Statistics in focus

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Short-term statistics

Focus on the links between new orders, turnover and production for industrial activities

Data on new orders, industrial production and industrial turnover are covered by the same regulation on short-term statistics (see methodological notes at the end of this publication).

The objective of the industrial new orders index is to assess the evolution of the demand for goods and services as an indication of future production; it is the first link in a chain that is followed by production and subsequently sales. Both the production index and the turnover index can be used to show the monthly evolution of markets for goods produced within industry. It is thought that the new orders index should help identify turning points in the business cycle in advance of changes for the indices of production and turnover.

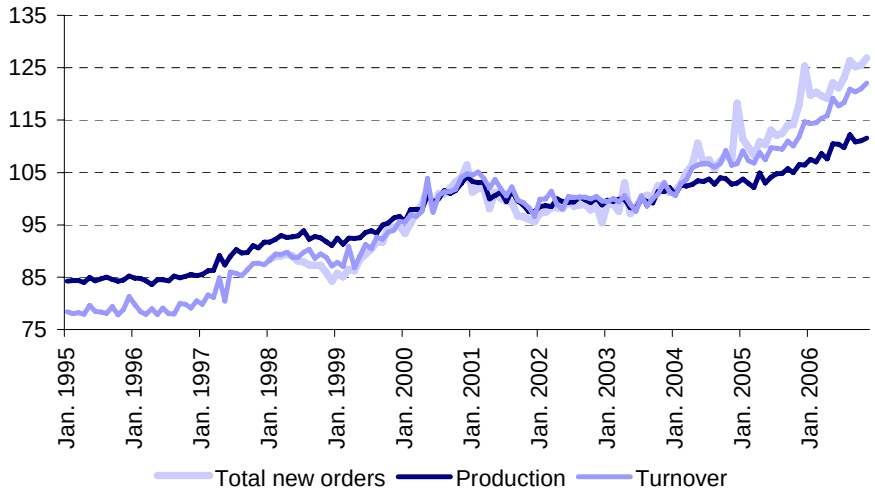
This short publication aims to draw attention to the relationship between these three indices by studying monthly data, principally for the EU-27, for those manufacturing industries working to order (as defined by NACE Divisions 17, 18, 21, 24 and 27 to 35). In terms of turnover, this group of industries represented about 65 % of EU-27 manufacturing (NACE Section D) in 2003.

The seasonally adjusted production index for all manufacturing industries that work to order generally followed an upward trend between 1995 and 2007, albeit with periods of accelerated growth (April 1997 to September 1998 and April 1999 and April 2001) followed by periods of decline (see Figure 1). In broad terms, these changes reflected the evolution of the business cycle.

The value of contracts for new orders and turnover for all manufacturing industries working on orders rose more sharply than the change in the production index during the period 1995 to 2007, particularly since the beginning of 2004. This recent divergence may reflect the impact of higher unit prices (the annual growth rate of output prices for manufacturing industries working on orders has been 2.1 % on average since 2004, having been 0.1 % between 1998 and 2003).

At this aggregated level of detail there appeared to be little evidence of a lag between turning points for new orders on the one hand and the indices of production and turnover on the other.

Figure 1: New orders received, production and turnover indices, EU-27
seasonally adjusted figures, all manufacturing industries working on orders, 2000=100



Manufacturing industries working on orders

A number of manufacturing activities are organised in such a manner that they work to order. In other words, they manufacture their goods according to exact specifications that have been ordered. In contrast, there are activities that do not work to order, for which it is more common for production to be stocked, with deliveries to customers being filled from work already finished. In reality, not all enterprises within an activity work one way or the other, producing some goods to order with the rest being produced to a standard specification for stock.

A new order is defined as the value of the contract linking a producer and a third party with respect to future deliveries by the producer of the goods and services. In this respect, the new orders index comprises a price and volume component. The production index differs from the new orders and turnover indices in this respect, as it is purely a volume measure of output (based on constant price data). In the majority of Member States the new orders index is not revised to reflect any subsequent cancellations from new orders, although these cancelled orders may not result in production or turnover. These distinctions are important to bear in mind when analysing the relationships between the three indices considered.

