

# Statistics in focus

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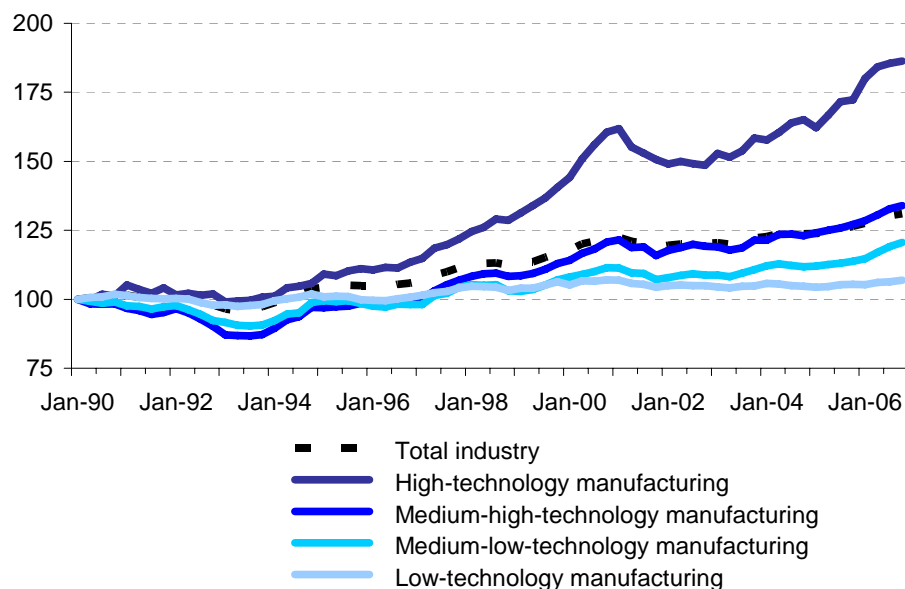
# Evolution of high-technology manufacturing and knowledge-intensive services

The Lisbon strategy to make the EU 'the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010' was adopted by the European Council in 2000. In July 2005, the Commission presented a 'Community Lisbon programme', which consisted of 50 initiatives (regulatory actions, financing actions and policy development) to refocus the EU's economic reforms agenda on growth and jobs. These were grouped together under eight key measures, one of which was supporting knowledge and innovation.

The aim of this short publication is to investigate the evolution of output and employment for high-tech manufacturing activities and knowledge intensive services compared with other areas of the economy.

- Output growth in high-technology manufacturing within the EU-27 in the period between 1990 and 2006 far exceeded the growth in less technology intensive activities (see Figure 1). There was a strong correlation between the technological intensity of an activity and the rate of output growth.
- Although there was a decline in employment within the EU-27's high-technology activities over the same period, this was at a slower rate than the losses recorded for lower-technology activities.
- There was a much higher rate of turnover growth for knowledge-intensive services (KIS) in the EU-27 during the period between 2000 and 2006 than for less knowledge-intensive market services.
- There was much stronger employment growth for knowledge-intensive services within the EU-27 than for less knowledge-intensive services.

