Statistics in focus

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Different trends in the manufacturing sector

EU, Japan and United States

This publication provides the results of a study of quarterly short-term business statistics (STS) for the Triad members: the EU (EU-25 and euro-zone, both Eurostat data), Japan and the United States (both OECD data). The aim is to show the different cyclical developments using observations of a long time series (10 or more years of quarterly data).

The study focuses on manufacturing, defined as Section D of the NACE Rev. 1.1 classification. In 2002 this activity accounted for around a third (32.2 %) of total value added at factor cost of the non-financial business economy (defined as NACE Sections C to I and K).

The indicators covered by the study are the production index, the index of domestic output prices (both from 1990 to 2005) and the index of employment (from 1995 to 2005).

This short study aims to show similarities and differences in the development of the Triad manufacturing economies through this last decade, by considering the following questions:

- How did the main manufacturing indices evolve among the Triad members?
- Is there a pattern in the cycle of developments observed among the Triad members?
- Is there a different pattern among the EU Member States? This analysis is carried out for the four largest economies in the EU, for the production index.
- Is there a different pattern according to the activity studied? This analysis is carried out for the Main Industrial Groupings (MIGs) for the production index.

As euro-zone developments are very similar to those of the EU-25 in the long-term, most of the analysis has focused on the EU-25 data.

Contents

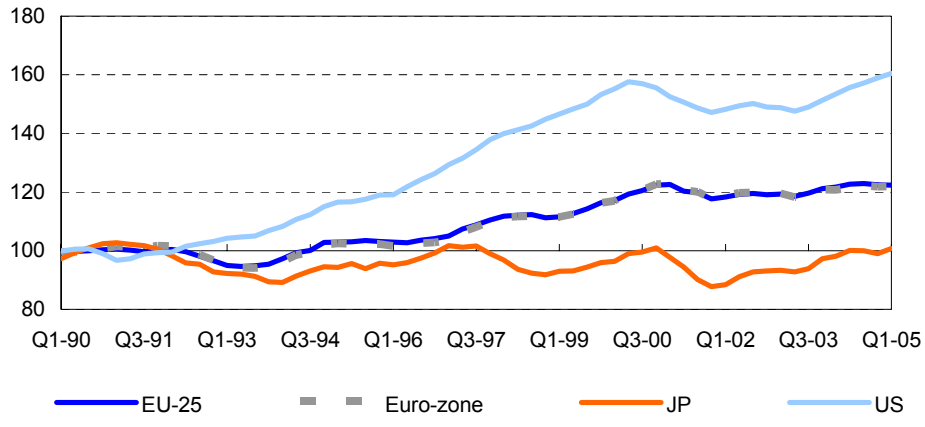

Figure 1: DEVELOPMENTS OF THE PRODUCTION INDEX, MANUFACTURING, SEASONALLY ADJUSTED, 1990=100; SOURCES: EUROSTAT STS AND OECD MEI

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Developments for production in manufacturing

The development of the manufacturing production index among the Triad members showed different patterns over the period from 1990 to 2005 (see Figure 1). Generally the production index in the United States developed at a higher pace than in the EU and Japan (the average quarterly rate of change was 0.8 %, compared to 0.3 % for the EU-25 and 0.1 % for Japan).

How did manufacturing production change among the members of the Triad?

From Figure 1 three main periods in the business cycle for the EU-25 manufacturing production index can be observed. From 1990 to the first half of 1993 the index was marked by a relative stagnation followed by a period of contraction, while from mid 1993 to 2001 the index showed an upward trend, with relatively slight quarterly fluctuations. Finally there was a further contraction starting at the beginning of 2001, followed by a year and a half of rather steady levels of production and then signs of growth from mid 2003. During the first period distinguished, Japanese manufacturing production developed in a similar way while the United States reported a different trend, with an earlier period of contraction followed by growth. During the second period developments in the EU and the United States were very similar while Japanese manufacturing production took longer to move out of the period of contraction, and did not sustain the recovery of the middle of the 1990s. Over the third period described for the EU, all the members of the Triad reported similar developments, although the contraction in the United States started earlier in 2000, and Japanese production started to increase in 2002.

