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# European Business Cycle Indicators

## 2<sup>nd</sup> Quarter 2015

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European Commission  
Directorate-General for Economic and Financial Affairs

# European Business Cycle Indicators

## 2<sup>nd</sup> Quarter 2015

### Special topic:

New uncertainty measures for the euro area using survey data

This document is written by the staff of the Directorate-General for Economic and Financial Affairs, Directorate A for Policy Strategy, Coordination, Unit A4 – Economic situation, forecasts, business and consumers surveys [http://ec.europa.eu/economy\\_finance/publications/cycle\\_indicators/index\\_en.htm](http://ec.europa.eu/economy_finance/publications/cycle_indicators/index_en.htm).

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## OVERVIEW

### Recent developments in survey indicators

- Both the EU and the euro-area Economic Sentiment Indicator (ESI) remained broadly stable over the second quarter of 2015. In June 2015, the ESI stood comfortably above its long-term average of 100 in both the EU (at 105.5) and the euro area (at 103.5).
- All results were collected before the talks between Greece and its eurozone creditors collapsed in disarray; any possible fallout from these recent developments on EU confidence is thus not yet mirrored in the results.
- At EU sector level, confidence improved in construction and remained stable in the other business sectors (industry, services and retail trade); by contrast, confidence deteriorated among consumers. Euro area developments were similar, except for stable confidence in construction and enhancing confidence in the services sector.
- Amongst the seven largest EU economies, sentiment improved in the Netherlands compared to the end of the first quarter of 2015; the UK and, to a lesser extent, Spain saw sentiment worsening, while in the remaining countries (Germany, France, Italy and Poland) the indicator remained broadly unchanged.
- Capacity utilisation in the manufacturing sector edged upwards in the second quarter and currently stands slightly above its long-term average in the EU and the euro area. In the services sector, capacity utilisation increased in both areas with the indicator scoring comfortably above the historical means.

### Special topic: New uncertainty measures for the euro area using survey data

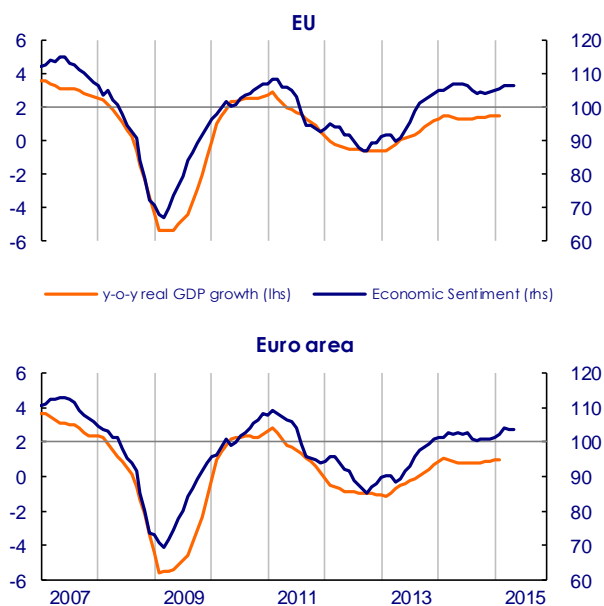
Departing from the idea that macro-uncertainty can be more directly derived from the opinions of economic agents (firms and consumers), rather than the judgments of professional forecasters and/or financial market participants, three survey-based indicators for the euro-area economy are presented. The measures are based on the concepts underlying already existing uncertainty indicators, but deviate from them in so far as they are (i) computable on the basis of publicly available data, (ii) derived from the assessments of actors in a multitude of economic sectors, and (iii) (partly) available in real-time, rather than ex-post. The measures are shown to be counter-cyclical, with major uncertainty peaks coinciding with periods of low or negative growth. Shocks to the proposed indicators are shown to be quantitatively important drivers of economic fluctuations, leading to a temporary reduction in real activity which is absorbed gradually over time without any signs of overshooting.

# 1. RECENT DEVELOPMENTS IN SURVEY INDICATORS

## 1.1. EU and euro area

The second quarter of 2015 saw a broadly flat development of the Economic Sentiment Indicators (ESI) for both the EU and the euro area (-0.5 and -0.4 compared to March, respectively). In the case of the euro area the indicator remained virtually unchanged for three months in a row, while some flickering was observed in the case of the EU, with the ESI increasing slightly in April, stabilising in May and worsening in June. Nonetheless, June's readings pointed to a level of the ESI comfortably above the long-term average of 100 in both the EU (at 105.5) and the euro area (at 103.5).

Graph 1.1.1: Economic Sentiment Indicator



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

A similar picture emerged from the Ifo Business Climate Index (for Germany) and Markit Economics' Composite PMI for the euro area, both of which remained broadly flat over the second quarter of 2015.

At EU sector level, the stabilisation of the headline sentiment indicator resulted from improved confidence in the construction sector being offset by worsened confidence among consumers, with flat developments in the remaining business sectors (industry, services and retail trade). In the euro area, sectoral developments echoed those in the EU, except for improving confidence in services, and construction confidence which remained unchanged compared to March's readings. In terms of levels, all sectoral EU indicators currently score around or above their corresponding historical means. For the euro-area, services and construction confidence still remain below their long-term averages.

