Volume of sold production (million)	Unit of volume	Rounding base (million)
Flat panel colour TV receivers, lcd/plasma, etc. excluding television projection equipment, apparatus with video recorder/player, video monitors, television receivers with integral tube	32.30.20.60	11 553	-	27.2	units	-
Transmission apparatus for radio-broadcasting & television with reception apparatus	32.20.11.60	9 000	3 000	38.5	units	-
Machines for the reception, conversion & transmission or regeneration of voice, images or other data, including switching & routing apparatus	32.20.20.45	8 190	-	188.1	units	-
Telephones for cellular networks or for other wireless networks	32.20.20.25	8 000	4 000	207.1	units	-
Electronic integrated circuits (excluding multichip circuits): processors & controllers, whether or not combined with memories, converters, logic circuits, amplifiers, clock & timing circuits	32.10.62.06	6 566	-	4 056.4	units	-
Base stations for line telephony or line telegraphy	32.20.20.35	5 372	-	3.3	units	-
Photosensitive semiconductor devices; solar cells, photo-diodes, photo-transistors, etc.	32.10.52.37	5 049	-	1 146.9	units	-

(1) Excluding products of a generic nature (other), sales of services such as repair, maintenance and installation; estimates; threshold of production value set at EUR 5 billion; the rounding base indicates the magnitude of the rounding employed to protect confidential cells (in the case of PRODCOM code 32.20.11.60, the value lies within the range +/- EUR 3 000 million of the reported value).

Source: Eurostat (PRODCOM)

2006. The respective workforces of Finland and Sweden were also highly productive (EUR 164.6 thousand and EUR 144.7 thousand per person employed). These figures, to some degree reflect the relatively high average levels of productivity in these three economies – although it is also interesting to note that all three countries were among the most specialised Member States in terms of the manufacture of radio, television and communication equipment. Furthermore, when comparing the labour productivity of the radio, television and communication equipment manufacturing sector with national non-financial business economy averages, Ireland again topped the ranking – as its workforce for this sector was 3.8 times as productive as the non-financial business economy average. Finland (2.5 times) and Sweden (2.4 times) were joined by Portugal and Bulgaria (both 2005) as the only other Member States where the radio, television and communication equipment workforce was at least twice as productive as the national non-financial business economy average.

Table 11.20: Manufacture of office machinery and computers (NACE Division 30)
Main indicators, 2006 (1)