**Figure 1: Evolution of the production index, EU-27**  
seasonally adjusted figures (Q1-1990=100)



## Evolution of manufacturing according to different technologies

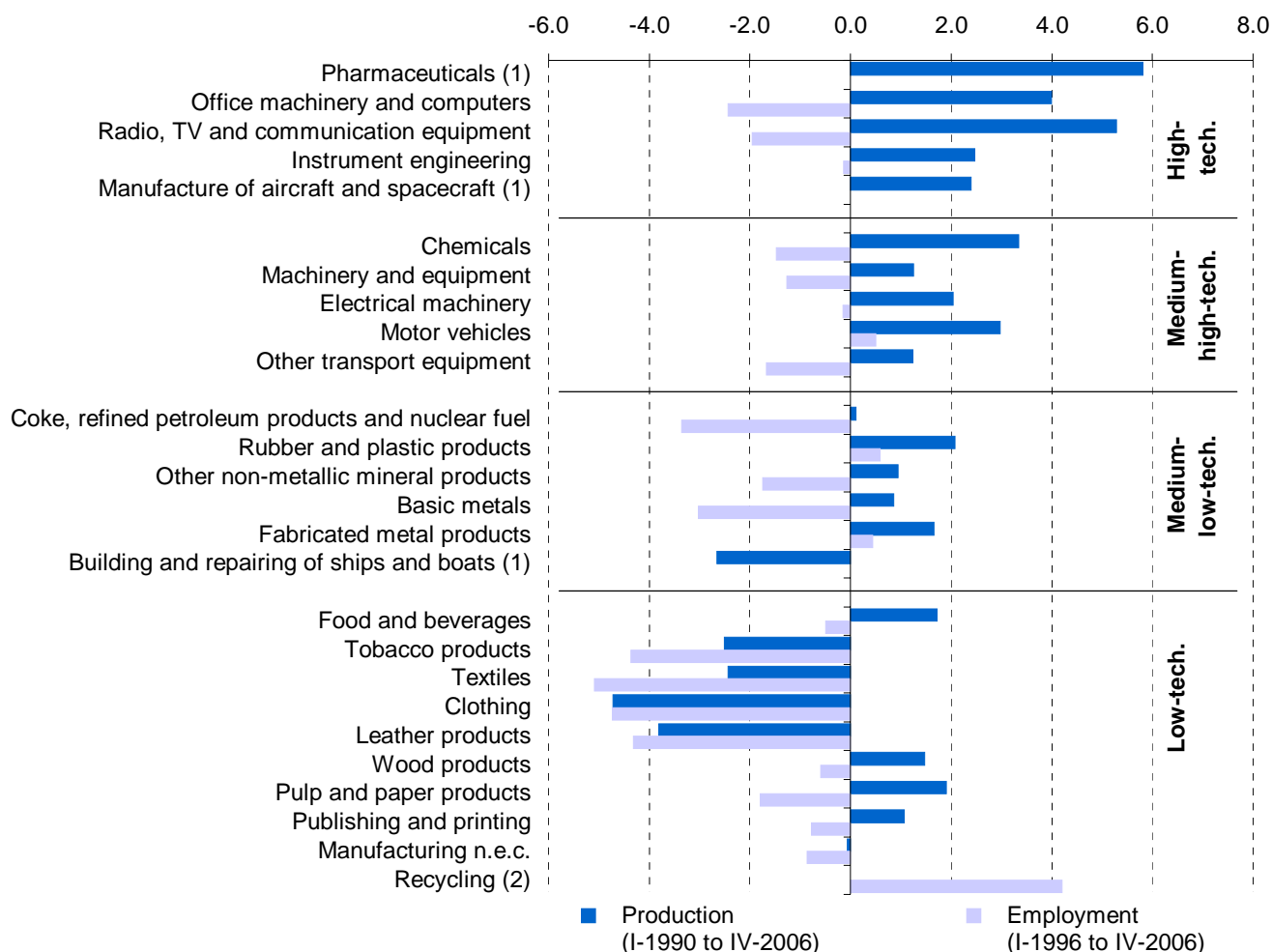
For the purpose of this publication four groupings of manufacturing activities have been established to reflect differing levels of technological intensity. These aggregates do not exist within Eurostat's regular short-term business statistics (STS), and they have been specially derived using STS data.

There is a clear relation between technological intensity on the one hand and production growth on the other (see Figure 2). The average growth rate of the production index for high-technology manufacturing activities was 4.0 % per annum between 1990 and 2006 in the EU-27, more than double the average rate for all industrial activities (NACE Sections C to E) where growth averaged 1.7 % per annum. The average annual rate of growth for the production index of medium-high-technology manufacturing activities (1.8 %) was just above the total industry average, while rates of growth progressively decreased for medium-low-technology manufacturing (1.2 %) and low-technology manufacturing (0.4 %).

Among the manufacturing NACE divisions and groups (see Figure 2), the fastest rates of growth for EU-27 production indices during the period between 1990 and 2006 were recorded for pharmaceuticals (an average of 5.8 % per annum) and radio, television and communication equipment (an average of 5.3 % per annum). This growth contrasted with declines in production for a number of low-technology manufacturing activities, notably those concerning clothing and leather products.

There was a general downward trend in employment levels across industrial activities (an average annual decline of 1.4 %). The largest rates of decline (averaging between 4 and 5 % per annum) were recorded among low-technology activities such as textiles, clothing and leather products manufacturing, as well as for tobacco products manufacturing. These activities have been subject to either intense global competition or reduced demand that also resulted in falling production indices.

**Figure 2: Evolution of indices of production and employment in industrial activities, EU-27**  
average annual growth (%)



(1) Employment, not available.