Is there a pattern in the developments observed among the members of the Triad?

A test was carried out to determine whether the production indices moved in the same direction among the three members of the Triad (euro-zone not included in the analysis) – see Figure 2. With this aim, the test was based on the sign of the quarterly rates of change, and the test showed that for 68 % of the quarters the EU-25 and Japanese rates had the same sign and for 67 % of quarters the EU-25 and the United States had the same sign. This supports the observation above that there were periods of time since the 1990s when the EU production index has developed in a similar manner to that of Japan, and other periods when it developed in a similar manner to that of the United States.

As a step to identify a possible pattern among the members of the Triad for the development of manufacturing production over the period 1990-2005, leads and lags of between 1 and 12 quarters were analysed for the EU-25 paired with Japan, and for the EU-25 paired with the United States. Without a lead or lag the correlation coefficient between EU-25 and Japanese indices was very close to 0 over the time period observed, and the coefficient remained very weak when comparing quarterly indices shifted by 1 to 12 quarters (in either direction). The correlation coefficient between the EU-25 and the United States indices was already quite high (0.94) without any lead or lag, but it was slightly higher when using pairs of data shifted by between 2 and 7 quarters ahead for the United States: this indicates that similar movements to those seen in one quarter in the production index in the United States are seen a few quarters later in the production index for the EU-25.

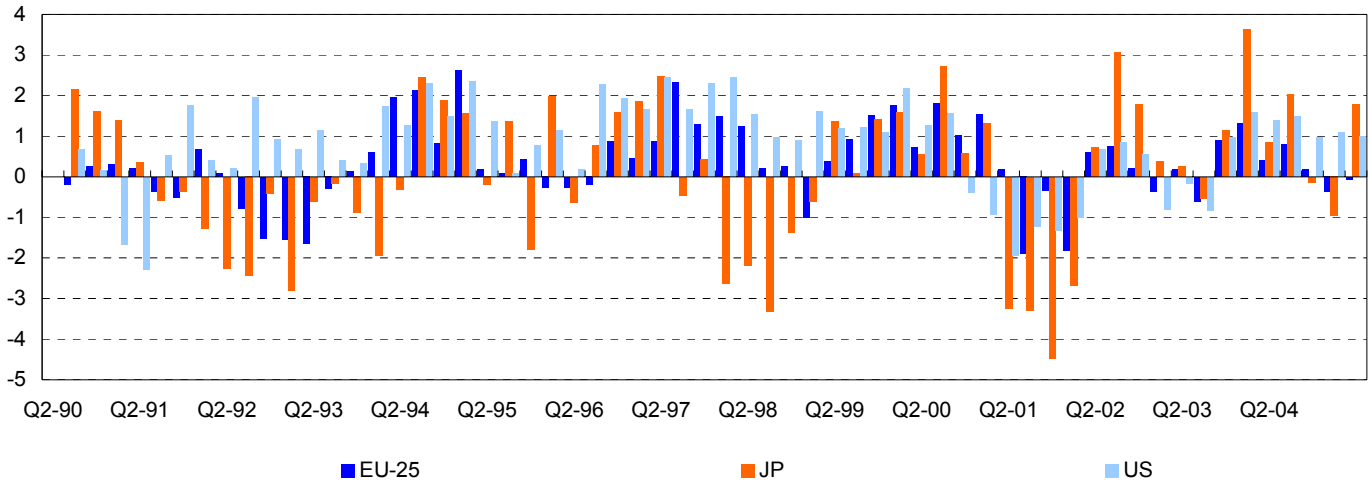

Figure 2: GROWTH RATES FOR THE PRODUCTION INDEX, MANUFACTURING, SEASONALLY ADJUSTED; SOURCES: EUROSTAT STS AND OECD MEI

Is there a different pattern according to the country?

Figure 3 presents the manufacturing index of production for the four largest EU economies (Germany, France, Italy and the United Kingdom), compared to Japan and the United States. This allows an analysis of whether developments in these four Member States more or less closely resemble those in Japan or the United States. As stated on the previous page, there was no clear correlation between the EU-25 and Japan quarterly indices for manufacturing production, and this was confirmed by the study of correlation coefficients for the four largest EU economies.