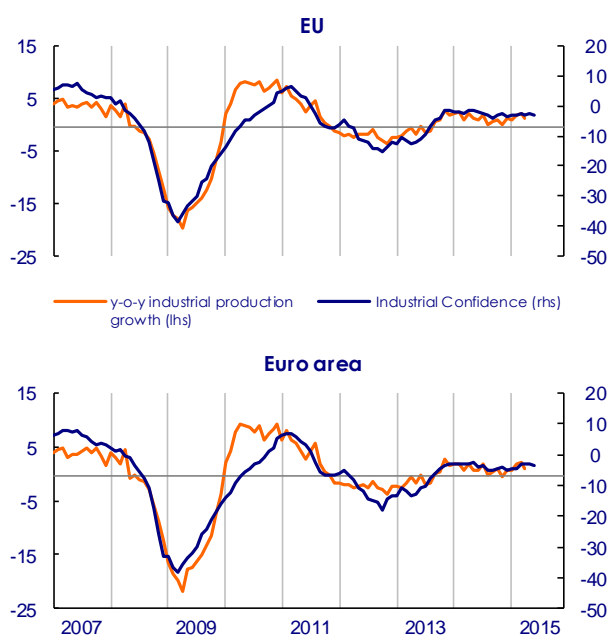
Amongst the seven largest EU economies, sentiment improved only in the Netherlands (+2.2) compared to March; the UK (-1.7) and, to a lesser extent, Spain (-0.7) saw sentiment worsening, while in the remaining countries (Germany, France, Italy and Poland) the indicator remained broadly unchanged.

## Sector developments

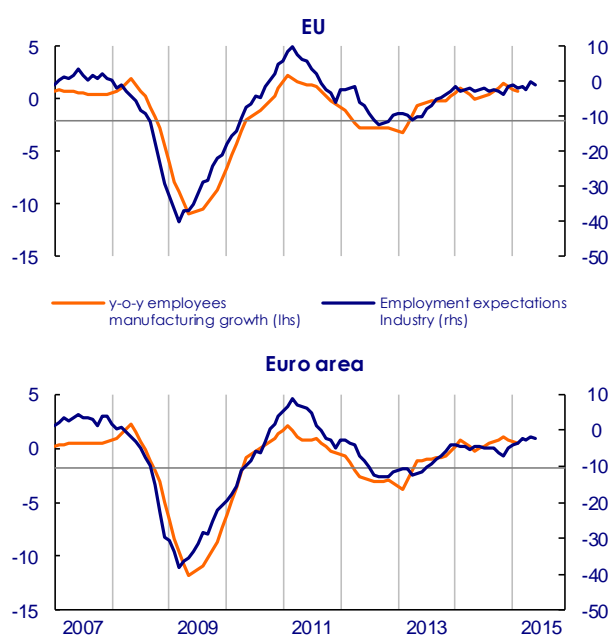
Confidence in **industry** in both the EU and the euro area remained broadly stable in the second quarter of 2015, reflecting flat developments in April and May followed by a slight decrease in June.

In both European aggregates, managers' assessments of order books and the stocks of finished products stabilised over the quarter, while production expectations were revised downwards.

Graph1.1.2: Industry Confidence indicator



Graph1.1.3: Employment - Industry



As for the questions not included in the confidence indicator, managers' appraisals of past production trends and export order books remained broadly unchanged. Also managers' employment expectations were largely stable in both regions. By contrast, in June, selling price expectations in both areas increased compared to March's readings: while the improvement in the EU was fuelled mostly by sizable upticks in April and May, the euro area scored gains in all three months, continuing the upward tendency that started in February.

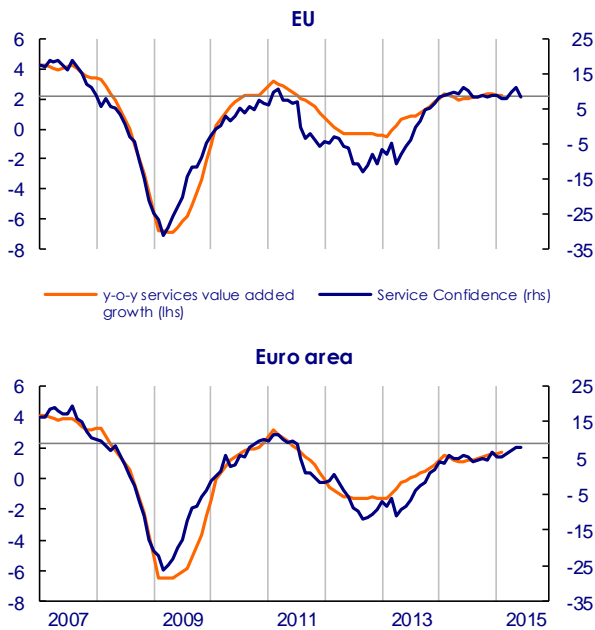
In the seven largest EU countries, compared to the end of the first quarter of 2015, industry confidence increased in the Netherlands and Spain. Confidence remained stable in France and Italy, while it worsened in Poland, Germany and the UK.

The latest readings from the quarterly manufacturing survey (conducted in April) show that, compared to January 2015, **capacity utilisation in manufacturing** increased by 0.2 ppts in the EU and the euro area. In both areas the level of capacity utilisation was 81.2% in April, scoring slightly above the long-term average (of 80.8% for the EU and 81.1% for the euro area).

Over the second quarter of 2015, EU confidence in **services** stayed broadly flat while the euro-area indicator improved. Nonetheless, the EU indicator currently scores around its historical average, while confidence in the euro area remains below its long-term mean. Confidence improved markedly in both areas in April and May; by contrast, June saw the indicator stabilising in the euro area and sharply decreasing in the case of the EU.