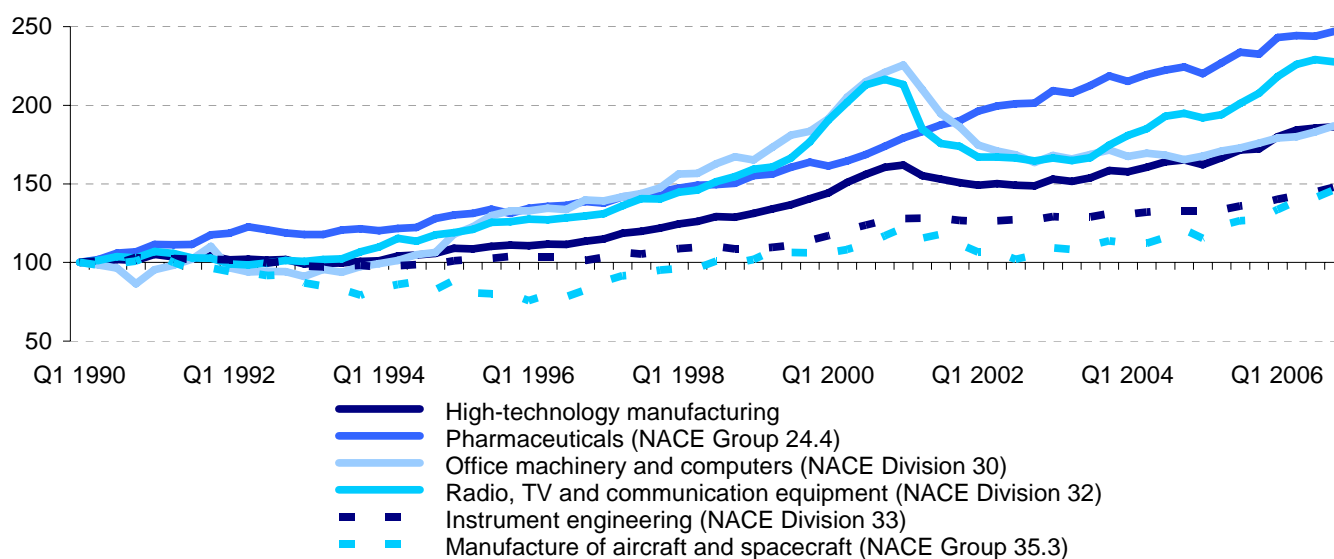
(2) Production, not available.

## Analysis of high-tech manufacturing by activity

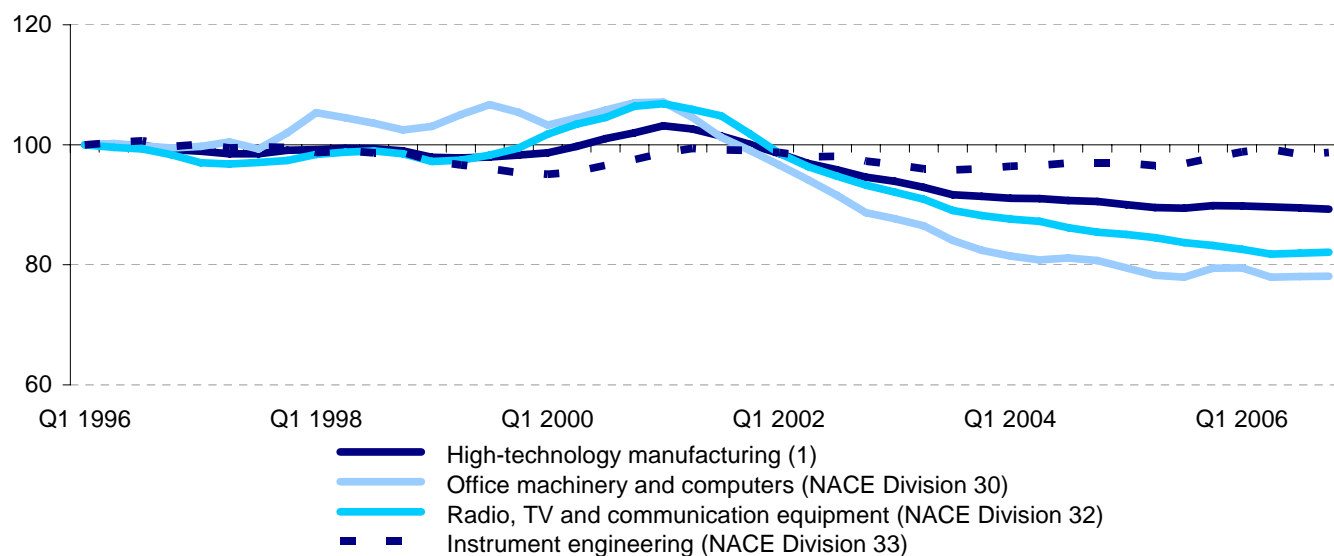
The production index for most high-technology manufacturing activities followed a general pattern of strong growth between 1994 and the first quarter of 2001 before a (sometimes sharp) reduction through until the fourth quarter of 2002 (see Figure 3). This was followed by a period of relative stability in the production index before further strong growth. Pharmaceuticals manufacturing was the most obvious exception to this general pattern, with its production index growing at a fairly constant and unbroken rate throughout the period under review in the EU-27.