When looking at the correlation coefficients with the United States series, coefficients ranged from 0.81 (Germany) to 0.91 (France), which was slightly less than for the EU-25 as a whole (0.94).

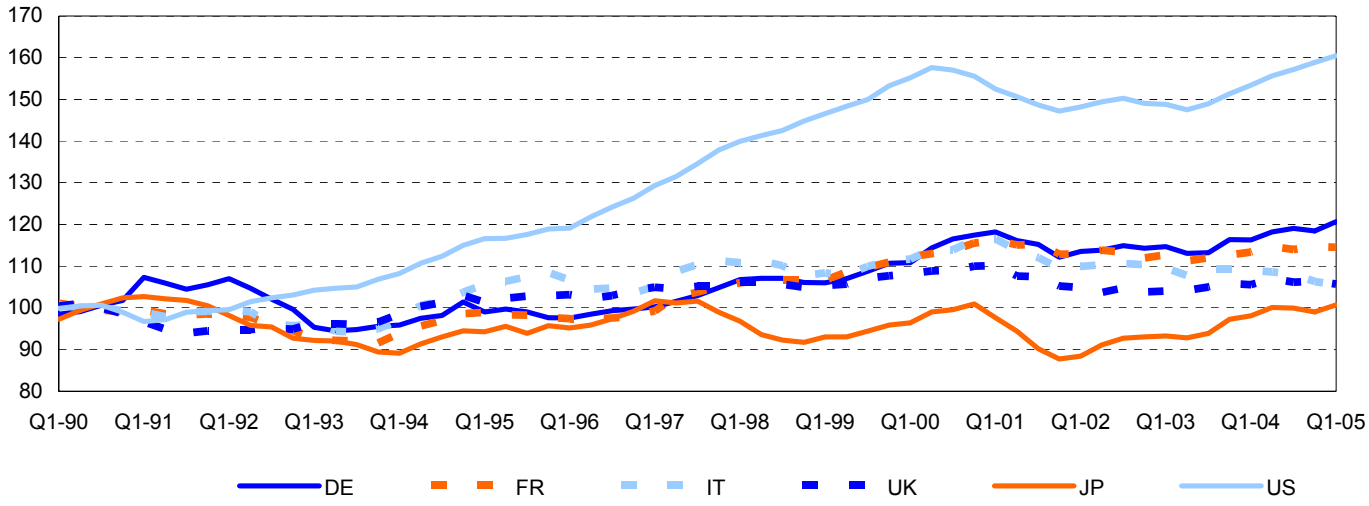

Figure 3: DEVELOPMENTS FOR THE PRODUCTION INDEX, MANUFACTURING, SEASONALLY ADJUSTED, 1990=100; SOURCES: EUROSTAT STS AND OECD MEI

Is there a different pattern of development, according to the activity?

Figures 4 to 6 present quarterly developments for the production index, for some of the Main Industrial Groupings (MIGs) for the EU-25, Japan and the United States, from 1990 to 2005 - note that the scales for the three figures are different for each member of the Triad. When comparing with the analysis for the manufacturing total note that the activity coverage for the MIGs collectively is different, as for example some mining and quarrying activities are covered by intermediate goods. Moreover, the coverage of the industrial groupings for Japan and the United States are similar but not identical with those used for the EU.

There were different patterns within the members of the Triad according to the activity observed. Indeed, from mid 1993 to the beginning of 2001 the EU-25 production index of capital goods increased rapidly, compared to the three other MIGs for which data are presented in Figure 4. Then, during the year that followed this period, decreases were registered for the production index of all MIGs shown, except for consumer non-durables, for which the output remained almost unchanged through to the beginning of 2005. In the United States the production index for consumer durables grew at a relatively fast pace until the beginning of 2000 compared to the other industrial groupings (see Figure 6), particularly consumer non-durables. Then the output for all MIGs decreased for around two years until the beginning of 2002 and remained rather stable during the course of this year, before starting to grow once more, with consumer durables as before and investment goods showing higher rates of growth. In Japan, the production indices for intermediate goods, investment goods and consumer durables alternated short periods of growth and contraction (see Figure 5). For consumer non-durables the production index remained rather stable until mid-2001, followed by a slow decrease.

