

# European Business Cycle Indicators

## *Developments in business and consumer survey data in 2011Q1*

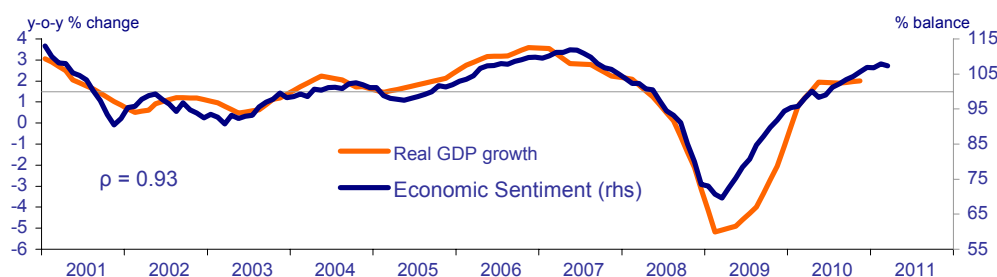
- Despite some modest signs of weakening in March, economic sentiment picked up further in the EU and the euro area over 2011Q1
- Industry and services were the main driver of the overall improvement
- Industrial confidence was fuelled by further gains in order books and production expectations, with stocks remaining at historic lows
- Services benefited from improvements in the business situation and in demand expectations
- Consumer confidence was slightly down in the EU, reflecting a less optimistic assessment of financial and macroeconomic developments

## *Highlight: Inventory behaviour since the recession*

*This quarter's highlight takes a closer look at the relationship between stocks and production expectations in the industry survey. The analysis suggests that the crisis has been associated with a significant change in manufacturers' inventory behaviour, with increased aversion to the risk of holding excessive stocks and more responsive stock management to fluctuations in economic activity.*

### ESI and GDP growth for the EU

(Jan 2001 to Mar 2011 for survey data)



Note 1: The horizontal line (rhs) marks the long-term average (=100) of the sentiment indicator.

Note 2: Both ESI and GDP series are plotted at monthly frequency. Monthly GDP data are obtained by linear interpolation of quarterly data.

'European Business Cycle Indicators' provides short-term analysis based on Business and Consumer Survey data. It appears quarterly.

European Commission – Economic and Financial Affairs Directorate-General

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KC-BA-11-001-EN-N

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## 1. Recent developments in survey indicators for the EU and the euro area

In the first quarter of 2011, the Economic Sentiment Indicator (ESI) improved further in both the EU and the euro area. The indicator now stands at 107.4 in the EU (1.1 points higher than in December 2010) and at 107.3 in the euro area (0.4 point higher than in December 2010), well above its long-term average in both regions.

The improvement in sentiment was mostly driven by Germany, France and the UK and by strong positive readings in industry, services and, albeit to a much lesser extent, in construction.

In March, the positive upward trend marked a pause in the EU, and the ESI declined slightly in the euro area. In the EU, industry and services remained on an upward trend, offsetting the declines observed in retail trade, construction and among consumers. Meanwhile, the slight decline in the euro area resulted from a combination of broadly unchanged sentiment in industry and weakening confidence in the other business sectors and among consumers. It is unlikely that the March reading of the ESI has been significantly affected by recent international events such as the start of air strikes in Libya or the earthquake in Japan on 11 March. The bulk of surveys are carried out during the first two weeks of the month and therefore these events are hardly reflected in March confidence data.

Confidence in *industry* improved in the first three months of the year in both the EU and the euro area, mainly driven by Germany, France and the UK. Gains in industrial confidence reflected improvements in order books and production expectations. Managers' assessment of stocks decreased further and is now at historically low levels (see the Highlight in this issue for a more detailed analysis). However, sentiment in industry stagnated in March in the euro area, reflecting a deterioration in Germany due to weaker production expectations. In both the EU and the euro area, managers revised their production expectations downwards slightly that month.

Sentiment in *services* improved further in the EU and the euro area during the first quarter of 2011, approaching its long-term average in both regions. Nevertheless, it slipped back in the euro area in March, reflecting mainly a decline in Germany and Italy. In March, managers in this sector reported a weakening of their assessments of demand and the business situation, while their demand expectations continued to improve.

Sentiment in the *retail sector* reached a peak in December 2010 and then fell back in the first quarter of 2011 in both regions, reflecting a worsening of managers' assessment of past business activity, the level of stocks and the intention of placing new orders in the next three months. The indicator nevertheless stands well above its long-term average.