Graph1.1.4: Services Confidence indicator



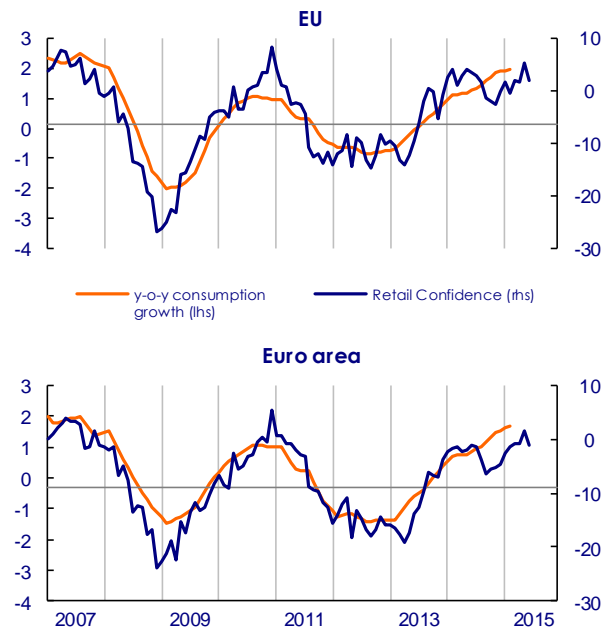
Looking at the largest EU countries, compared to March 2015, confidence picked up in Italy, France and, more so, Germany (+4.6 points); the Netherlands and the UK saw the indicator falling markedly (around 4-5 points), while confidence remained relatively unchanged in Spain and Poland.

The latest readings of the quarterly survey on **capacity utilisation in services** (April) pointed to a slight increase (+0.6 points) in the EU and the euro area. In both regions, the indicator stands above the long-term average and scores currently 89.1% for the EU and 88.4% for the euro area.

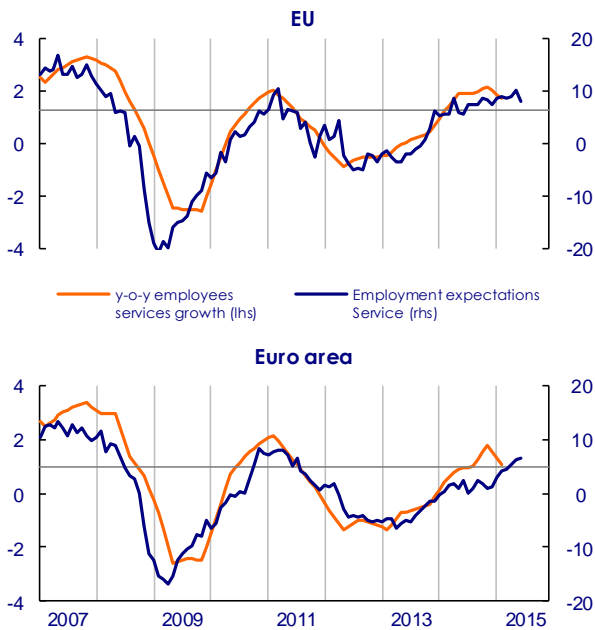
The EU and euro area **retail trade** confidence remained broadly flat in a quarterly perspective from March to June. In both regions, the marked drop in April was offset by sustained upward revisions in May and, particularly, June.

As for the individual components of the confidence index, EU managers' appraisals of the past business situation and demand were largely stable, while their views on expected demand improved. By contrast, euro-area managers were more optimistic as regards the past business situation and demand, while their appraisal of expected demand remained virtually flat.

Graph1.1.6: Retail Trade Confidence indicator



Graph1.1.5: Employment - Services

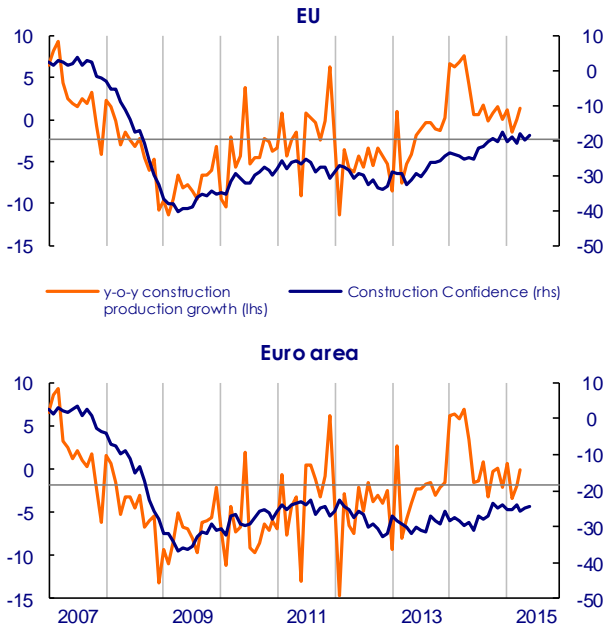


A glance at the development of the individual components of the indicator reveals that the stabilisation of confidence in the EU resulted from a downward revision of managers' appraisal of the expected business situation compensated by their more optimistic views on past business activity, while managers' assessment of the adequacy of the volume of stocks remained virtually unchanged. Also in the euro area the expected business situation improved; contrary to the EU, however,

managers' assessment of the adequacy of the volume of stocks was revised upwards, while their views on past business activity were broadly in line with March's levels. From a country perspective, confidence rose only in the Netherlands. By contrast, it remained broadly stable in Germany and Italy while it deteriorated in Spain and, to a lesser extent, Poland and France.