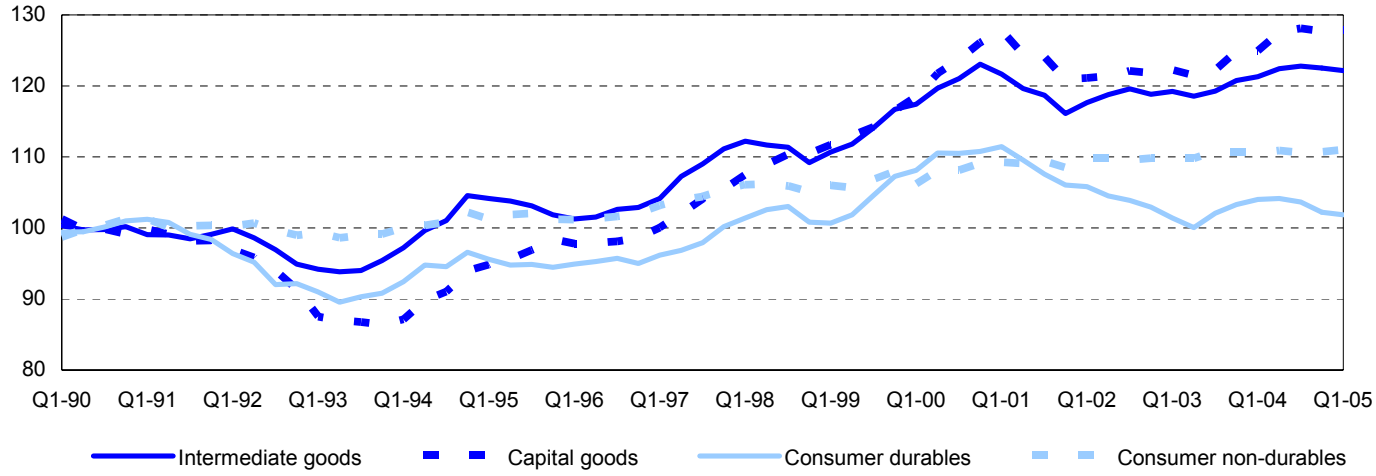

Figure 4: DEVELOPMENTS FOR THE PRODUCTION INDEX FOR THE EU-25, MIGs, SEASONALLY ADJUSTED, 1990=100; SOURCE: EUROSTAT STS

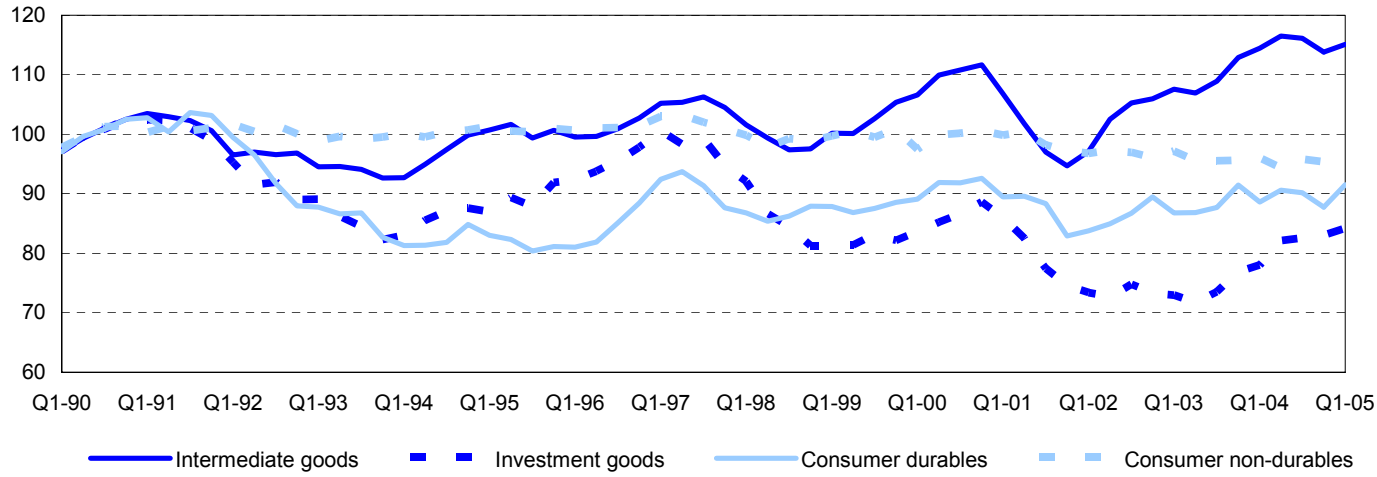

Figure 5: DEVELOPMENTS FOR THE PRODUCTION INDEX FOR JAPAN, MIGs, SEASONALLY ADJUSTED, 1990=100; SOURCE: OECD MEI

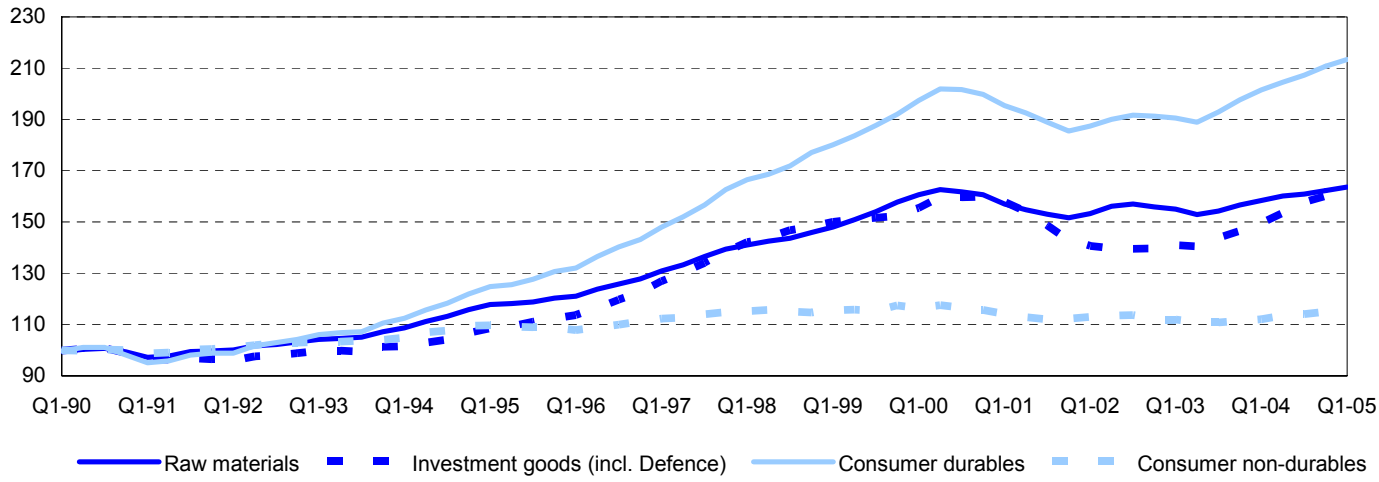

Figure 6: DEVELOPMENTS FOR THE PRODUCTION INDEX FOR THE UNITED STATES, MIGs, SEASONALLY ADJUSTED, 1990=100; SOURCE: OECD MEI

Developments for output prices for manufacturing

How did manufacturing output prices evolve among the members of the Triad?

Output prices for manufacturing - in national currency terms - presented different patterns across the members of the Triad: an upward trend from 1990 to 2005 for the EU and for the United States, contrasting with Japanese prices that showed a downward trend. The average quarterly rates of change over this period were 0.5 % for the United States and 0.4 % for the EU-25, while the equivalent rate was -0.2 % for Japan. There was a higher range in the rates of change for the United States than for Japan or the EU, reflecting a somewhat higher volatility in the development of prices from one quarter to the next.

Is there a pattern in the developments observed among the members of the Triad?