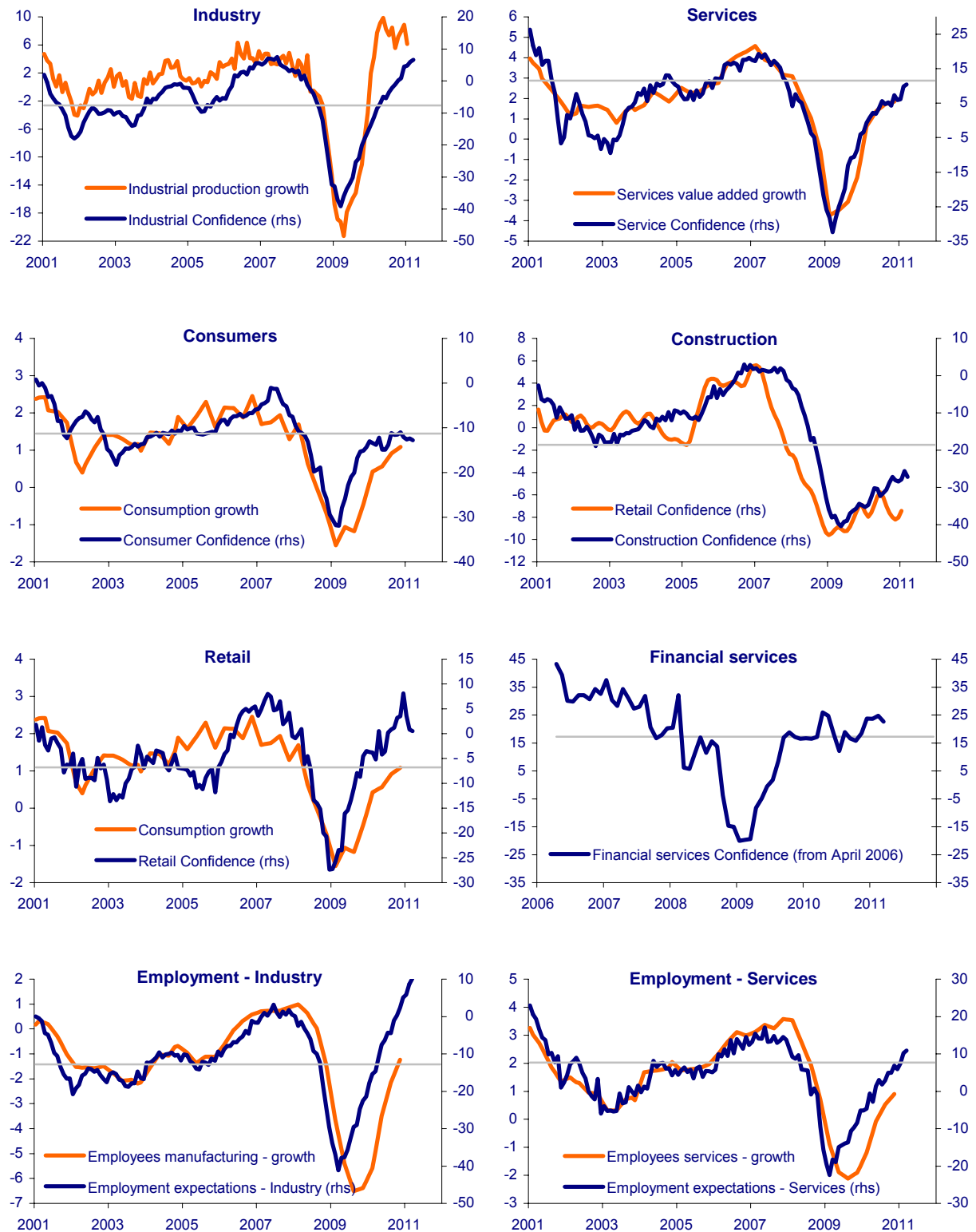
In both regions, sentiment in *construction* recovered further in the first two months of 2011, but in March the indicator dropped again, because of growing pessimism among entrepreneurs about their order books and employment prospects. Overall, during the first quarter of 2011 sentiment in construction followed very different patterns across countries, with strong gains in Germany, France and in the Netherlands, while Spain, Greece and the UK have continued the downward trend seen in recent months.

In the first three months of the year, confidence among *consumers* shrank somewhat in the EU and remained broadly unchanged in the euro area. In general, consumers have become less optimistic about their future financial situation, the expected general economic situation and the possibility of saving money in the months ahead. Meanwhile, their unemployment fears have continued to ease in both regions (though more markedly in the euro area) and are now stabilising at levels last seen in summer 2008.

Confidence in *financial services* — not included in the ESI — improved significantly in both the EU and the euro area in the first quarter of 2011. Nevertheless, March data showed a significant deterioration of sentiment in the sector on the back of weaker assessment of past and expected development of demand.

Graph 1: Sectoral confidence indicators and reference series for the EU

(Jan 2001 to Mar 2011 for survey data)



Note 1: The horizontal line (rhs) marks the long-term average of the survey indicators.

Note 2: Confidence indicators are expressed in balances of opinion and hard data in y-o-y changes. If necessary, monthly frequency is obtained by linear interpolation of quarterly data.

Overall, the latest survey readings suggest that the recovery remains on track, although uncertainty may have recently increased. This is confirmed by the economic climate tracer for both the EU and the euro area, which is currently firmly in the expansion quadrant (see Section 4 for further details). On the other hand, the turning point indicator for the euro area — which extracts the (positive or negative) surprises from new available data — decreased in March to move into ‘neutral’ territory, signalling a more uncertain phase (see Section 5 for further details).

## 2. Recent developments in selected Member States

In general, the ESI improved in the first quarter of 2011 compared with the fourth quarter of 2010. However, in March the indicator registered a decrease in most of the EU Member States. Of the seven largest Member States, France and the Netherlands registered significant increases in the first quarter, while improvements were less pronounced in the UK, Poland and Germany. Sentiment remained broadly stable in Italy and Spain. In Germany, France, Italy, the UK and the Netherlands the ESI is above its long-term average.

As to other euro-area countries, economic sentiment in Greece and Portugal remained at very low levels. Confidence worsened markedly among Greek construction managers, while some improvements were registered in industry in both countries<sup>1</sup>.

Climate tracers suggest that sentiment is in the expansion phase in Germany, France and the Netherlands, still in the upswing phase in the UK, Italy and Poland, and moving towards contraction in Spain (see the Section 4 for further details).