Compared to the end of the first quarter of 2015, confidence in **construction** improved in the EU and remained unchanged in the euro area. In the EU, the indicator edged up in April and June while it scored a loss in May; by contrast, monthly developments for the euro area showed a drop in April, which was offset by upward revisions in May and June.

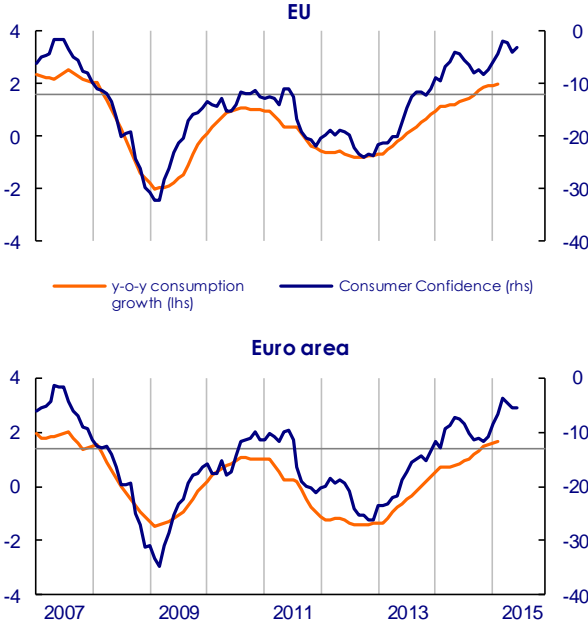
**Graph1.1.7: Construction Confidence indicator**



The rise in EU confidence was fuelled by managers' more optimistic views on current order books, while their appraisal of employment expectations remained somewhat unchanged compared to March 2015. Also euro-area managers' assessments of their current order books were revised upwards, but their employment expectations plummeted. Focusing on individual countries, the indicator rallied in the UK and the Netherlands (+9.1 and +7 points, respectively). Also France and Italy saw the indicator picking up, while in Germany confidence stayed broadly unchanged. Only Poland scored a loss compared to March 2015.

In both the EU and the euro area, confidence among **consumers** deteriorated in the second quarter of 2015. Both regions booked losses in April and May, while June's readings pointed to a stabilisation for the EU and a slight increase for the euro area.

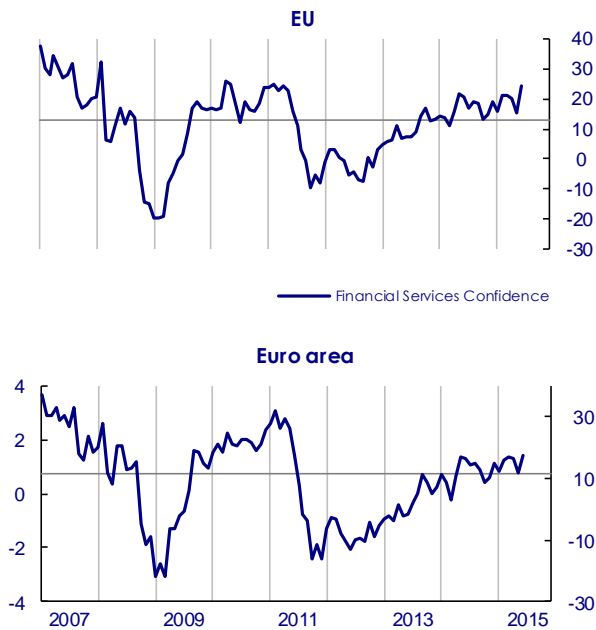
**Graph1.1.8: Consumer Confidence indicator**



In both regions, worsened confidence resulted from clear downward revisions in consumers' expectations about the general economic situation and savings and, to a lesser extent, unemployment; by contrast consumers' views on their future personal financial situation remained broadly unchanged compared to March 2015. Confidence fell in France, Italy and Spain and remained stable in Germany and the UK; only the Netherlands and Poland saw the indicator increasing over the second quarter.

EU confidence in **financial services** (not included in the ESI) improved compared to March's readings, continuing the upward trend observed since the end of 2012. By contrast, the euro area indicator remained broadly flat. In both regions, however, readings in 2015 have pointed to levels above the historical averages.

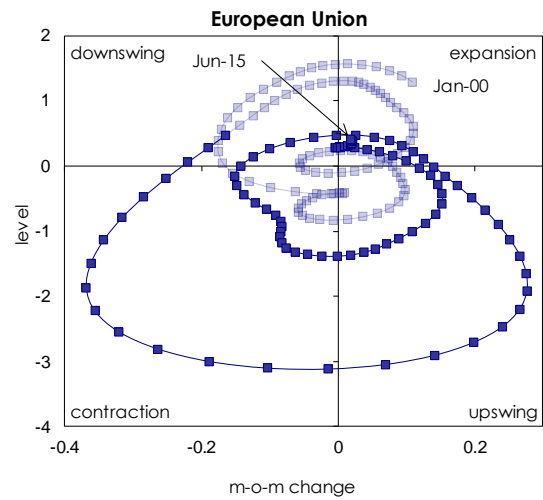
Graph 1.1.9: Financial Services Confidence indicator



The increase of EU confidence was backed by managers' more positive answers to all questions feeding into the indicator. In the euro area, the broadly flat development of the indicator resulted from managers' more optimistic views on past business being offset by a downward revision of their appraisal of expected demand, while managers' assessment of past demand remained unchanged compared to March.

The developments in survey data over the second quarter are illustrated by the evolution of the **climate tracers**. The economic climate tracer for the EU has moved further into the expansion quadrant (see the Annex for further details).