Among the high-tech manufacturing activities for which information is available (pharmaceuticals and the manufacture of aircraft and spacecraft being excluded), employment levels were relatively stable between the first quarter of 1996 and the first quarter of 2001. Since then, however, employment for high-technology manufacturing declined overall by 10 %, a rate that grew to 21 % for office machinery and computers manufacturing (see Figure 4). These reductions in employment levels could be contrasted with the relatively unchanged employment levels that were registered over the whole period considered for instrument engineering in the EU-27.

**Figure 3: Evolution of the production index for high-tech manufacturing activities, EU-27**  
seasonally adjusted figures (Q1-1990 = 100)



**Figure 4: Evolution of the employment index for high-tech manufacturing activities, EU-27**  
seasonally adjusted figures (Q1-1996=100)



(1) Excludes NACE Groups 24.4 and 35.3.

## Analysis of manufacturing activity according to technological level

Between the first quarter of 1995 and the fourth quarter of 2006, the fastest growth in industrial output among the four technology groups was clearly registered for high-technology activities. However, the development of high-technology manufacturing output, during this period incorporated one significant adjustment (see Figure 5), as there was a steep cut-back in the level of output from a relative peak in the 4<sup>th</sup> quarter of 2000 that was not surpassed until the first quarter of 2006. This development appears to follow developments in the broader business cycle, but with a much greater fall in output requiring a longer period to recover the lost level. It should be noted, however, that the coverage of high-technology activities used in the graph below excludes the manufacture of pharmaceuticals (NACE Group 24.4) and the manufacture of aircraft and spacecraft (NACE Group 35.3),

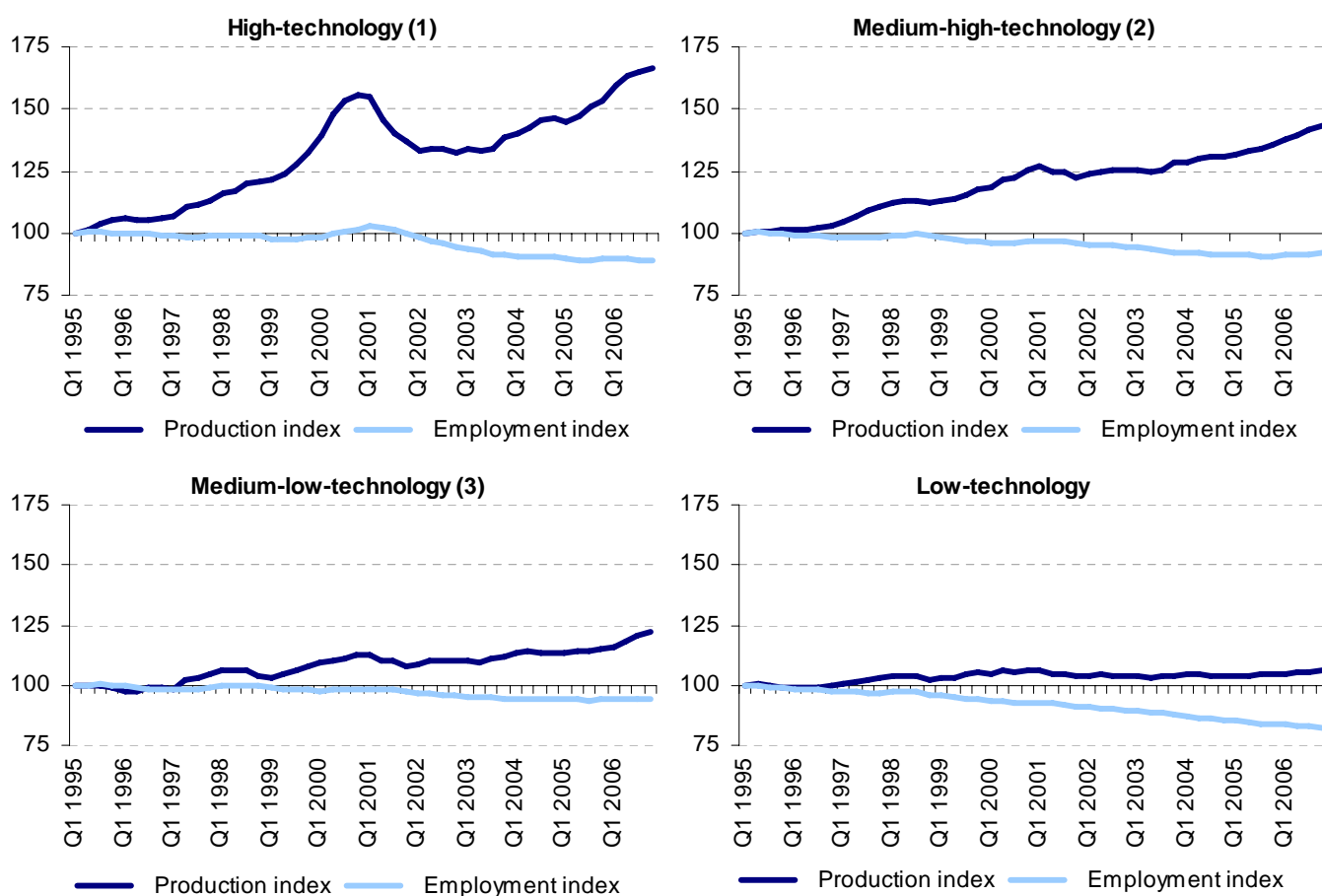
Output growth over the period under review was progressively lower for less technologically intensive activities (see Figure 4). Indeed, low-technology manufacturing output was relatively unchanged for