	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT
Enterprises	0.1	0.1	0.6	0.1	0.7	0.0	0.0	0.8	1.1	0.5	1.9	0.0	0.0	0.0
Persons employed	0.9	2.1	10.4	1.1	39.2	0.3	12.9	0.9	4.9	7.8	14.7	0.0	0.2	0.4
Turnover	239	67	4 111	243	16 664	59	19 649	14	792	1 986	3 878	0	28	26
Production	229	64	4 134	240	13 126	42	18 843	11	733	1 586	3 203	0	27	17
Purch. of goods & serv.	183	62	4 099	157	13 034	54	17 726	9	633	1 564	3 520	0	21	23
Value added	54	14	61	88	3 692	5	2 009	5	157	387	430	0	7	4
Personnel costs	31	6	110	53	2 546	3	551	1	127	359	472	0	2	2
Average personnel costs	44.5	2.9	11.2	50.5	65.4	12.0	42.9	12.9	30.1	46.0	38.3	:	8.9	5.4
Gross operating surplus	23	9	-50	35	1 146	2	1 458	4	30	28	-42	0	6	2
Gross investment	4	5	44	4	177	0	62	2	15	43	64	0	0	1
Apparent labour prod.	63.0	6.9	5.9	82.5	94.2	19.1	156.2	5.5	31.8	49.4	29.3	:	42.4	9.7
Wage adj. labour prod.	141.6	235.8	52.4	163.4	144.0	159.5	364.3	42.3	105.6	107.3	76.4	:	475.8	178.2
Gross operating rate	9.7	12.6	-1.2	14.4	6.9	3.4	7.4	28.4	3.8	1.4	-1.1	:	20.9	6.8
Investment rate	7.1	33.3	72.6	4.6	4.8	3.1	3.1	36.1	9.3	11.1	14.8	:	4.1	20.1
	LU	**HU**	**MT**	**NL**	**AT**	**PL**	**PT**	**RO**	**SI**	**SK**	**FI**	**SE**	**UK**	**NO**
Enterprises	0.0	0.3	:	0.2	0.1	0.9	0.1	0.5	0.1	0.0	0.1	0.4	1.6	0.0
Persons employed	0.0	8.9	:	:	1.1	6.7	0.9	4.3	0.7	1.4	0.3	4.3	25.3	0.2
Turnover	0	2 570	:	1 453	213	602	110	422	110	72	73	845	5 196	69
Production	0	2 442	:	1 246	200	446	66	306	73	62	60	851	4 647	70
Purch. of goods & serv.	0	2 317	:	1 169	147	502	91	469	89	52	57	605	3 499	57
Value added	0	271	:	346	74	99	21	-46	22	20	16	252	1 613	13
Personnel costs	0	108	:	275	51	48	16	24	17	12	11	175	1 138	14
Average personnel costs	:	12.2	:	:	48.3	8.6	19.5	5.6	23.4	8.4	39.0	45.7	48.0	84.1
Gross operating surplus	0	163	:	70	23	51	5	-70	5	8	5	70	475	-1
Gross investment	0	26	:	:	4	10	3	27	2	7	1	17	145	1
Apparent labour prod.	:	30.3	:	:	67.2	14.9	25.1	-10.7	29.1	13.6	54.3	58.9	63.8	75.1
Wage adj. labour prod.	:	248.5	:	:	139.2	173.4	129.0	-190.5	124.4	160.9	139.4	128.8	132.9	89.3
Gross operating rate	:	6.3	:	4.8	10.8	8.5	4.9	-16.5	4.3	10.5	6.9	8.3	9.1	-1.8
Investment rate	:	9.7	:	:	5.7	9.6	11.6	-59.3	9.6	32.9	3.2	6.7	9.0	5.5

(1) Greece, the Netherlands, Poland and Portugal, 2005; unless otherwise stated, values refer to EUR million; number of enterprises and number of persons employed are given in thousands; average personnel costs and apparent labour productivity are given in EUR thousand per person; wage adjusted labour productivity, gross operating rate and investment are ratios expressed as percentages.

Source: Eurostat (SBS)

Table 11.21: Manufacture of electrical machinery and apparatus n.e.c. (NACE Division 31)
Main indicators, 2006 (1)