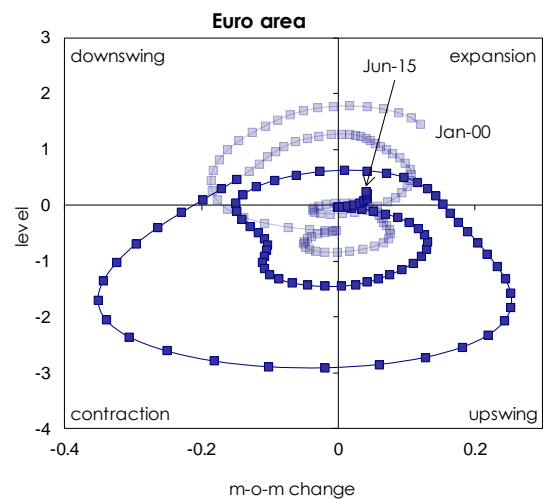
Graph 1.1.10: EU Climate Tracer



The movement of the overall climate tracer for the EU economy was driven mainly by the climate tracers for consumers and the retail trade sector. The climate tracer for construction remained in the upswing area, while the climate tracers for industry and services have settled just between the downswing and the expansion areas.

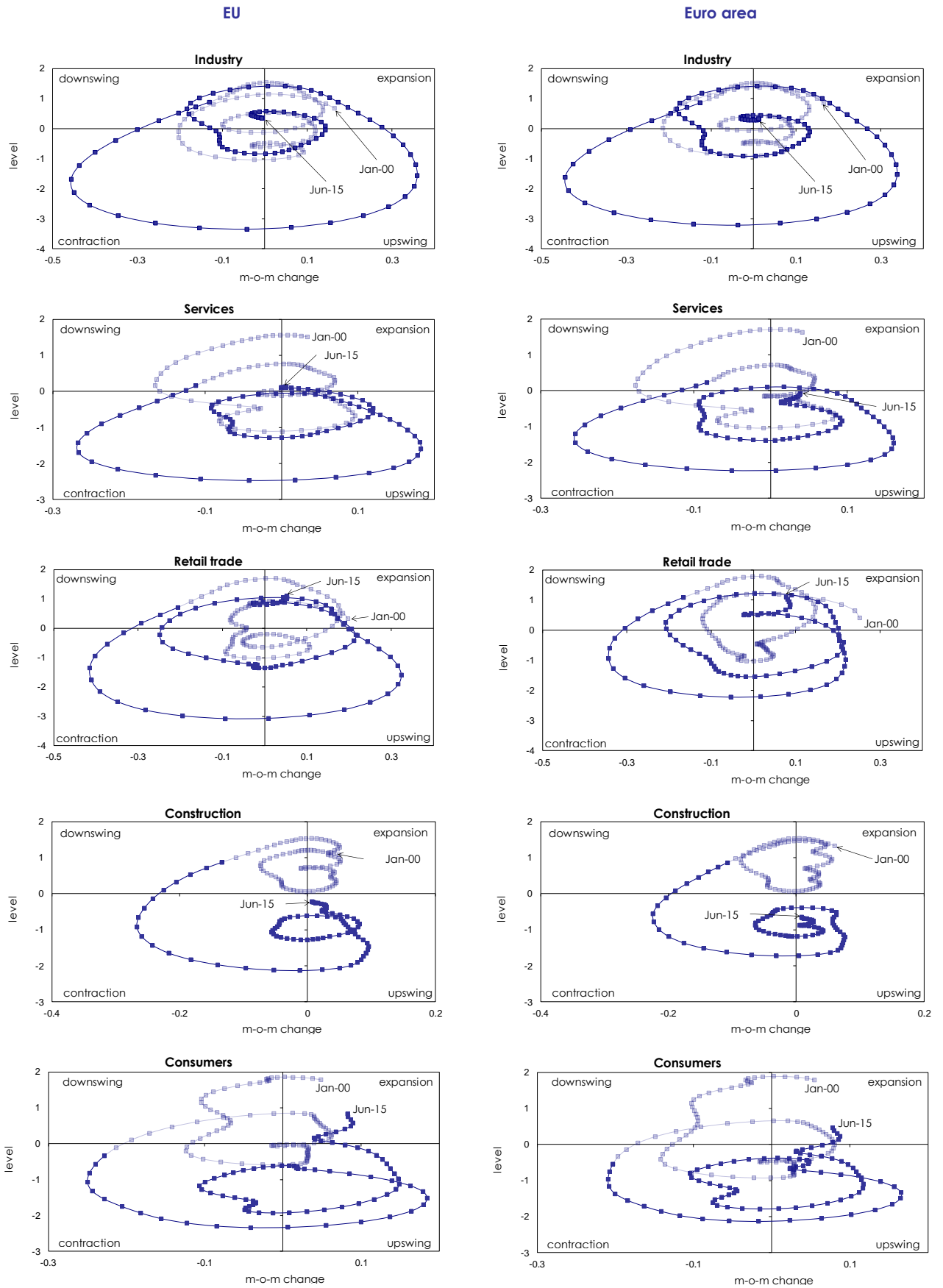
Also for the euro area, the overall economic climate tracer is located in the expansion quadrant.

Graph 1.1.11: Euro area Climate Tracer



In contrast to the EU, the euro-area climate tracer for the service sector has remained just on the border between the upswing and the expansion areas and the industry climate tracer has moved into the expansion quadrant more clearly than in the EU.