The **German** ESI reached a peak in December 2010. It fell slightly during the first quarter of 2011, but remains at a very high level. Confidence in German industry reached a historic peak in February, boosted by

improving assessment of the level of order books, before dipping slightly in March. Also, confidence in construction grew markedly in the first quarter and now stands well above its long-term average and at levels last seen in the early 1990s. Though still at very high levels, confidence in services, retail trade and among consumers weakened somewhat during the first quarter.

In **France**, economic sentiment improved markedly in the first quarter of 2011, sustained by sizeable increases in industry, services and construction. The latter, however, is still well below its long-term average. In contrast, confidence worsened in retail trade and among consumers, who were more pessimistic about their future financial position, as well as the future general economic situation.

The **United Kingdom** reported a significant increase in the Economic Sentiment Indicator during the first three months of the year. This was mainly thanks to large gains in confidence in industry and services, where managers expressed increasing optimism in both backward- and forward-looking questions. By contrast, sentiment in the other sectors and among consumers deteriorated.

In **Italy**, overall sentiment remained broadly stable in the first three months of the year. This resulted from an increase in confidence among managers in industry, services and construction, offset by a decline in retail trade and among consumers. Italian consumers, like their French counterparts, became less optimistic about their future financial position, as well as the future general economic situation.

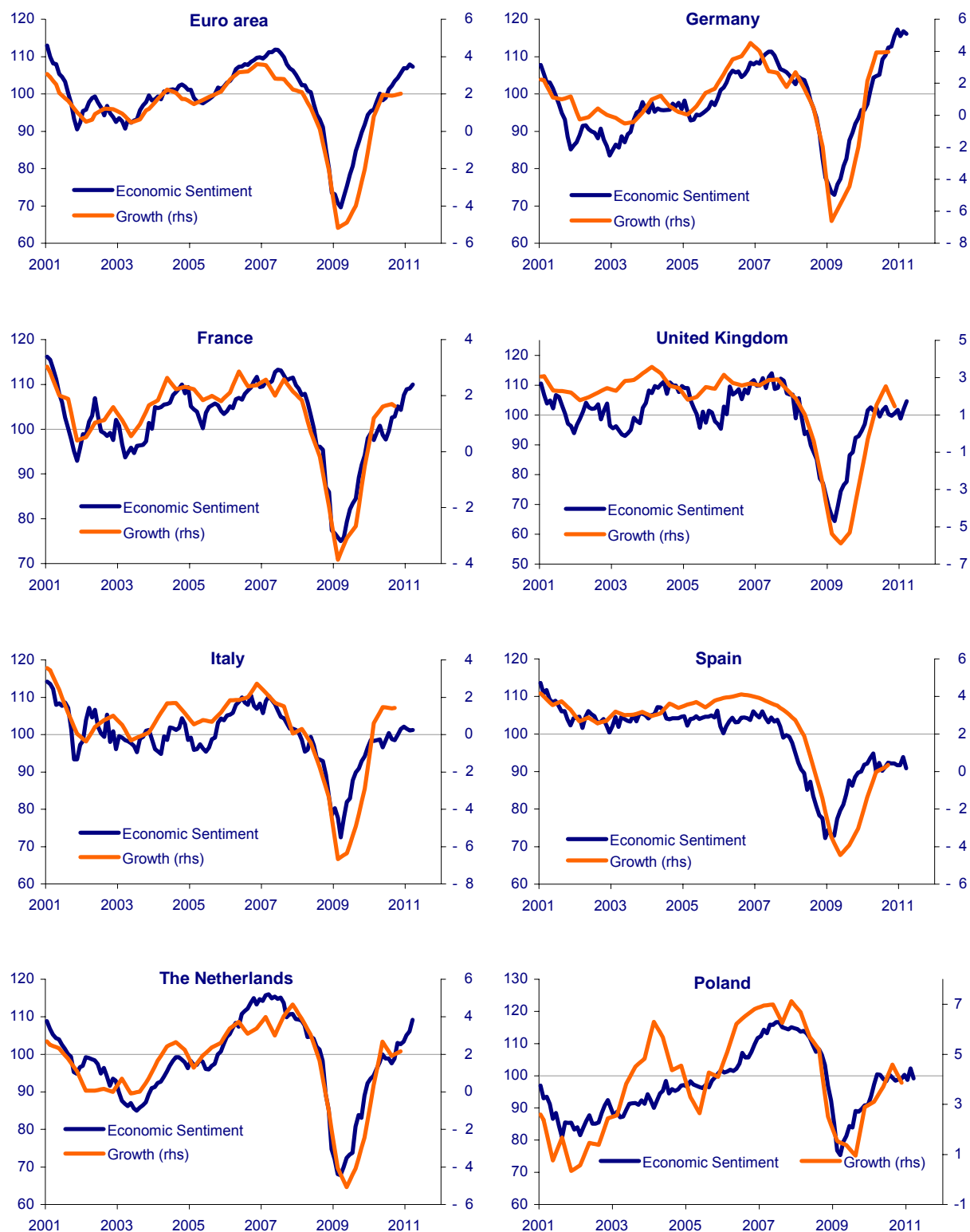
Also in **Spain**, sentiment remained broadly unchanged over the first quarter of 2011, and the country's ESI remains the lowest among the large EU Member States. This situation was the result of a further sharp decline in construction (now at historic lows), which was only partially compensated by a slight improvement in consumer confidence. Meanwhile, sentiment in industry, services and retail trade remained broadly stable.