	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT
Enterprises	0.7	0.6	14.4	0.9	6.4	0.1	0.1	1.7	3.0	4.1	17.6	0.1	0.1	0.3
Persons employed	18.2	21.9	115.5	23.9	519.1	6.3	7.6	8.0	87.7	150.7	184.7	0.4	3.6	6.6
Turnover	3 993	645	7 428	6 211	105 796	394	2 847	1 248	20 639	33 013	35 578	35	152	286
Production	3 986	616	7 242	6 098	98 345	353	2 828	1 230	19 683	32 250	34 844	33	136	274
Purch. of goods & serv.	2 799	546	5 672	4 872	75 009	306	2 128	984	15 915	25 062	26 907	24	116	207
Value added	1 274	135	2 022	1 560	33 785	99	745	339	5 352	8 975	9 522	12	46	85
Personnel costs	915	61	1 171	1 110	28 214	63	311	155	3 149	6 953	5 502	8	26	39
Average personnel costs	51.9	2.8	11.4	47.0	54.7	10.1	41.4	24.6	36.5	46.3	34.5	19.9	7.3	6.1
Gross operating surplus	359	74	851	450	5 571	36	434	184	2 203	2 022	4 019	4	20	46
Gross investment	56	40	342	215	2 634	27	51	115	465	709	962	1	11	3
Apparent labour prod.	69.8	6.1	17.5	65.1	65.1	15.8	98.3	42.2	61.1	59.6	51.5	28.9	12.9	13.0
Wage adj. labour prod.	134.6	215.9	153.6	138.5	118.9	155.6	237.7	171.6	167.2	128.5	149.4	145.5	177.0	212.5
Gross operating rate	9.0	11.4	11.5	7.2	5.3	9.0	15.3	14.7	10.7	6.1	11.3	12.0	13.3	16.2
Investment rate	4.4	29.8	16.9	13.8	7.8	27.0	6.8	34.1	8.7	7.9	10.1	9.7	22.7	4.0
	LU	**HU**	**MT**	**NL**	**AT**	**PL**	**PT**	**RO**	**SI**	**SK**	**FI**	**SE**	**UK**	**NO**
Enterprises	0.0	1.5	:	1.0	0.6	5.0	3.1	0.9	0.8	0.4	0.5	1.3	5.3	0.5
Persons employed	:	69.1	:	16.5	27.9	97.8	24.6	84.0	15.2	46.1	17.5	24.7	125.0	6.6
Turnover	:	6 469	:	3 797	6 190	6 138	2 612	2 284	1 369	2 231	4 336	5 210	21 450	1 855
Production	:	5 411	:	3 255	5 780	5 590	2 465	2 286	1 266	2 092	4 004	5 013	20 037	1 708
Purch. of goods & serv.	:	5 182	:	2 706	4 543	4 618	2 097	1 821	968	1 726	3 217	3 811	14 199	1 314
Value added	:	1 714	:	1 117	1 946	1 644	563	559	431	509	1 263	1 544	7 262	575
Personnel costs	:	732	:	768	1 307	747	461	376	259	337	782	1 087	4 732	413
Average personnel costs	:	10.7	:	47.8	47.4	8.1	19.0	4.5	17.6	7.3	44.8	48.1	38.9	63.1
Gross operating surplus	:	982	:	349	639	896	102	183	172	172	482	425	2 530	162
Gross investment	:	241	:	63	191	245	52	245	85	148	66	98	439	64
Apparent labour prod.	:	24.8	:	67.6	69.8	16.8	22.8	6.7	28.4	11.0	72.1	62.6	58.1	86.6
Wage adj. labour prod.	:	231.4	:	141.6	147.2	207.8	120.5	148.2	161.8	150.8	161.0	130.2	149.5	137.2
Gross operating rate	:	15.2	:	9.2	10.3	14.6	3.9	8.0	12.6	7.7	11.1	8.2	11.8	8.7
Investment rate	:	14.1	:	5.6	9.8	14.9	9.2	43.8	19.7	29.1	5.2	6.3	6.0	11.1

(1) The Netherlands and Poland, 2005; unless otherwise stated, values refer to EUR million; number of enterprises and number of persons employed are given in thousands; average personnel costs and apparent labour productivity are given in EUR thousand per person; wage adjusted labour productivity, gross operating rate and investment are ratios expressed as percentages.

Source: Eurostat (SBS)

Table 11.22: Manufacture of radio, television and communication equipment and apparatus (NACE Division 32) Main indicators, 2006 (1)