Graph 1.1.12: Economic climate tracers across sectors

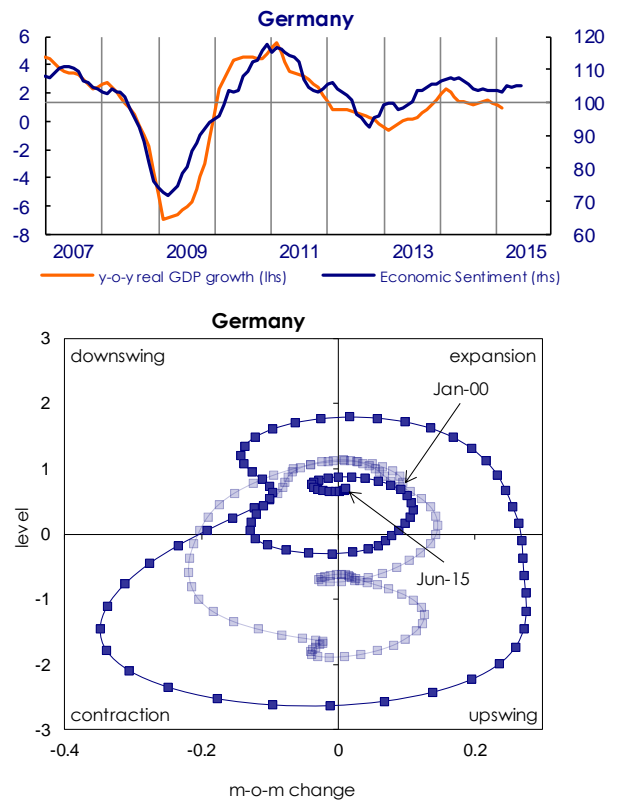


## 1.2. Selected Member States

During the second quarter of 2015, sentiment has improved strongly in the Netherlands, while it has remained broadly unchanged in Germany, France, Italy and Poland. Only the UK and, to a lesser extent, Spain saw the indicator decreasing. The sentiment index scored above its long-term average in all countries, except for France and Poland.

In **Germany**, the stabilisation of the ESI in the second quarter of 2015 resulted from a drop in April offset by an uptick in May and a subsequent flat development in June. The indicator remains well above its long-term average of 100, at 105 points. Confidence improved markedly in services and remained virtually unchanged among consumers, as well as in retail trade and construction, while it lost ground in industry. In terms of the climate tracer, Germany remains close to the border between the downswing area and the expansion quadrant, confirming a deceleration of the pace of growth that emerged at the end of the first quarter of 2015.

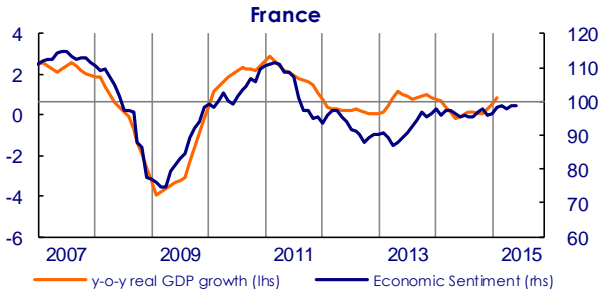
Graph 1.2.1: Economic Sentiment Indicator and Climate Tracer for Germany



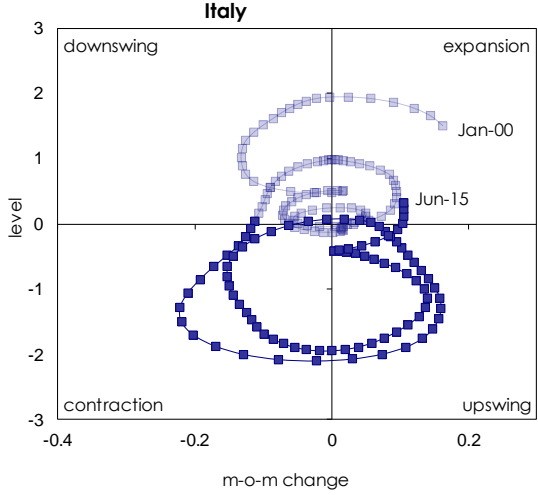
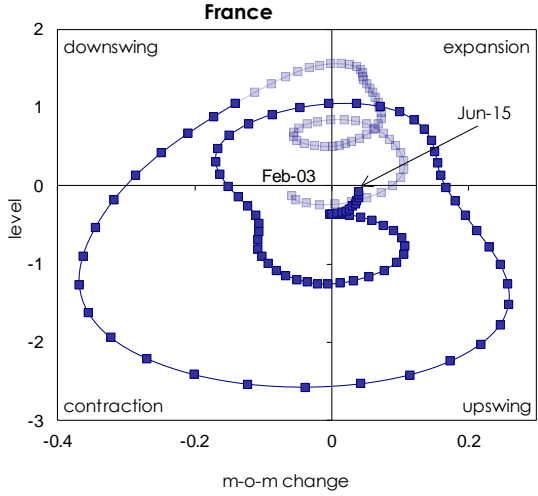
Economic sentiment in **France** remained virtually unchanged over the second quarter; the indicator deteriorated in April and, marginally, in June while it scored a gain in May. At 98.5 points, however, the sentiment index stands clearly below its long-term average of 100. Confidence worsened among consumers, while it improved in services and construction and remained broadly flat in retail trade and industry. The climate tracer is approaching the expansion quadrant, pointing to the potential for further growth.