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<sup>1</sup> Survey data on Ireland is not available.

**Graph 2: Economic Sentiment Indicator — Selected EU Member States**

(Jan 2001 to Mar 2011 for survey data)



Note 1: The horizontal line marks the long-term average (=100) of the sentiment indicator.

Note 2: Confidence indicators are expressed in balances of opinion and GDP in y-o-y changes. Both variables are plotted at monthly frequency. Monthly GDP data are obtained by linear interpolation of quarterly data.

In the **Netherlands**, sentiment improved markedly during the first quarter of 2011, after having remained broadly unchanged in the previous quarter. This was mainly due to strong gains among consumers, who have turned much more confident with respect to both general macroeconomic prospects and their personal financial situation. The construction sector also registered a buoyant performance, while industry remained on an upward trend.

Finally, in **Poland** economic sentiment followed an uneven pattern during the first quarter of 2011, with a strong improvement in February followed by a drop in March, which pushed the indicator back to a lower level than at the end of 2010. Sentiment remains, however, close to its long-term average. Changes in overall sentiment over the first quarter were the result of opposing movements at the sectoral level with improvements in the retail and construction sectors offset by weaker developments in sentiment in industry and among consumers.

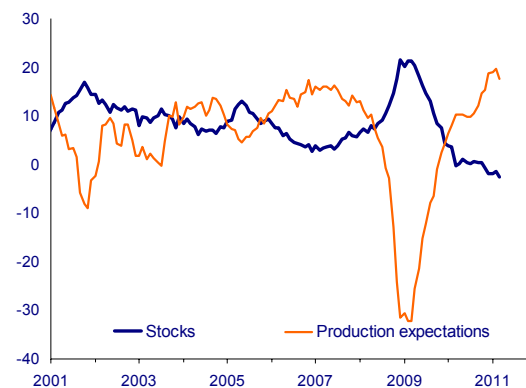
### 3. Highlight: Inventory behaviour since the recession

Explaining features of inventory behaviour is of critical importance for a better understanding of business cycle fluctuations. The inventory cycle tends to amplify the existing economic cycle as stocks are accumulated in good times (when manufacturers consider them too low) and run down in bad times (when manufacturers consider them too high). For example, in the recession of 2008-2009, demand plunged in the euro area, leaving companies with significant excess inventory. This can be seen in the industry survey: manufacturers' production expectations went into free fall in the second half of 2008 and in the first months of 2009 while their assessment of stocks surged, as they considered them to be much too large (see Graph 3).

There are two main theories in the economic literature to explain inventory behaviour: the production smoothing theory and the stockout-avoidance theory. According to the production smoothing theory, firms hold inventories in

order to reduce production costs under demand uncertainty. According to the stockout-avoidance theory, firms hold inventories in order to avoid losing sales opportunities when production takes time and hence is incapable of responding to a demand shock instantaneously. In both theories, expectations are a key variable in explaining how stocks are built.

Graph 3: Assessment of stocks and production expectations, euro-area industry (Jan 2000 to Mar 2011)



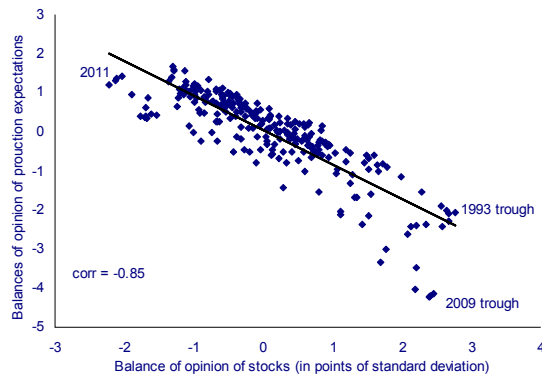
Note: sentiment indicators are expressed in balances of opinion.

Testing a full-blown model of inventory behaviour is beyond the scope of this section. We nevertheless provide survey-based evidence that the crisis has been associated with a significant change in manufacturers' inventory behaviour, with increased aversion to the risk of holding excessive stocks.

Business surveys can be exploited to analyse the link between inventories and expected productions. Usually, stocks and production expectations have a stable relationship, as managers always adapt their (expected) production taking into account the situation of stocks. If producers consider their current stocks to be too small (too large), they expect to increase (reduce) production over the next three months in order to replenish (reduce) their stocks. Graph 4 illustrates the link between manufacturers' appraisal of stocks of finished goods (question Q4 of the industry survey) and their production expectations (question Q5). The regression line of Q5 on Q4

shows a strong negative correlation between the two balances of opinion (-0.85).<sup>2</sup>

**Graph 4: Correlation between production expectations and assessment of stocks, euro-area industry (Jan 1990 to Mar 2011)**