most of the period under review and also reflected to a lesser extent general movements in the broader business cycle.

There were declines in employment across the EU's manufacturing sector. However, the decline in employment was longer, larger and more constant in low-technology manufacturing activities than it was for activities with higher technological levels. Aside from low-technology manufacturing, employment levels remained relatively stable until the broad downturn in output in the first quarter of 2001. A downward trend in employment then followed until the second-half of 2005, since when employment levels remained relatively stable.

Comparing the evolution in the production index with the evolution of the employment index, it is clear that the greatest increases in output relative to employment were recorded for high-technology manufacturing activities and the smallest relative increases for the low-technology manufacturing activities.

**Figure 5: Evolution of output and employment for manufacturing activities, EU-27**  
seasonally adjusted figures (Q1-1995=100)



(1) Excludes NACE Group 24.4 and 35.3.

(2) Includes NACE Groups 24.4, 35.1 and 35.3.

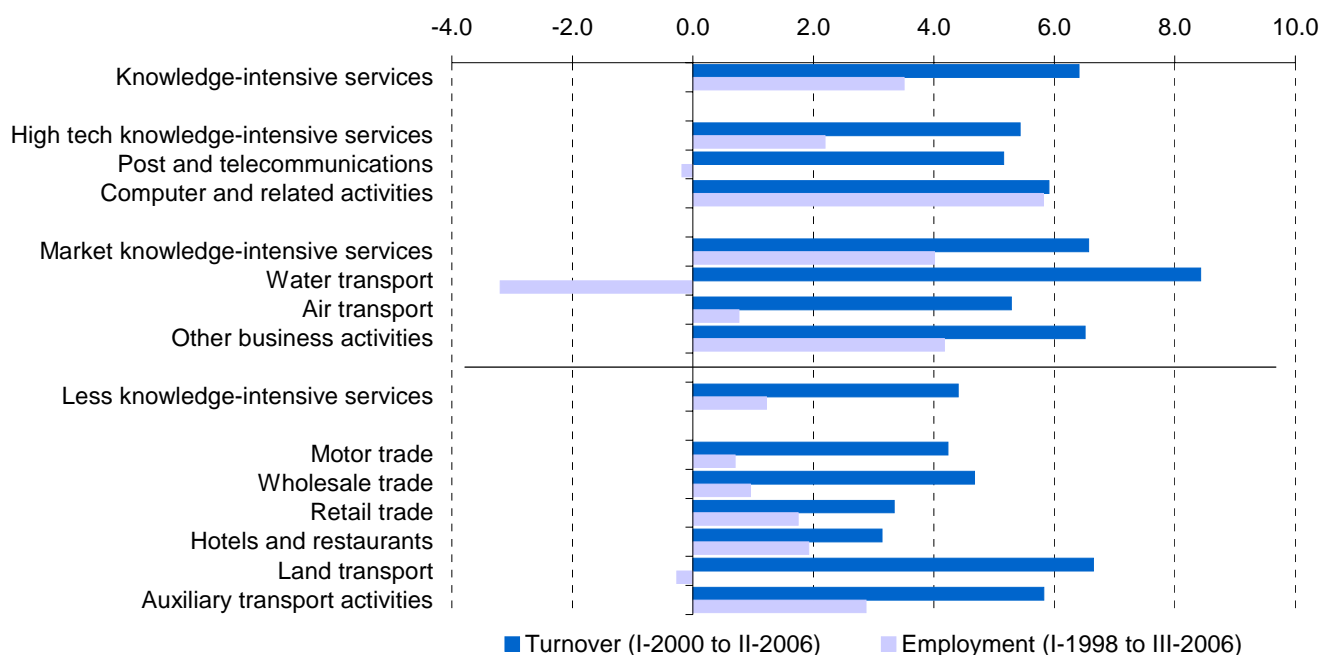
(3) Excludes NACE Group 35.1.