Based on the observation of the development of output prices for manufacturing in the EU-25, four different periods can be distinguished. From the start of the period studied to the beginning of 1998, there was a fairly steady increase in this price index followed by a short period of falling prices until the beginning of 1999.

A shorter period of increasing prices was followed by a relatively gentle decrease in the gross price index from the second half of 1999 to the end of 2001. The third period distinguished was a steady increase until the beginning of 2004, and finally there was a more rapid increase in the following quarters of 2004 through to the first quarter of 2005. Over the first two periods identified (from 1990 to the end of 2001) manufacturing output prices evolved in opposite directions in the EU-25 and Japan, while from the end of 2003 there were signs of inflation in Japan too. As can be seen clearly in Figure 7 output price developments in the United States and the EU-25 followed a very similar path over the whole period considered.

As for the production index a study of possible leads and lags of the indices was carried out for output prices, again using lags/leads of between 1 and 12 quarters. When the index for output prices in the United States preceded by one quarter the EU-25's index, the correlation coefficient between both series reached 0.99: as for the production index this suggests a small lead for the United States relative to the EU-25. For Japan, this test did not lead to any significant results.

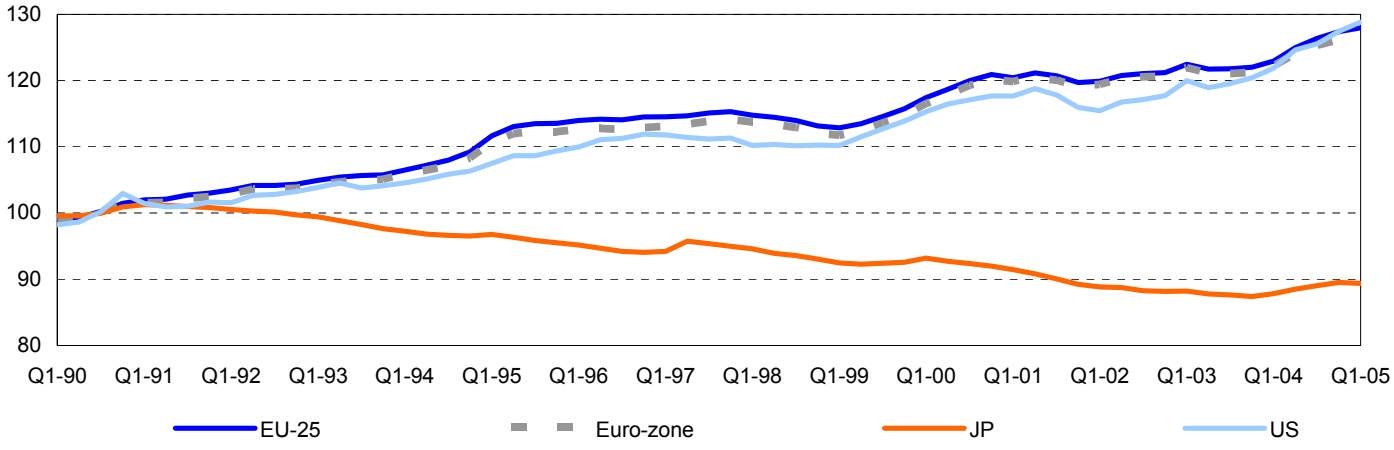

Figure 7: DEVELOPMENTS FOR THE OUTPUT PRICES INDEX, MANUFACTURING, GROSS DATA, 1990=100; SOURCES: EUROSTAT STS AND OECD MEI

Developments for employment in manufacturing

How did manufacturing employment evolve among the members of the Triad?

The developments for the manufacturing employment index for the members of the Triad is shown in Figure 8 for the period running from 1995 to 2005. Note that the employment index represents the number of persons employed for the EU-25 and the euro-zone, while the number of paid employees is used for the Japanese and American time series.

In the EU-25 the manufacturing employment index registered a decrease from one quarter to the next at a fairly stable pace over the period observed (by 0.2 % on average). A similar development can be observed for the euro-zone, except during the year 2000 and into the first quarter of 2001, when there was a slight recovery of the number of persons employed in euro-zone manufacturing.