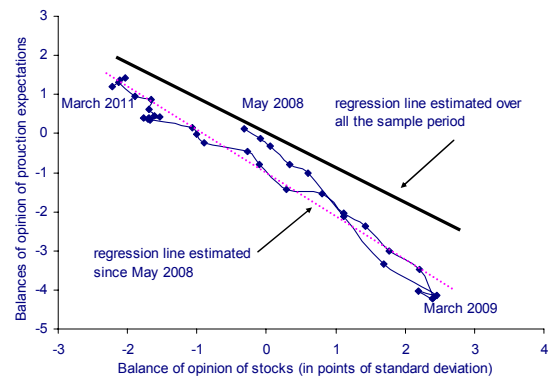


*Note: balances of opinion have been normalised.*

In the latest business cycle, manufacturers' assessments of stocks have followed the traditional cyclical pattern: a steep deterioration (i.e. a rise in the share of companies reporting excessive inventories), followed by rapid improvement in the recovery (i.e. a fall in the share of companies reporting excessive inventories) and, finally, stabilisation of the indicator at a low level. Several features of the current recovery stand out, however. First, the current level of manufacturers' appraisal of stocks has been exceptionally low for some time (about year). Second, a change in the relationship between the assessment of inventories and production expectations has been noticeable since the beginning of the crisis. This can be seen in Graph 5, which shows that the regression line since summer 2008 (in pink) has become both steeper than the traditional regression line (in bold) and shifted southwards. As discussed more in depth later, this can be interpreted as an indication that manufacturers have (at least temporarily) changed their management of

inventories, probably reflecting changing attitudes towards risks.

**Graph 5: Correlation between production expectations and assessment of stocks, euro-area industry (balances of opinion normalised – May 2008 to March 2011)**

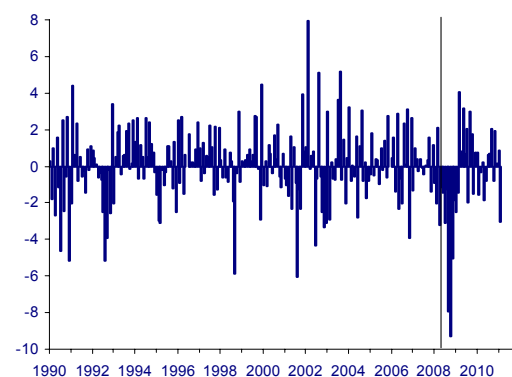


*Note: balances of opinion have been normalised.*

To test this apparent change in behaviour more formally, we estimate a simple model, where manufacturers' production expectations (hereafter E) can be explained by the assessment of stocks (hereafter S) and past values of both the assessment of stocks and production expectations:

$$E_t = a + b_0 S_t + b_1 S_{t-1} + c_1 E_{t-1} + u_t$$

**Graph 6: Residuals of a regression explaining manufacturers' production expectations by their appraisal of stocks, euro area (Feb 1990 to Mar 2011)**



Based on this framework, manufacturers' production expectations are accurate in a statistical sense (estimated errors  $u_t$  are distributed like a white noise). However,

<sup>2</sup> The two corresponding questions in the industry survey are:

Q4 – Do you consider your current stock of finished products to be: too large, adequate, too small?

Q5 – How do you expect your production to develop over the next 3 months: increase, remain unchanged, decrease?

during the latest crisis, the errors have become strongly negative for several months in a row, implying that the production expectations — as reported in the survey — have been (almost) continuously lower than what the model would have predicted based on pre-crisis behaviour (see Graph 6). This suggests a possible structural break in the relationship between stocks and production.

The possible presence of breaks in the errors is tested through the Bai-Perron procedure,<sup>(3)</sup> which also makes it possible to identify the dates on which the breaks occur. This tool is widely used in the econometric and financial literature, as it relies on sufficiently general assumptions and yields robust results. As expected, the test identifies a structural break in the residuals in May 2008.

Interpreting this structural break economically is, however, not straightforward. The associated change in inventory behaviour seems to be related to the global financial crisis and probably reflects higher aversion to the risk of holding excessive stocks. The recent downshift in the regression line since 2008 means that producers tend to keep stocks persistently lower than what their level of activity would have justified in pre-crisis years. This could be explained by several factors, including a reluctance to raise production too quickly and, possibly, lingering doubts about the sustainability of the demand expansion in the medium term. In addition, the fact that the regression line has recently become steeper indicates that manufacturers adjust production plans more quickly when inventories deviate from their normal level (or rather from the level which is currently considered as normal and is persistently lower than in pre-crisis years). In other words, inventory management has become more responsive to short-term fluctuations in activity.

Overall, the analysis presented here points to a double change in inventory behaviour (increased risk aversion and more responsive

stock management) since the beginning of the crisis. Whether this change is structural or just a temporary effect of the crisis is difficult to say. There is some evidence that the relationship between stocks and production expectations may eventually be normalising. In Graph 5 the latest combinations of production expectations and stock assessment are again located relatively close to the black regression line (i.e. the pink and black lines are now about to cross). Manufacturers' expected production for the next three months has increased steadily over the past year, bridging much of the gap with historically low inventory appraisals. A continuation of this trend would bode well for short-term industrial production in the euro area.

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<sup>(3)</sup> Bai J. and P. Perron (1998), 'Estimating and testing linear models with multiple structural changes', *Econometrica*, Vol. 66, pp. 47–78.

#### 4. The Economic Climate Tracer

The graphs hereafter show the economic climate tracer for the EU (including sectoral components), the euro area and the seven largest EU Member States.