There was a substantial increase of about 48 % overall in the EU-27 new orders index for manufacturing industries working on orders between a relative low at the start of 1999 through until November 2006, the latest month for which data are considered. The increase in new orders over this period was not smooth, however, with a sharp but relatively short-lived reduction between December 2000 and November 2001, followed by a period of relatively unchanged orders through until June 2003. There has more recently been relatively strong growth in new orders for a period of just over three years (see Figure 1), albeit with periodic slowdowns - such as in the first quarter of 2005.

Table 1: New orders received, turnover and production indices, EU-27

all manufacturing industries that work to order, growth rates (%)

Quarter on quarter growth rates, seasonally adjusted data

	2000				2001				2002				2003				2004				2005				2006		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
New orders	0.7	4.5	1.7	3.2	-2.7	-1.9	-1.3	-2.5	1.7	0.9	0.1	-1.4	1.2	1.0	0.8	1.7	1.0	4.6	-1.1	4.3	-1.4	1.5	1.3	5.6	0.6	0.7	3.4
Turnover	2.0	3.4	1.5	2.4	0.9	-1.9	-1.7	-2.7	2.4	-1.3	1.2	-0.3	-0.4	-0.6	0.7	2.1	0.6	3.9	0.1	0.9	0.3	0.8	1.3	2.0	2.2	2.5	2.0
Production	1.1	2.2	1.5	2.1	0.3	-2.5	-0.5	-2.2	0.6	1.0	0.3	-0.4	0.3	-0.9	0.8	2.1	0.3	1.2	0.4	-0.3	-0.3	1.1	1.0	0.9	1.6	1.7	1.3

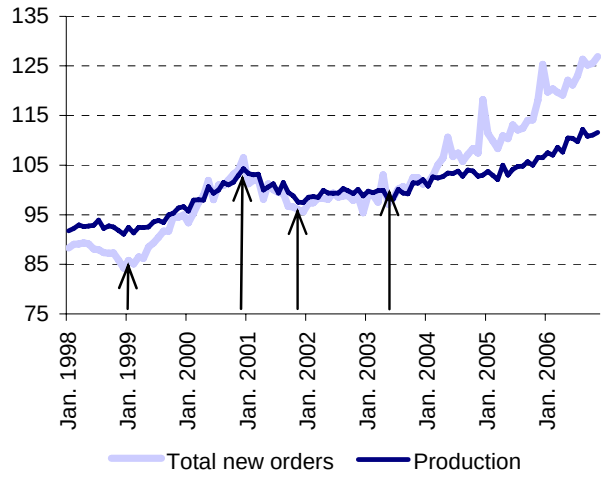
Since the turning point in June 2003, the rate of growth in new orders for EU-27 manufacturing industries working on orders has generally been higher than that for the index of production (see Table 1 and Figure 1). Over the whole of the period since 1998 (the first reference period available for the new orders index), new orders for EU-27 manufacturing industries working on orders tended to either rise faster or fall more sharply than the production index. In part, this is likely to reflect the more elastic nature of demand than supply. Although changes in stocks of finished products and work in progress should be included in the production index, when a change in production capacity is required, either to meet greater than expected orders (sometimes involving the building of new facilities) or lower than expected orders (sometimes leading to labour disputes as closures are announced), the required changes often take time to be put in place. Changes in the production index are less volatile from month to month and quarter to quarter than the new orders index (on the basis of quarterly data between the 2nd quarter of 1998 and the 3rd quarter of 2006, there was a standard deviation of 1.1 % for production and 2.2 % for new orders). This difference may also throw some light on why there might sometimes be a delay between turning points for new orders and production.

Does the orders index lead production? Does it predict turning points of economic activity?

Between 1999 and 2004, there was evidence of a clear relationship between the indices of new orders and production for all manufacturing industries working on orders (see Figure 2).

Figure 2: New orders received and production indices, EU-27

seasonally adjusted figures, all manufacturing industries working on orders, 2000=100



A closer analysis of the monthly indices for new orders and production for all manufacturing activities working on orders shows that the key turning points were the same; these were in February 1999, December 2000, December 2001 and June 2003 (see Figure 2). The data do not suggest, therefore, that the new orders index necessarily leads production but rather that manufacturing industries working to order were generally fast to adapt production levels to changes in levels of new orders. It should be noted, however, that the growth in production since 2004 has failed to keep pace with the growth in new orders.