## Evolution of knowledge-intensive services

For the purpose of this publication, four groupings of service activities within the non-financial services economy (NACE Sections G to I and K) have also been established to reflect differing levels of knowledge intensity. The first distinction is between knowledge-intensive and less knowledge-intensive services, while a further distinction is made within the knowledge-intensive services between high-tech and

market services. As with the manufacturing aggregates, these service aggregates do not exist within Eurostat's regular short-term business statistics (STS), and they have been specially derived using EU-27 weights to combine data for individual NACE divisions. The coverage of these four service aggregates (in terms of NACE) is shown in Figure 6.

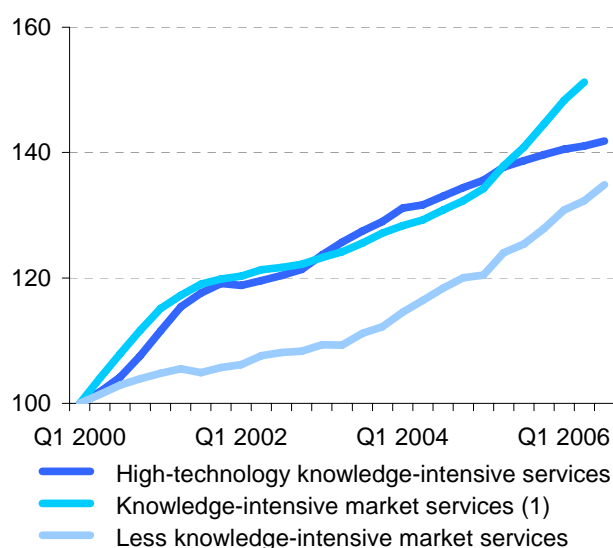
**Figure 6: Average annual change in turnover and employment across knowledge-intensive services, EU-27**  
average annual growth (%)



There was strong turnover growth for all the service activities covered in Figure 6 between the first quarter of 2000 and the second quarter of 2006 (the longest period for which EU-27 data are available). Sales growth accelerated from the first quarter of 2003 onwards (see Figure 7) and was generally stronger for knowledge-intensive services than for less knowledge-intensive services. This was a result of high sales growth for water transport activities (an average of 8.4 % per year) and other business activities (an average of 6.5 % per year). On the other hand, turnover growth was comparatively modest for retail trade (an average of 3.3 % per year) and hotels and restaurants (3.1 % per year).

The level of employment grew for both knowledge-intensive and less knowledge-intensive services. Employment growth was lower for less-knowledge-intensive activities (rising by an average of 1.2 % per annum) compared with 3.5 % per annum for knowledge-intensive services. The highest employment growth was recorded for computer-related services (an average of 5.8 % per annum) and for other business activities (4.2 % per annum), while the level of employment fell by an average of 3.2 % per annum for water transport – in contrast to its high rates of growth for the index of turnover.

**Figure 7: Evolution of turnover for service activities of different levels of knowledge intensity, EU-27**  
seasonally adjusted figures (Q1-2000=100)



(1) Not available for the 3rd quarter of 2006.

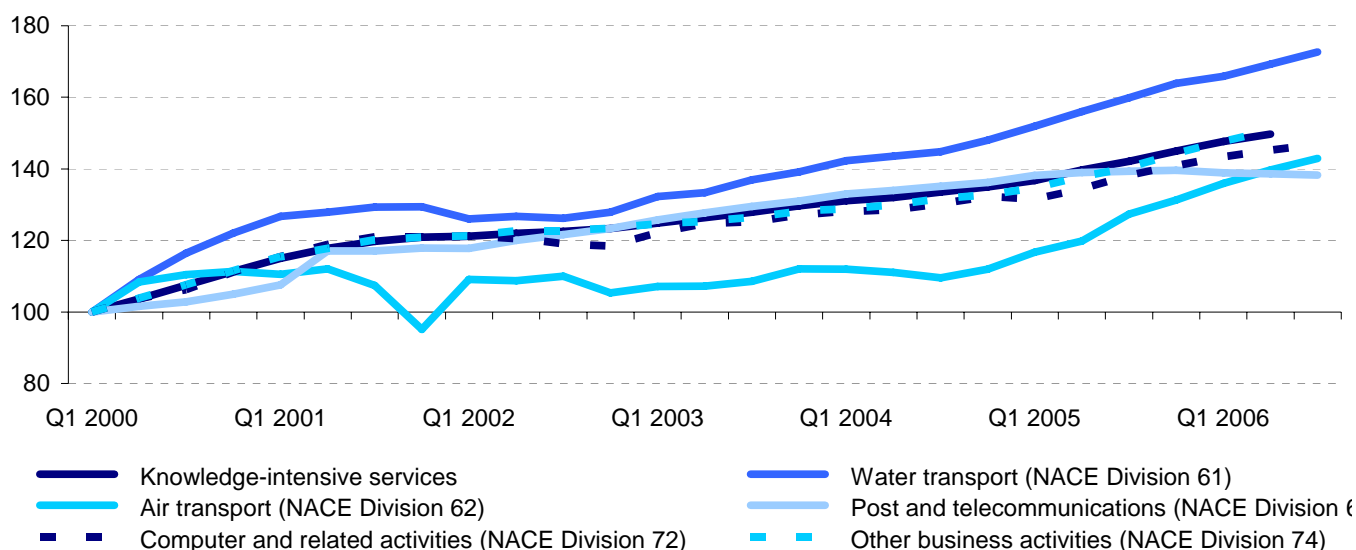
## Analysis of knowledge-intensive services by activity