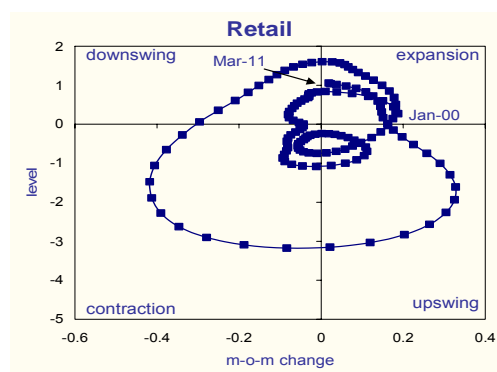
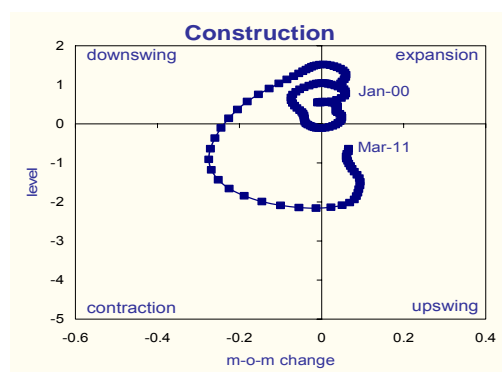
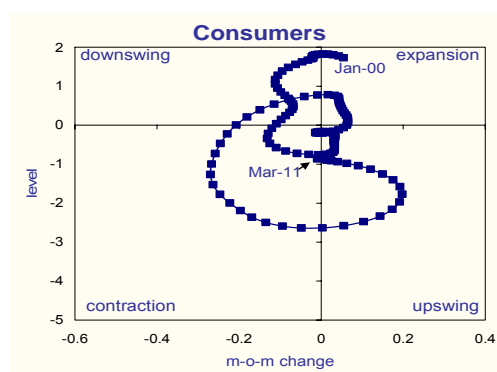
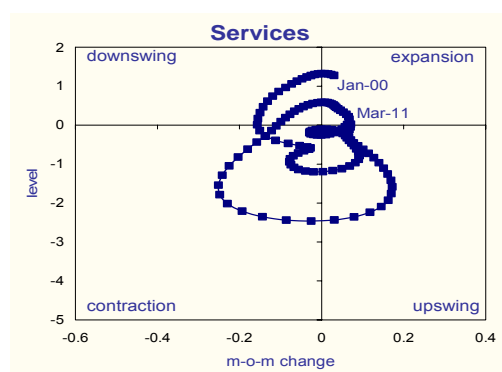
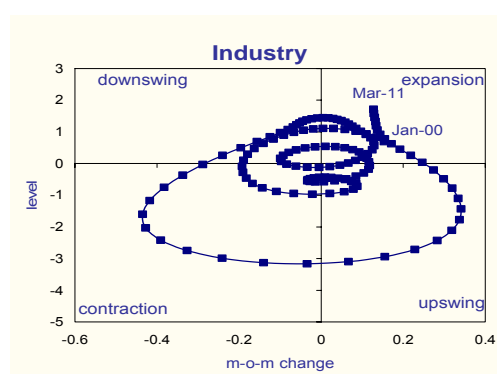
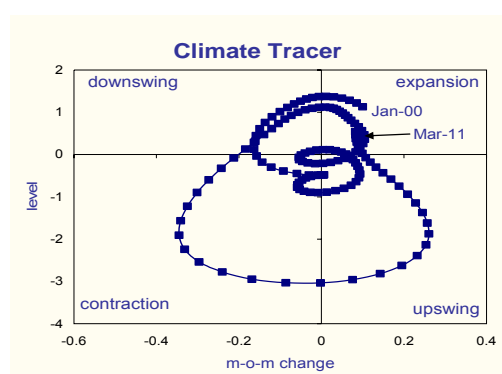
The series levels are plotted against their first differences (m-o-m changes), so that each chart depicts — at the same time — the current stance of the sector/country and its most recent dynamics. Series are smoothed to eliminate short-term fluctuations.

The four quadrants of the graphs allow four phases of the business cycle to be distinguished:

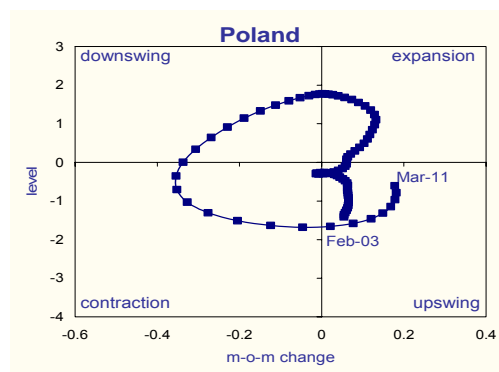
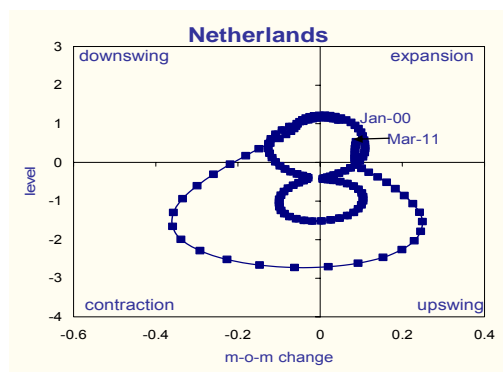
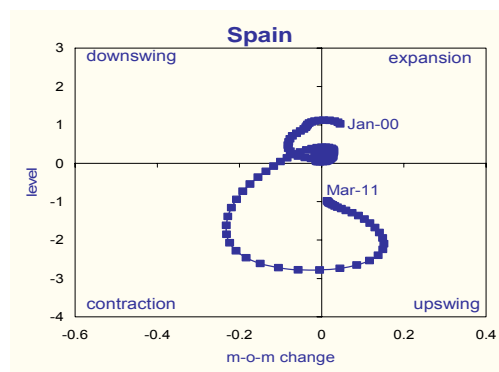
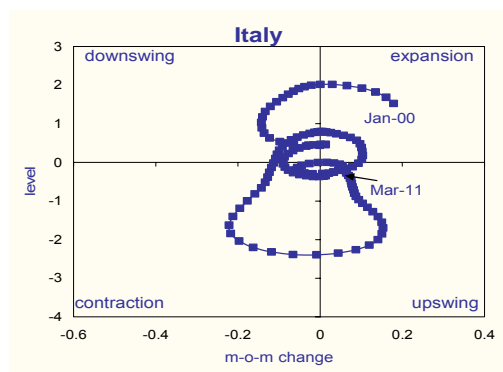
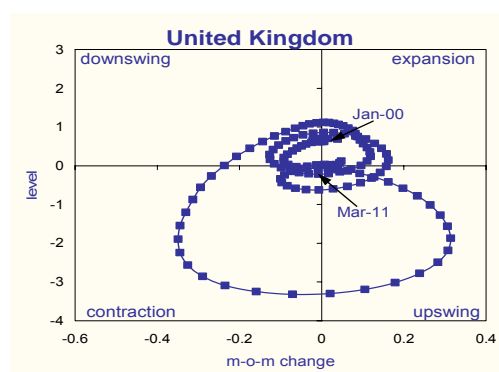
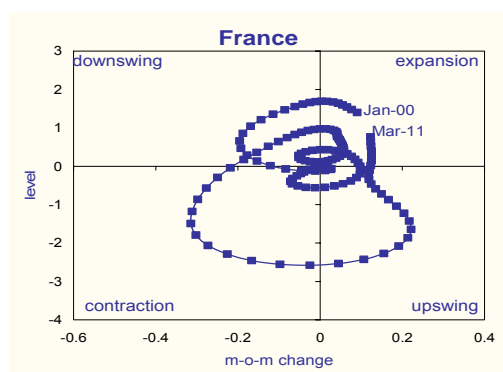
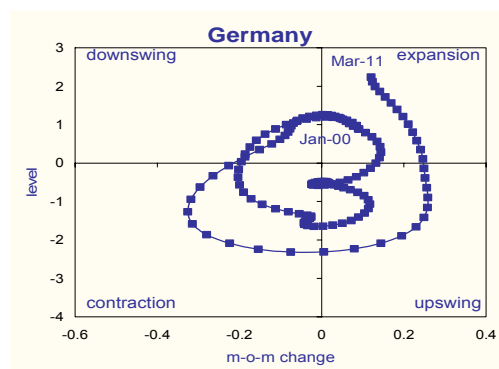
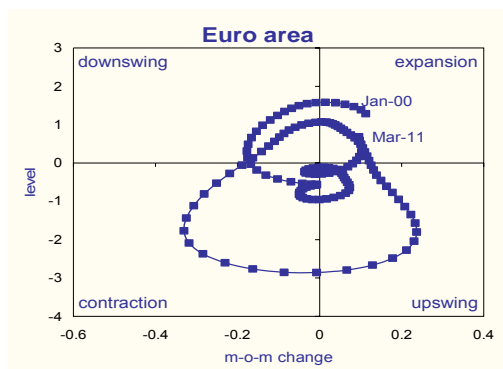
- ‘expansion’ (top right quadrant),
- ‘downswing’ (top left),
- ‘contraction’ (bottom left), and
- ‘upswing’ (bottom right).

Cyclical peaks are positioned in the top centre of the graph, and troughs in the bottom centre.