	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT
Enterprises	0.2	0.2	4.4	0.2	2.7	0.1	0.0	0.8	1.0	2.4	7.2	0.0	0.0	0.1
Persons employed	16.2	5.5	32.9	6.4	138.5	6.1	8.4	4.4	24.5	111.1	80.5	0.0	1.0	5.8
Turnover	5 043	124	4 080	1 360	50 776	245	4 307	578	6 480	27 009	13 492	35	38	231
Production	4 879	116	3 749	1 337	38 498	243	4 700	444	5 320	23 982	12 478	36	38	231
Purch. of goods & serv.	3 603	91	3 405	988	39 908	178	2 155	455	5 610	20 578	9 559	32	22	193
Value added	1 850	37	760	423	10 844	78	2 681	150	1 153	6 923	3 935	4	18	37
Personnel costs	1 105	17	370	291	7 620	51	396	113	793	6 094	2 792	1	7	44
Average personnel costs	69.1	3.2	12.4	45.6	55.6	8.4	47.2	31.2	33.4	55.0	39.4	16.2	7.1	7.6
Gross operating surplus	745	20	390	131	3 224	27	2 285	37	360	829	1 142	3	11	-7
Gross investment	101	18	200	41	2 479	10	641	32	195	1 005	797	0	3	5
Apparent labour prod.	114.1	6.7	23.1	65.6	78.3	12.7	318.9	34.0	47.2	62.3	48.9	87.3	18.0	6.5
Wage adj. labour prod.	165.1	210.9	185.9	143.8	140.8	152.0	676.1	108.9	141.4	113.3	124.0	538.7	253.0	84.8
Gross operating rate	14.8	16.0	9.6	9.7	6.3	10.9	53.1	6.5	5.6	3.1	8.5	9.3	29.4	-2.8
Investment rate	5.5	47.7	26.3	9.7	22.9	13.4	23.9	21.2	16.9	14.5	20.2	10.8	13.7	14.4
	LU	**HU**	**MT**	**NL**	**AT**	**PL**	**PT**	**RO**	**SI**	**SK**	**FI**	**SE**	**UK**	**NO**
Enterprises	0.0	1.7	:	0.4	0.3	2.7	0.3	0.2	0.3	0.2	0.3	0.8	2.7	0.1
Persons employed	:	49.7	:	:	25.6	33.0	12.4	9.2	5.0	12.9	35.1	28.3	65.6	3.9
Turnover	:	12 879	:	:	6 686	3 395	3 165	414	412	3 344	36 852	11 854	14 514	1 212
Production	:	11 947	:	:	6 091	3 349	3 161	408	341	3 286	19 116	12 513	13 538	1 211
Purch. of goods & serv.	:	11 517	:	:	4 449	3 034	2 640	308	303	3 027	31 970	8 444	9 454	829
Value added	:	1 521	:	:	2 582	594	608	117	115	399	5 786	4 093	4 867	391
Personnel costs	:	569	:	:	1 644	287	320	71	104	105	2 166	1 907	2 766	281
Average personnel costs	:	11.8	:	:	64.6	9.6	26.3	7.8	21.3	8.1	61.7	70.9	43.0	73.2
Gross operating surplus	:	952	:	:	938	307	288	46	11	294	3 620	2 113	2 101	110
Gross investment	:	215	:	:	256	137	106	55	27	111	378	152	328	33
Apparent labour prod.	:	30.6	:	:	100.8	18.0	48.9	12.8	22.7	30.8	164.6	144.7	74.2	101.5
Wage adj. labour prod.	:	260.5	:	:	156.1	188.1	185.9	163.0	106.4	380.1	266.7	203.9	172.5	138.6
Gross operating rate	:	7.4	:	:	14.0	9.0	9.1	11.0	2.7	8.8	9.8	17.8	14.5	9.1
Investment rate	:	14.1	:	:	9.9	23.0	17.4	47.1	23.2	27.7	6.5	3.7	6.7	8.4

(1) The Netherlands and Poland, 2005; Portugal, 2005 except for enterprises; unless otherwise stated, values refer to EUR million; number of enterprises and number of persons employed are given in thousands; average personnel costs and apparent labour productivity are given in EUR thousand per person; wage adjusted labour productivity, gross operating rate and investment are ratios expressed as percentages.