The turnover of computer and related activities, post and telecommunications activities, and other business activities, for the EU-27 followed a very similar pattern, displaying relatively steady and continuous growth (see Figure 8).

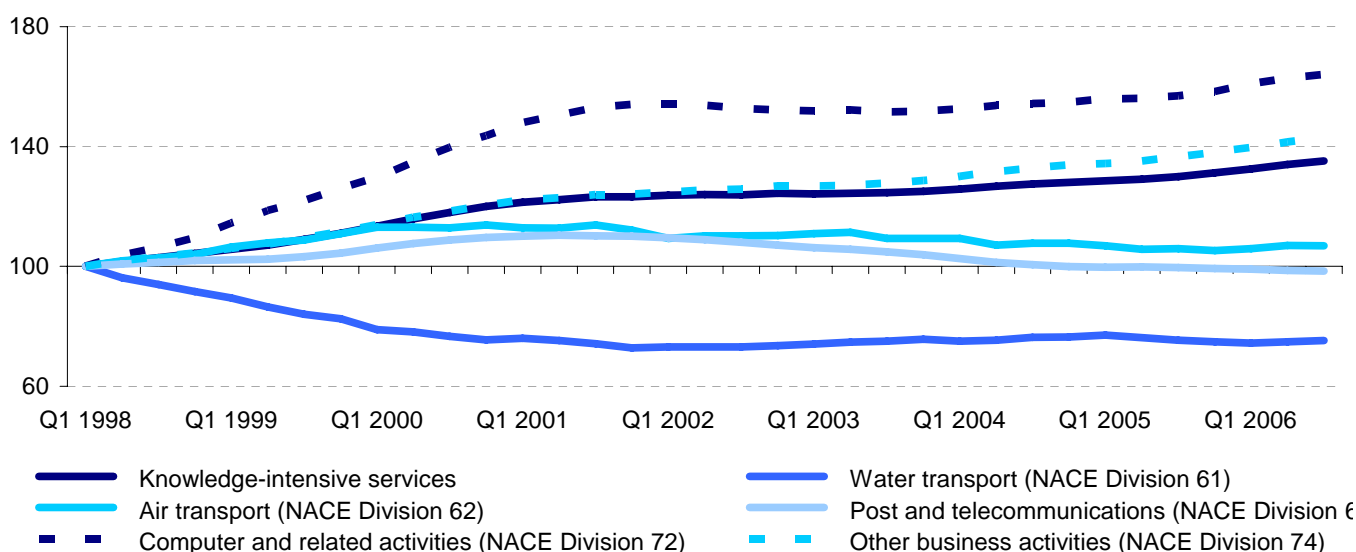
The development in the turnover of the transport-related knowledge-intensive services was more uneven, although there was also strong growth over the period as a whole. The evolution of sales for air transport activities, in particular, reflected two important events during this period considered: the first concerned the drop-off in activity following the September 11<sup>th</sup> 2001 terrorist attacks in America and the second concerned the strong rise in fuel prices from mid-2004 onwards.

Most of the employment growth for knowledge-intensive services in the period between the first quarter of 2001 and the second quarter of 2006 came from relatively steady growth within computer and related activities and other business activities (see Figure 9). In contrast, there was a notable decline in employment levels for water transport activities, mainly in the early part of the period studied, and little overall change in employment for either air transport activities or post and telecommunications activities, after rises in employment through until mid-2001 gave way to declines thereafter.