#### Economic climate tracer across sectors, EU



## Economic climate, largest EU Member States

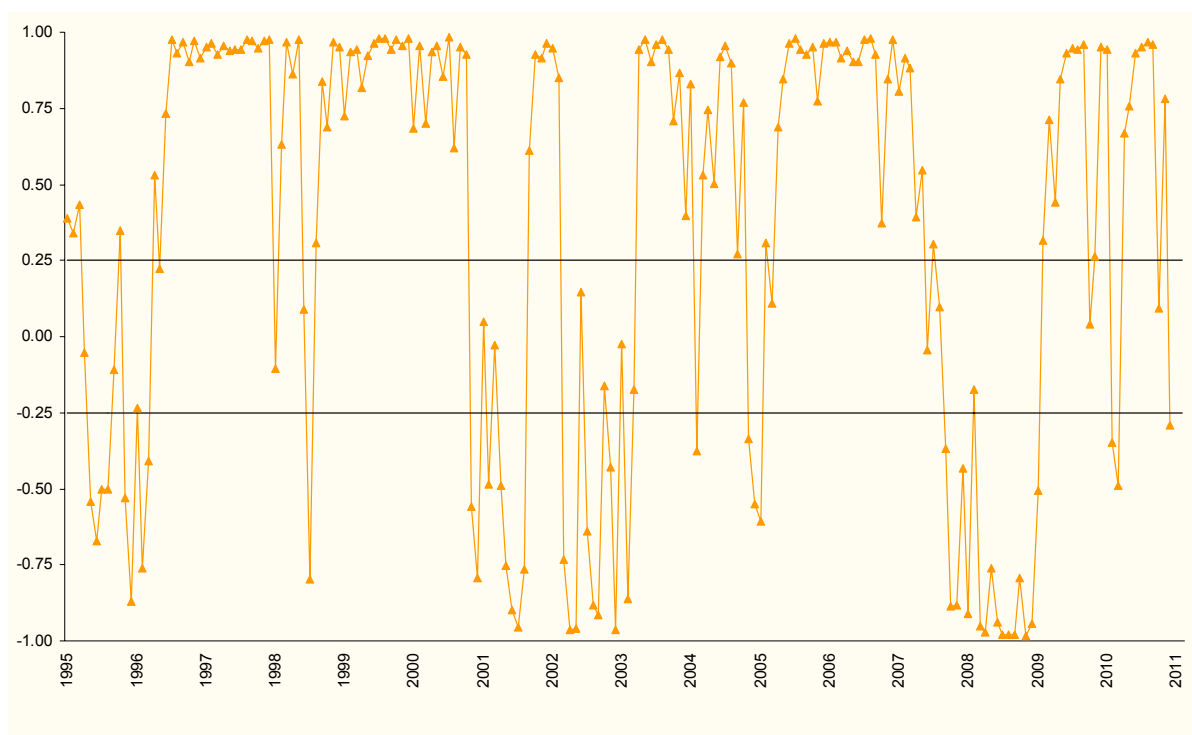


## 5. Euro-area turning point index

The turning point index — based on a Markov switching model — estimates the difference between high- and low-regime probabilities. On the basis of the latest survey data for the euro area, the turning point index (TPI) declined to -0.29 in March.

By design, the computation of the turning point aims to extract the surprises — positive or negative — from new information in the surveys. As confidence in services, retail trade, construction and among consumers deteriorated in March, the innovations within the framework of the AR modelling method were interpreted as unfavourable. Therefore, the TPI decreased and now stands in 'neutral' territory, signalling an uncertainty phase.

**Turning point index for the euro area**



## 6. Annex — Reference series

The reference series are from Eurostat, via Ecwin:

Confidence indicators	Reference series (volume/year-on-year growth rates)
Total economy (ESI)	GDP, seasonally- and calendar-adjusted
Industry	Industrial production, working day-adjusted
Services	Gross value added for the private services sector, seasonally- and calendar-adjusted
Consumption	Household and NPISH final consumption expenditure, seasonally- and calendar-adjusted
Retail	Household and NPISH final consumption expenditure, seasonally- and calendar-adjusted
Building	Production index for building and civil engineering, trend-cycle component

### Economic Sentiment Indicator

The economic sentiment indicator (ESI) is a weighted average of the balances of replies to selected questions addressed to firms and consumers in five sectors covered by the EU Business and Consumer Surveys Programme. The sectors covered are industry (weight 40%), services (30%), consumers (20%), retail (5%) and construction (5%).

Balances are constructed as the difference between the percentages of respondents giving positive and negative replies. The Commission calculates EU and euro-area aggregates on the basis of the national results and seasonally adjusts the balance series. The indicator is scaled to have a long-term mean of 100 and a standard deviation of 10. Thus, values greater than 100 indicate above-average economic sentiment and vice versa. Further details on construction of the ESI can be found at:

[Methodological guides - Surveys – DG ECFIN website](#)

Long time series of the ESI and confidence indicators are available at:

[Survey database – DG ECFIN website](#)

### Economic Climate Tracer

The economic climate tracer is a two-step procedure. The first consists of building economic climate indicators. They are based on principal component (PC) analyses of balance series (s.a.) from the surveys conducted in industry, services, building, the retail trade and among consumers. In the case of industry, five of the monthly questions in the industry survey are used as input variables (employment and selling-price expectations are excluded). For the other sectors the number of input series is: services: all five monthly questions; consumers: nine questions (price-related questions and the question about the current financial situation are excluded); retail: all five monthly questions; building: all four monthly questions. The economic climate indicator (ECI) is a weighted average of the five PC-based sector climate indicators. The sector weights equal those underlying the economic sentiment indicator (ESI), i.e. industry 40 %; services 30 %; consumers 20 %; construction 5 %; and retail trade 5 %. The weights were allocated broadly on the basis of two criteria: the representativeness of the sector in question and historical tracking performance vis-à-vis GDP growth.

In the second step of the procedure, all climate indicators are smoothed using the HP filter in order to eliminate short-term fluctuations of a period of less than 18 months. The smoothed series are then standardised to a common mean

of zero and standard deviation of one. The resulting series are plotted against their first differences. The four quadrants of the graph, corresponding to the four business cycle phases, are crossed in an anti-clockwise movement. The phases can be described as: above average and increasing (top right, 'expansion'), above average but decreasing (top left, 'downswing'), below average and decreasing (bottom left, 'contraction') and below average but increasing (bottom right, 'upswing'). Cyclical peaks are positioned in the top centre of the graph and troughs in the bottom centre.

### Markov Switching Turning Point Index

The purpose of the turning point index model, based on the work of Grégoir and Lengart (2000),<sup>4</sup> is to identify economic growth trends in the euro area, using as input all the confidence indicators derived from the surveys of industry, services, building, retail trade and consumers. This model is symmetric in signalling turning points. TPI values within the  $\pm 0.25$  range imply stabilisation, when the pace of activity is around its potential (the signals received are very varied and indicate no clear-cut upward or downward movement). The economy is performing a soft landing or soft take-off, depending on whether the previous period was marked by acceleration or deceleration. By contrast, the signal is very consistent when TPI values draw very close to or reach  $\pm 1$ : the cyclical phase is deemed to be clearly favourable or unfavourable; economic activity is in a period of sharp acceleration (or sharp deceleration or even contraction).

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<sup>4</sup> Grégoir, S. and Lengart, F. (2000), 'Measuring the probability of a business cycle turning point by using a multivariate qualitative hidden Markov model', *Journal of Forecasting*, 19.