The absence of a lead in the turning points makes it difficult to use the new orders index as a tool for predicting turning points in the economy for the production index.

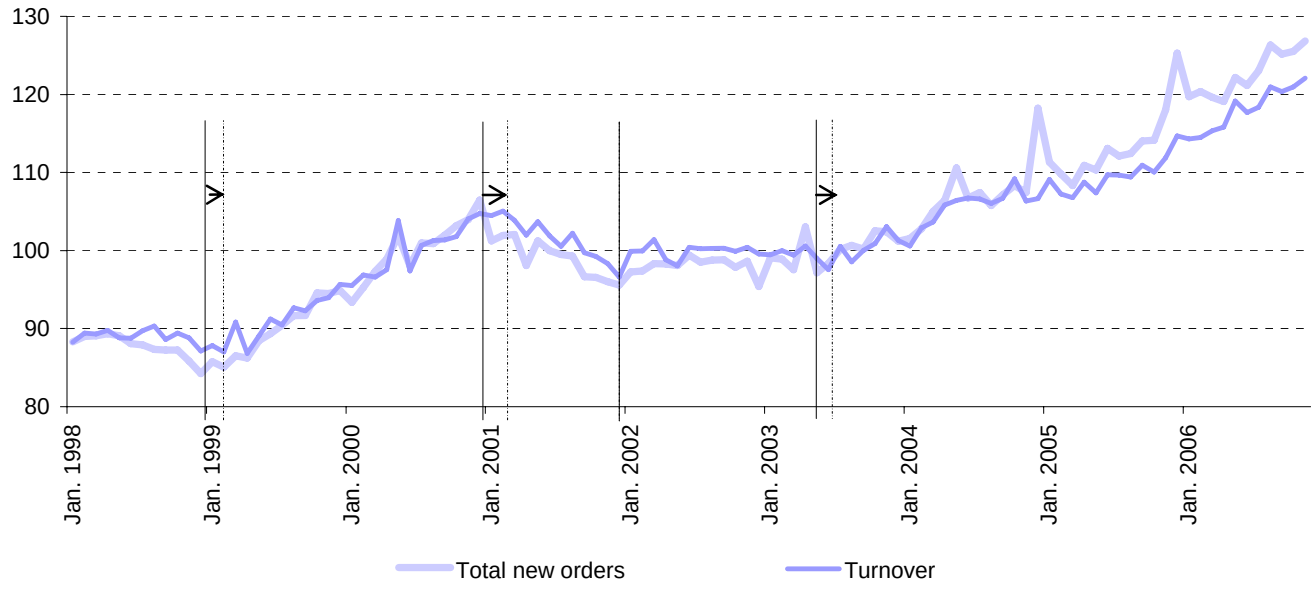
Does the orders index lead turnover? Does it predict turning points of economic activity?

There was also a close relationship between the development of the new orders index and the turnover index (see Figure 3). The overall rise in the turnover index from a relatively low point at the end of 1998 through until November 2006 was 39 % overall, somewhat lower than the corresponding increase for new orders (48 %) but considerably more than the growth in production (21 %).

As with production, there was no clear indication that a switch in the new orders index from positive to negative growth rates, or vice versa, necessarily led to a similar switch for turnover. Quarter to quarter growth rates (as shown in Table 1) suggest that the turnover index was rather less volatile than the new orders index, perhaps reflecting a range of characteristics regarding delivery and invoices, such as down-payments, instalments, staged payment schemes and payment on delivery designed to help cover the manufacturing costs incurred at various steps in the production process and smooth, therefore, revenue streams. This may help explain why in the first quarter of 2001, by way of example, the turnover of all manufacturing industries working on orders continued to increase despite a sharp downturn in new orders.

An analysis of the monthly indices for new orders and turnover for all manufacturing activities working on orders shows that the key turning points for the new orders index preceded similar turning points in the turnover index by one to two months (illustrated in Figure 3). This was not a systematic lead, however, with spikes between turning points often occurring in the same month (such as December 2001).