In Japan the manufacturing employment index decreased at a rapid pace over the period from 1995 to 2005, by 0.6 % per quarter on average, with the most sustained fall registered from 1998 to mid-2002. In the United States however, the manufacturing employment index remained fairly stable from 1995 to the end of 2000, before starting a two and a half year period of a fast decrease in the index of the number of employees. Indeed, over this period the index of employment fell by 1.7 % per quarter on average, compared to an average fall of 0.5 % per quarter over the whole period observed from 1995 to 2005. This marked decrease stopped in mid-2003 and the employment index remained relatively unchanged during the following quarters.

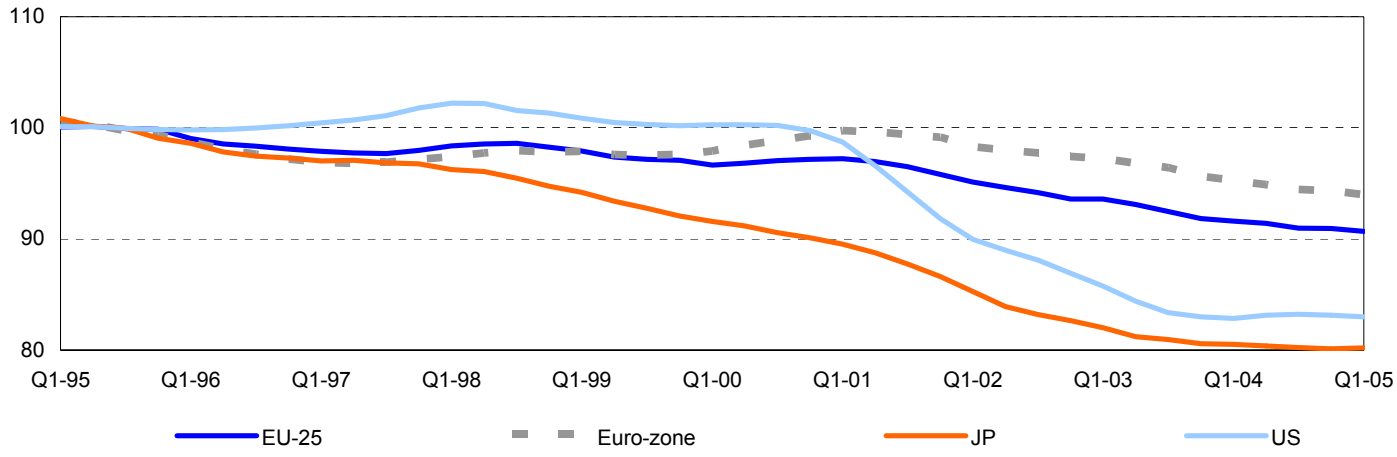

Figure 8: DEVELOPMENTS FOR THE INDEX OF EMPLOYMENT, MANUFACTURING, SEASONALLY ADJUSTED, 1995=100; SOURCES: EUROSTAT STS AND OECD MEI

➢ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

EUROSTAT SHORT-TERM INDICATORS
(for the EU-25 and the euro-zone)

The ***legal basis*** for the production index, output prices index and employment index is the ***Council Regulation No 1165/98*** of 19 May 1998 concerning short-term statistics[1] (STS-R) and ***Regulation (EC) No 1158/2005 of the European Parliament and of the Council*** of 6 July 2005 amending Council Regulation (EC) No 1165/98 concerning short-term statistics[2]. The study focuses on manufacturing, defined as Section D of the NACE Rev. 1.1 classification[3].

The ***production index*** is an important business cycle indicator which shows the monthly activity of industry, which is one of the most volatile components of the economy.

The ***output price index*** (*or producer price index*) shows monthly price changes in industry, which can be an indicator of inflationary pressure before it reaches the consumer.

The index of the ***number of persons employed*** monitors the development of employment in terms of total employment. This indicator may be approximated by the number of employees.

Definition

As specified in the STS-R, and in line with traditional practice in business statistics, ***the production index should show the evolution of value added at factor cost***, at constant prices. Value added at factor cost can be calculated from turnover (excluding VAT), plus capitalised production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products and taxes linked to production.