Source: Eurostat (SBS)

Table 11.23: Manufacture of medical, precision and optical instruments, watches and clocks (NACE Division 33) Main indicators, 2006 (1)

	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT
Enterprises	1.4	0.9	4.2	0.7	15.8	0.1	0.1	0.6	5.6	12.1	21.1	0.1	0.2	0.3
Persons employed	8.4	7.0	36.2	17.8	327.0	1.9	26.0	2.2	36.4	136.8	132.3	0.2	1.8	4.0
Turnover	1 718	127	1 755	3 313	47 577	107	6 422	222	4 123	23 135	19 297	11	51	126
Production	1 699	118	1 730	3 254	44 468	106	5 991	217	3 953	21 689	18 858	9	50	120
Purch. of goods & serv.	1 219	96	1 312	1 854	27 363	85	3 817	113	2 764	14 826	13 003	6	30	83
Value added	511	37	537	1 565	20 129	28	2 787	115	1 526	8 440	6 839	5	22	48
Personnel costs	326	18	379	927	13 851	21	1 064	33	997	6 720	3 937	3	11	28
Average personnel costs	46.5	3.0	11.7	52.8	43.9	10.8	41.0	20.9	30.9	50.7	37.9	19.3	5.9	7.3
Gross operating surplus	185	18	157	638	6 278	8	1 723	82	530	1 720	2 902	2	12	20
Gross investment	30	12	138	108	1 263	2	256	10	138	628	541	1	7	13
Apparent labour prod.	60.7	5.2	14.8	87.9	61.6	14.6	107.3	52.1	41.9	61.7	51.7	25.0	12.2	12.1
Wage adj. labour prod.	130.6	177.4	127.0	166.6	140.3	134.9	261.7	249.8	135.7	121.6	136.5	129.4	206.6	165.0
Gross operating rate	10.8	14.4	9.0	19.3	13.2	7.1	26.8	36.8	12.8	7.4	15.0	17.7	22.9	16.1
Investment rate	6.0	32.0	25.7	6.9	6.3	8.3	9.2	8.8	9.0	7.4	7.9	10.0	32.1	26.4
	LU	**HU**	**MT**	**NL**	**AT**	**PL**	**PT**	**RO**	**SI**	**SK**	**FI**	**SE**	**UK**	**NO**
Enterprises	0.1	3.6	:	2.1	1.5	10.3	1.1	1.2	0.5	0.3	0.9	2.2	5.7	0.6
Persons employed	2.2	20.1	:	26.8	16.4	50.4	7.1	15.7	6.9	7.4	12.0	26.7	111.1	8.7
Turnover	341	988	:	:	2 052	1 746	528	465	469	404	2 233	5 610	18 572	2 338
Production	335	838	:	:	1 998	1 633	488	449	414	362	2 260	5 076	17 634	2 211
Purch. of goods & serv.	208	686	:	:	1 131	1 066	359	356	308	282	1 478	3 542	10 276	1 568
Value added	130	309	:	:	1 026	692	169	150	160	133	893	2 132	8 350	787
Personnel costs	92	179	:	:	621	322	113	82	116	69	560	1 352	4 943	628
Average personnel costs	41.4	10.0	:	:	40.4	8.4	16.4	5.3	17.3	9.4	47.7	55.2	45.5	73.7
Gross operating surplus	38	130	:	:	405	370	56	68	44	64	333	745	3 407	159
Gross investment	6	39	:	83	73	77	19	120	25	28	38	140	548	41
Apparent labour prod.	58.0	15.4	:	:	62.4	13.7	23.9	9.5	23.1	18.0	74.5	79.8	75.2	90.5
Wage adj. labour prod.	140.1	154.3	:	:	154.4	164.3	145.7	181.1	133.7	191.3	156.0	144.5	165.3	122.8
Gross operating rate	11.2	13.2	:	:	19.7	21.2	10.5	14.6	9.4	15.8	14.9	13.3	18.3	6.8
Investment rate	4.7	12.6	:	:	7.1	11.1	11.0	80.3	15.6	21.2	4.3	6.6	6.6	5.2

(1) Greece, the Netherlands and Poland, 2005; Portugal, except for enterprises, 2005; unless otherwise stated, values refer to EUR million; number of enterprises and number of persons employed are given in thousands; average personnel costs and apparent labour productivity are given in EUR thousand per person; wage adjusted labour productivity, gross operating rate and investment are ratios expressed as percentages.

Source: Eurostat (SBS)