Figure 3: New orders received and turnover indices, EU-27
seasonally adjusted figures, all manufacturing industries working on orders, 2000=100



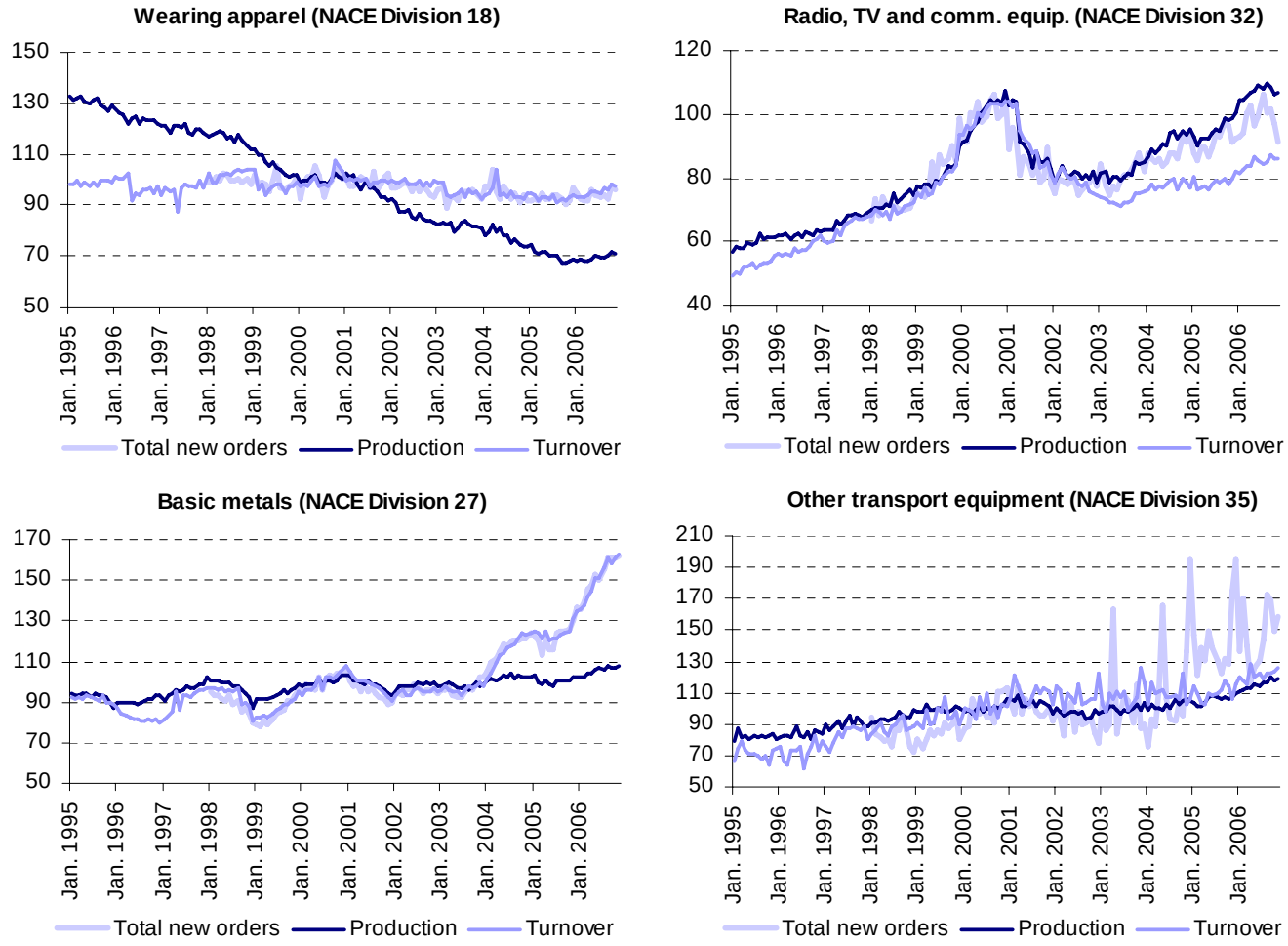
NACE divisions within manufacturing working on orders

Looking in more detail at the developments for the different manufacturing industries that work to order there were contrasting developments at the level of individual NACE divisions. To demonstrate the complexity of the situation, a number of examples are detailed below.