Sentiment in **Italy** remained largely unchanged compared to March 2015 thanks to an uptick in June that offset the deterioration in May. The sentiment index remains comfortably above its long-term average of 100, at 106.1 points. At sector level, confidence improved in services and construction, while industry and retail trade registered marginal changes compared to the end of the first quarter; by contrast, confidence among consumers worsened markedly. The climate tracer in the expansion area points to positive growth dynamics.

**Graph 1.2.2: Economic Sentiment Indicator and Climate Tracer for France**

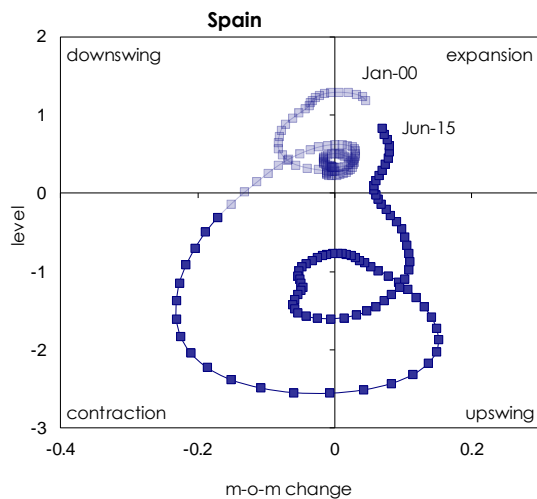
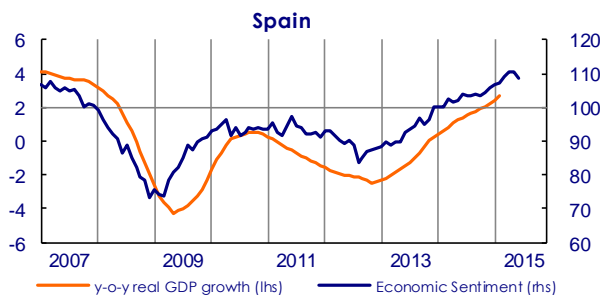


**Graph 1.2.3: Economic Sentiment Indicator and Climate Tracer for Italy**



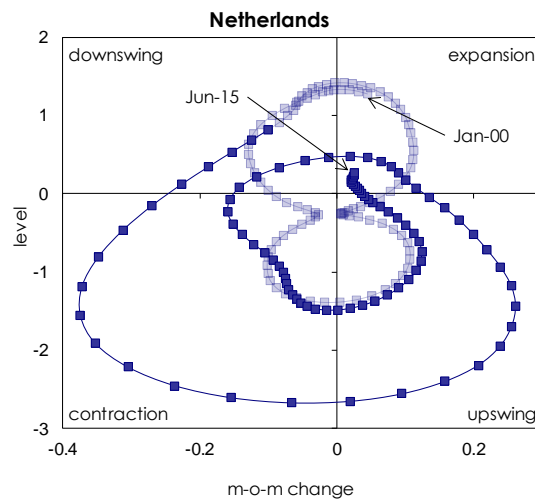
The ESI in **Spain** recorded a mild loss compared to the end of the first quarter, resulting from a marked uptick in April followed by a stable development in May and a severe downward correction in June. At 108.4 points, however, the sentiment indicator is clearly above its long-term average of 100. Confidence worsened among consumers, as well as in retail trade and, particularly, construction (-7 points). Also confidence in services deteriorated somewhat, while it improved in industry. The climate tracer for Spain moved further into the expansion area indicating a sustained recovery.

**Graph 1.2.4: Economic Sentiment Indicator and Climate Tracer for Spain**



Sentiment in the **Netherlands** rose in all three months of the quarter, resulting in a marked increase compared to March 2015. At 104.8, the indicator stands above its long-term average. At sector level, sentiment improved among consumers, in retail trade, industry and, particularly, construction (+7 points); only services saw a clear downward revision compared to the end of the first quarter. The climate tracer has moved further into the expansion quadrant, signalling further positive growth dynamics.

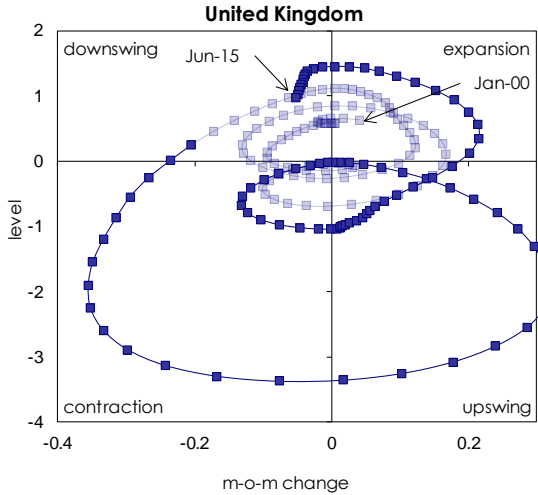
**Graph 1.2.5: Economic Sentiment Indicator and Climate Tracer for the Netherlands**



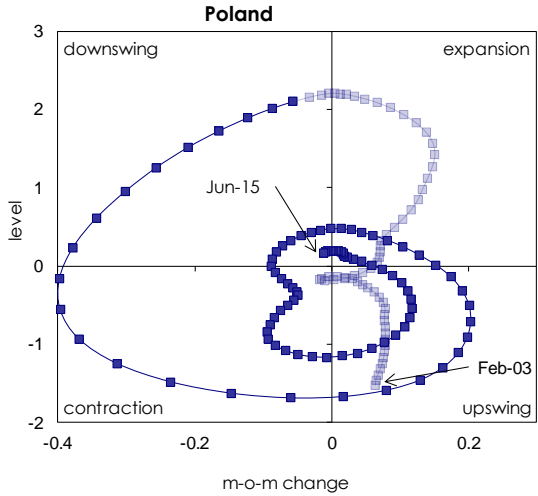
In the **United Kingdom**, sentiment worsened in the second quarter compared to March 2015, due to a sharp drop in June that nullified the increase booked in April. Nevertheless, at 111.1, the indicator remains well above its long-term average of 100. Worsened sentiment was driven by losses booked in industry and services, which were only partially offset by soaring confidence in construction (+9.1 points). Confidence in retail trade and among consumers remained broadly unchanged compared to the end of the first quarter of 2015. The climate tracer in the downswing quadrant points to high but decelerating growth.