**Figure 8: Evolution of turnover for knowledge-intensive services, EU-27**  
seasonally adjusted figures (Q1-2000=100)



**Figure 9: Evolution of employment for knowledge-intensive services, EU-27**  
seasonally adjusted figures (Q1-1998=100)





## ➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

### Short term statistics (STS)

The legal basis for the STS indices is Council Regulation No 1165/98 of 19 May 1998<sup>1</sup> concerning short-term statistics (STS-R) and Regulation (EC) No 1158/2005 of the European Parliament and of the Council of 6 July 2005<sup>2</sup> amending Council Regulation (EC) No 1165/98. The definitions of short-term statistics variables are laid down in Commission Regulation No 588/2001 of 26 March 2001 implementing Council Regulation No 1165/98 of 19 May 1998.

The **industrial production index (IPI)** is a business cycle indicator. It provides a measure of the volume trend in value added at basic prices over a given reference period. Value added at basic prices can be calculated from turnover (excluding VAT and other similar deductible taxes directly linked to turnover), plus capitalised production, plus other operating income plus or minus the changes in stocks, minus the purchases of goods and services, minus taxes on products which are linked to turnover but not deductible plus any subsidies on products received.

The **turnover index** is also a business cycle indicator. Its objective is to show the evolution of the market for goods and services. Turnover comprises the totals invoiced by the observation unit during the reference period. This corresponds to market sales of goods or services supplied to third parties. It includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover.

The **index of employment** is an important short-term indicator. The number of persons employed is defined as the total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams). It includes persons absent for a short period (e.g. sick leave, paid leave or special leave), and also those on strike, but not those absent for an indefinite period. It also includes part-time workers who are regarded as such under the laws of the country concerned and who are on the payroll, as well as seasonal workers, apprentices and home workers on the payroll. Note that Member States may use an index of (paid) employees to approximate the index of the number of persons employed.

**Seasonal adjustment** is a statistical technique to remove the effects of seasonal influences within a series. Seasonal effects usually reflect the influence of the seasons themselves either directly or through production series related to them, or social conventions. Eurostat calculates the adjustment only if nationally adjusted data are not available.

### Dissemination

Eurostat publishes detailed data and time series in the Industry, trade and services theme on the Eurostat Internet site.

### High-technology manufacturing

NACE Group 24.4 Pharmaceuticals

NACE Division 30 Office machinery and computers  
NACE Division 32 Radio, TV and communication equipment  
NACE Division 33 Instrument engineering  
NACE Group 35.3 Manufacture of aircraft and spacecraft

### Medium-high-technology manufacturing

NACE Division 24 Chemicals  
NACE Division 24-24.4 Chemicals, excluding pharmaceuticals  
NACE Division 29 Machinery and equipment  
NACE Division 31 Electrical machinery  
NACE Division 34 Motor vehicles  
NACE Division 35-35.1 and 35.3 Other transport equipment, excluding ships and aerospace  
NACE Division 35 Other transport equipment

### Medium-low-technology manufacturing

NACE Division 23 Coke, refined petroleum products and nuclear fuel  
NACE Division 25 Rubber and plastic products  
NACE Division 26 Other non-metallic mineral products  
NACE Division 27 Basic metals  
NACE Division 28 Fabricated metal products  
NACE Group 35.1 Building and repairing of ships and boats

### Low-technology manufacturing

NACE Division 15 Food and beverages  
NACE Division 16 Tobacco products  
NACE Division 17 Textiles  
NACE Division 18 Clothing  
NACE Division 19 Leather products  
NACE Division 20 Wood products  
NACE Division 21 Pulp and paper products  
NACE Division 22 Publishing and printing  
NACE Division 36 Manufacturing n.e.c.  
NACE Division 37 Recycling

### Knowledge-intensive services

NACE Division 61 Water transport  
NACE Division 62 Air transport  
NACE Division 64 Post and telecommunications  
NACE Division 72 Computer and related activities  
NACE Division 74 Other business activities

### High tech knowledge-intensive services

NACE Division 64 Post and telecommunications  
NACE Division 72 Computer and related activities

### Market knowledge-intensive services

NACE Division 61 Water transport  
NACE Division 62 Air transport  
NACE Division 74 Other business activities

### Less knowledge-intensive services

NACE Division 50 Motor trade  
NACE Division 51 Wholesale trade  
NACE Division 52 Retail trade  
NACE Division 55 Hotels and restaurants  
NACE Division 60 Land transport  
NACE Division 63 Auxiliary transport activities

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<sup>1</sup> Official Journal No L 162, of 5 June 1998.

<sup>2</sup> Official Journal No L 191, of 22 July 2005.

## ***Further information:***

Data: [EUROSTAT Website/Home page/Industry, trade and services/Data](#)

### **Industry, trade and services**

 [Industry, trade and services - horizontal view](#)

 [Short-term Business Statistics - Monthly and Quarterly \(Industry, Construction, Retail Trade and Other Services\)](#)

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