In the case of wearing apparel, there was a steep decline in production within the EU-27 in the face of strong global competition (particularly from less developed countries). Between 1995 and 2005 the transitional Agreement on Textiles and Clothing (ATC) operated to progressively remove quotas. During this period much of the EU's textile production was closed down or transferred to lower-cost regions. The focus of remaining EU production has increasingly been on higher value added products (such as high-technology cellulosic synthetic yarns or industrial filters). This could explain why there was no correlation between the indices of new orders and production for the EU-27, although there was a relatively high degree of correlation between the new orders and turnover indices (see Figure 4).

Figure 4: New orders, production and turnover indices, EU-27

seasonally adjusted figures, selected NACE Divisions among manufacturing industries working on orders, 2000=100



The developments of the three indices for basic metals (NACE Division 27) follow closely that of the overall business cycle (see Figure 4), in part reflecting the cyclical demand for raw metal products (particularly from the construction industry). Indeed, the key turning points closely reflect those recorded for all manufacturing industries working to order. However, the strong demand for metals (particularly steel) from the start of 2004 onwards forced prices up (an annual rise of 10.1 % for basic metals since the start of 2004 compared to an average 1.3 % for goods from manufacturing industries working on orders as a whole).

The cyclical pattern for the manufacture of radio, television and communications equipment (NACE Division 32) was very pronounced. In addition, there was a clear pattern with the index of new orders leading the indices of production and turnover by three months. As such, in this example the new

orders index could be used as a predictor for subsequent turning points in the business cycle for radio, television and communications equipment. It is interesting to note that despite a sharp rise in new orders and production levels, turnover rose at a much slower pace. This development may well reflect a reduction in unit prices (an average decline of 6.4 % per year on average during the past five years, compared to a 1.3 % rise for goods from manufacturing industries working on orders as a whole).

The development of the three indices for the manufacture of other transport equipment (NACE Division 35) is also shown in Figure 4. The erratic nature of the new orders index may be attributed to the sporadic nature of orders for other transport equipment, including ships, railway locomotives and aircraft or spacecraft. New orders for these products are not placed on a regular basis but as part of periodic re-investment programmes, whether it be to upgrade civilian or military aircraft fleets, railway rolling stock, or invest in new ship capacity. These products have a high value, which means that when new orders are placed, the monthly new orders index takes on a spiked appearance. Furthermore, these products made within this industry are not likely to be stockpiled, with manufacturing throughput likely to take a considerable time to reflect changes in orders, as lengthy periods (often years) are required for the production process (for example, consider the time taken to build a new plane or a cruise ship).

Summary of results by activity and Member State

For many manufacturing industries, the long-term developments in new orders, production and turnover indices show a similar evolution. The use of time-series information provides clear indications of the main, historical, turning points in the series, as well as some evidence of lags between the turning points for the index of new orders and corresponding turning points for production and turnover indices.

When the latest monthly data become available, it is not easy to identify, however, whether the latest rate of change signifies a turning point or is more representative of the generally erratic nature of the new orders index (which often fluctuates between growth and contraction). As such, it is difficult to make predictions regarding the future behaviour of the production or turnover indices based on the current behaviour of the new orders index. Indeed, a number of the economic activities studied displayed a low degree of correlation between the monthly changes in new orders and production.

The results of an analysis of the month on month growth rates for new orders, production and turnover (based on two-month moving averages) are shown in Table 2. The correlations between the monthly rates of change for the new orders and production indices for industries working on orders reveal that it was only for the manufacture of office machinery and computers, basic metals and chemical and chemical products that there was a positive correlation above 0.6. In other words, for all the other manufacturing industries working on orders there was little evidence to suggest that it is meaningful to predict the monthly change in production from the change in new orders. The relatively high correlation for total manufacturing industries working on orders (excluding the other transport equipment industry) suggests that some changes in orders among the individual industries working on orders cancel each other out.

In contrast, there was a much stronger correlation between the monthly changes in new orders and turnover. The correlation coefficients were strongest for basic metals, textiles, and chemicals and chemical products (a little over 0.75). There was also strong correlation at the level of all manufacturing industries working on orders (excluding the other transport equipment industry).