For the calculation of the ***output price index***, all price-determining characteristics of the products should be taken into account, including quantity of units sold, transport provided, rebates, service conditions, guarantee conditions and destination.

The specification must be such that in subsequent reference periods, the observation unit is able to identify the product and to provide the appropriate price per unit. The ***domestic market for output prices index*** is defined as customers resident in the same national territory as the observation unit.

The ***number of persons employed*** is defined as the total number of persons working in an 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).

Dissemination

Eurostat publishes detailed data and time series in the Industry, trade and services theme of their database.

OECD SHORT-TERM INDICATORS

The United States

The ***index of production*** for manufacturing measures the quantity of output of the manufacturing industries. Data cover all enterprises in the manufacturing industries. For the period since 1997, the total index has been constructed from 295 individual series based on the 2002 North American Industrial Classification System (NAICS). For investment goods, the index also includes goods for national defence. Data on physical products are obtained from private trade associations and from government agencies. The weights used to aggregate individual industries are derived from value added data.

The index for ***producer prices*** measures the average change in prices received by domestic producers of goods and services. Prices are free on board at the point of production. Discounts granted by producers are included, excise taxes are not. Starting with January 2004 data are compiled according to the North American Industry Classification System (NAICS).

The ***index of employment*** has been compiled for the purpose of this publication, based on the number of employees on payrolls of manufacturing establishments, who received pay for any part of the pay period which includes the 12th day of the month. Persons on paid sick leave, paid holiday or who worked during a part of the pay period even though they were unemployed during the rest of the period are counted as employed. Data are consistent with the 2002 North American Industry Classification System (NAICS 2002).

Japan

The ***index of production*** measures monthly changes in production and relates to the physical quantity of commodities produced by industrial enterprises. The industrial classification is based on the Standard Industrial Classification for Japan. Data are derived from the Current Survey of Production. The weights are based on value added by industry obtained mainly from the 1995 Census of Manufactures. Data are not adjusted for unequal number of working days in the month.

The ***producer prices*** index measures monthly average changes of prices received by producers of commodities. The indices are referred to as domestic corporate goods price indexes by source. They cover products of manufacturing industries for domestic sale (imported goods are excluded). Prices are those of inter-enterprise transactions at the primary wholesalers stage or manufacturers' shipment prices in the case of commodities directly sold to users. They are net of discounts but include a consumption tax from April 1989. The weights, which are revised every five years, are based on the value of transactions of domestic products for domestic demand. The current base period for both the index and the weights is 2000.

The ***index of employment*** has been compiled for the purpose of this publication and refers to regular employees in manufacturing including part-time workers. Regular employees comprise persons hired for an indefinite period or for longer than one month, and those hired on a daily basis or for less than one month and hired for 18 days or more in each of the two preceding months.

Data refer to manufacturing as defined in the Japan Standard Industrial Classification.

Data cover establishments with 30 or more employees selected from the latest Establishment Census.

GLOSSARY

Business cycles: cycles involve shifts over time between phases of relatively rapid growth of output (recovery and prosperity), followed by phases of relative stagnation or decline (contraction or recession).

When used in this publication, the ***correlation coefficient*** is a Pearson's correlation coefficient and gives a measure of the strength of the relationship between two sets of data (with the same number of observations). Values are ranged between +1 (which indicates perfect correlation) and -1 (which indicates perfect inverse correlation); a value of 0 indicates no correlation.

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[1] *Official Journal No L 162, of 5 June 1998.*

[2] *Official Journal No L 191/1, of 22 July 2005.*

[3] *NACE Rev. 1.1 – Statistical classification of economic activities in the European Community, Commission Regulation (EC) No 29/2002 of 19 December 2001 amending Council Regulation (EEC) No 3037/90 on the statistical classification of economic activities in the European Community.*

Further information:

Reference publications

Title	Quarterly Panorama of European business statistics
Subsciption number	VPA000
Price	EUR 100

Databases: EUROSTAT Website/Home page/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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      - Trade and other services (NACE Rev.1 G-K)
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