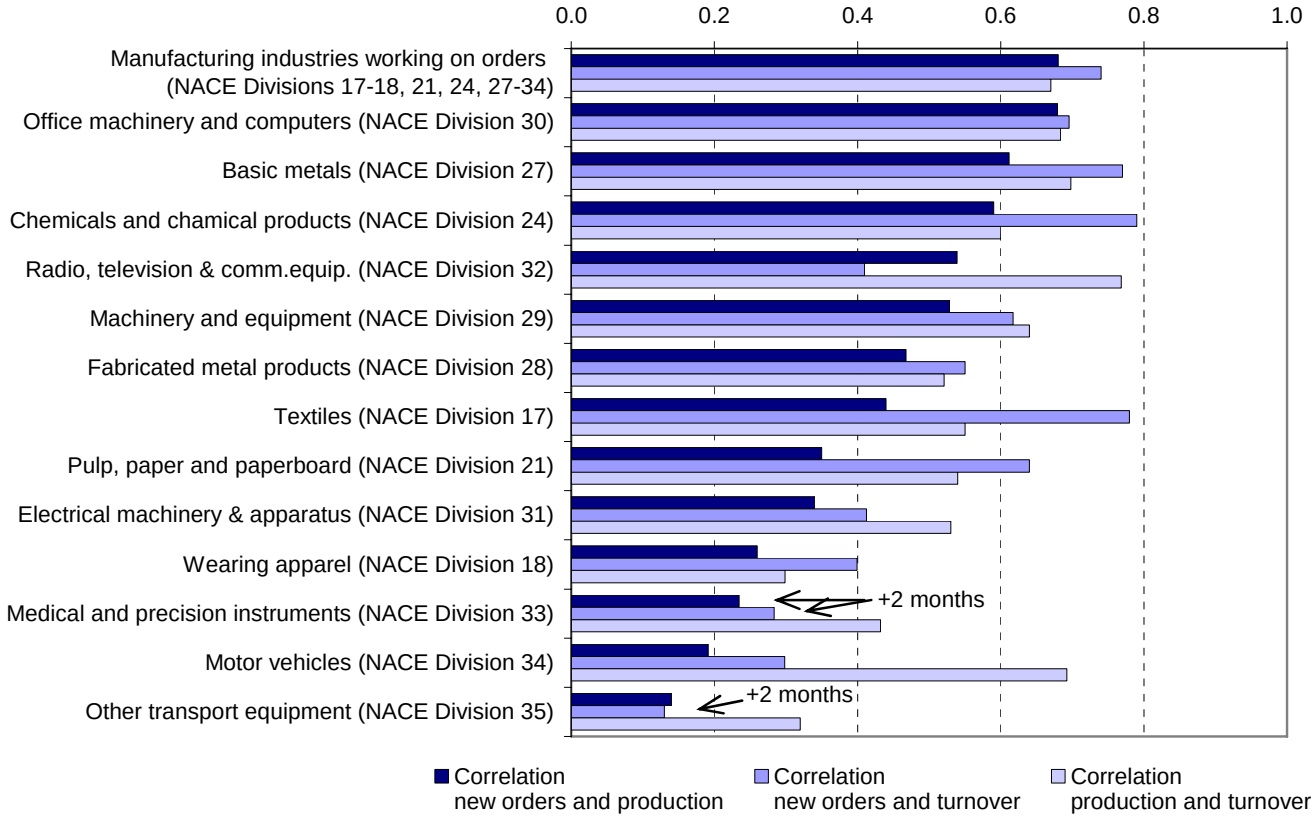
The correlation coefficients between the monthly growth rates for the indices of production and turnover also tended to be higher than between new orders and production across the range of manufacturing industries working on orders, although not necessarily higher than between new orders and turnover.

Across those industries working on orders, the lowest correlations tended to concern either activities whose products take a considerable time to manufacture and are unlikely to be stocked (such as other transport equipment) and/or those activities whose products compete in highly competitive markets, where unit prices are frequently in the process of being driven downwards (for example, the manufacture of clothing).

The general absence of time lags between turning points suggests that production processes for those manufacturing industries working on orders are relatively responsive. This is likely to reflect greater labour market flexibility (lengthening and shortening the working week in response to demand) on the one hand and the greater use of technology on the other (just-in-time production processes, more efficient stock control, flexibility to produce to order).

Figure 5: Correlation coefficients between month on month growth rates for new orders, production and turnover indices, selected manufacturing industries, EU-27

seasonally adjusted figures, based on 2-month moving averages, longest time-series available
highest positive correlation (with lags indicated)



Among the Member States there were considerable differences between correlation coefficients across all manufacturing industries working to order. As a general rule, there were relatively low levels of correlation between the month on month growth rates of the three indices within each of the Member States (see Table 2), particularly between new orders and production. There were some exceptions: in Lithuania, and to lesser extent Estonia, there were relatively strong correlations in the month on month growth rates in the three indices; in Ireland there was a high correlation between growth rates for new orders and turnover, with a relatively strong correlation between the same two indices (new orders and turnover) in Germany.

Table 2: Coefficients of correlation between growth rates for new orders, production and turnover indices, manufacturing industries working to order

seasonally adjusted figures, based on 2-month moving averages, longest time-series available,
highest positive correlation (with lags indicated)

	Correlation (new orders and production)	Correlation (new orders and turnover)	Correlation (production and turnover)		Correlation (new orders and production)	Correlation (new orders and turnover)	Correlation (production and turnover)
BE	0.24	0.48	0.43	**LU**	0.13	0.44	0.46
CZ	0.25	0.34	0.83	**HU**	:	0.30	:
DK	0.32	0.35	0.46	**MT**	:	0.31 (+1 mnth)	:
DE	0.43	0.72	0.61	**NL**	0.44	0.64	0.65
EE	0.61	0.54	0.77	**AT**	0.29 (+3 mnth)	0.50	0.37
IE	0.59	0.97	0.58	**PL**	0.15	0.13 (+2 mnth)	0.86
EL	0.20	0.61	0.42	**PT**	0.25	0.45	0.60
FR	0.46	0.28	0.51	**SK**	0.20	0.38	0.51
IT	0.35	0.54	0.59	**FI**	:	:	0.48
LV	0.21	0.27	0.41	**SE**	0.25	0.38	0.66
LT	0.71	0.75	0.75	**UK**	:	:	0.66

➢ 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[1] concerning short-term statistics (STS-R) and Regulation (EC) No 1158/2005 of the European Parliament and of the Council of 6 July 2005[2] 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 concerning short-term statistics as regards the definition of variables.

The objective of the **industrial new orders index** is to assess the future evolution of demand for goods and services as an indication of future production. An order is defined as the value of the contract linking a producer and a third party in respect of the provision by producer goods and services. The order is accepted if, in the producer's judgement, there is sufficient evidence for a valid agreement. New orders refer to goods and services that are provided by the observation unit, including those originating from sub-contractors.

The following items should be deducted from the value of orders: (1) VAT and other similar deductible taxes directly linked to turnover; (2) reductions in prices, rebates and discounts when they are given at the moment of order as well as the value of packing that is expected to be returned after the delivery; (3) subsidies received from public authorities or the institutions of the European Union.

Orders of previous periods that have been cancelled during the observation period are not to be deducted from the new orders received nor is the index for previous periods revised due to cancellations.

New orders include all duties and taxes on the goods or services that will be invoiced by the unit with the exception of the VAT and other similar deductible taxes directly linked to turnover. The value of new orders also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges will be listed separately in the invoice.

All Member States are obliged to transmit the industrial new orders index for the following NACE Rev. 1.1 activities:

- textiles (Division 17);
- wearing apparel (Division 18);
- pulp, paper and paperboard (Division 21);
- chemicals and chemical products (Division 24);
- basic metals (Division 27);
- fabricated metal products (Division 28);
- machinery and equipment (Division 29);
- office machinery and computers (Division 30);
- electrical machinery and apparatus (Division 31);
- radio, television and communication equipment and apparatus (Division 32);
- medical and precision instruments (Division 33);
- motor vehicles (Division 34);
- other transport equipment (Division 35).

The main aggregate for new orders is the sum of the above NACE divisions and is referred to as '**manufacturing industries working on orders**'.

The production index is a business cycle indicator showing the output and activity of industry. The index provides a measure of the volume trend in value added at basic prices over a given reference period.

The objective of **the turnover index** 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.

Seasonal adjustment
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 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.

Further information
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[1] Official Journal No L 162, of 5 June 1998.
[2] 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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