After an improvement in April, sentiment in **Poland** worsened in May and remained broadly stable in June, resulting in a largely flat development compared to the end of the first quarter 2015. The ESI continues to score below its long-term average at 98.3. At sector level, confidence decreased in all business sectors except for services, which remained virtually unchanged. By contrast, confidence among consumers was revised upwards. Also for Poland the climate tracer is moving further into the downswing quadrant.

**Graph 1.2.6: Economic Sentiment Indicator and Climate Tracer for the United Kingdom**



**Graph 1.2.7: Economic Sentiment Indicator and Climate Tracer for Poland**





## 2. SPECIAL TOPIC: NEW UNCERTAINTY MEASURES FOR THE EURO AREA USING SURVEY DATA

While the concept of uncertainty is well established in economics, the measurement of uncertainty and its empirical impact on the economy are subject to debate and far from settled. Economic literature has advanced a raft of proposals for the empirical measurement of uncertainty based on data from financial markets, newspapers and digital media, professional forecasts of economic aggregates, surveys among firms or large panels of macroeconomic time-series.

Exploiting the idea that macro-uncertainty can be directly derived from the opinions of economic agents (firms and consumers), three novel survey-based indicators for the euro-area economy are presented. The measures are based on the concepts underlying already existing uncertainty indicators, but differ from them in so far as they are (i) computable on the basis of publicly available data, (ii) derived from the assessments of actors in a multitude of economic sectors, and (iii) (in the case of two indicators) available in real-time, rather than ex-post.

Also in respect of the analysis of the indicators' properties, the measures supplement existing ones in two important ways. First of all, the indicators are constructed and assessed on the basis of euro area data. This closes an important gap in the literature, which has hitherto been limited to the US case, with a few exceptions. Furthermore, assuming that uncertainty is a human condition with potential effects across all branches of the economy, the indicators are assessed in terms of their bearing on overall GDP, rather than more indirect proxies for the level of economic activity like industrial production.

### The dataset

The analysis uses data provided by the Joint Harmonised EU Programme of Business and Consumer Surveys (EU BCS), which inquires every month some 120,000 enterprises, as well

as 40,000 consumers, across Europe (see European Commission, 2014).<sup>1</sup>

While enterprises are asked to assess the development of concepts like production, order books, employment, etc., consumers give insights into their personal financial situation (e.g. their intentions to save or consume), as well as their views on macro-economic developments (unemployment, prices, etc.). The survey questions refer to the present situation, developments over the past three, or expectations for the next three months.<sup>2</sup> A number of questions feature twice on the questionnaire, so as to capture their assessments through the responses both in respect of past and future developments. Once collected, the replies to each question are summarised in the form of so-called balances, i.e. the share of respondents giving positive answers minus the share of those responding negatively.<sup>3</sup>

For the purpose of constructing the indicators, balance series, as well as the individual components feeding into the balances, i.e. the shares of positive and negative replies, are used. A full list of the survey questions is included in the Appendix.

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<sup>1</sup> For further details see The Joint Harmonised EU Programme of Business and Consumer Surveys (User Guide), available at: [http://ec.europa.eu/economy\\_finance/db\\_indicators/surveys/documents/bcs\\_user\\_guide\\_en.pdf](http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/bcs_user_guide_en.pdf)

<sup>2</sup> In the case of the consumer survey, the time horizon covered by the questions referring to the past and the future is twelve months, rather than three.

<sup>3</sup> Individual respondents' answers are usually weighted before aggregation at question-level. For the business surveys, weights are value-added and/or turnover and/or amount of employees, being applied at firm-and/or, sub-sector-level. As regards the consumer survey, answers are weighted by respondents' gender and/or educational level and/or income and/or place of residence.

## The proposed uncertainty indicators

The first measure is an extension of Bachmann et al.'s (2013) and is based on all 22 (monthly and quarterly) forward-looking questions contained in the EU BCS programme (see the Appendix).<sup>4</sup> In respect of business surveys, these are questions referring to the development of selling prices and employment in all four sectors (industry, services, retail trade, construction), export orders and production in industry, demand in services, as well as orders placed with suppliers and sales in retail trade. The consumer survey contributes questions about households' individual economic situation (their financial position, the likelihood of them saving money, making major purchases, buying a car, building a house or embarking on renovations), as well as questions about macro-economic developments, namely the general economic situation, prices and unemployment.

Turning to the construction of the indicator, the first step consists of calculating the cross-sectional standard deviation of the share of positive and negative responses for every survey question in a given month. Subsequently, the question-specific dispersion measures are standardised so as to have zero mean and unit standard deviation. This step helps avoiding that the average dispersion across all questions, which is calculated in a next step, is dominated by survey questions with a particularly pronounced degree of volatility and/or an incomparably high absolute mean. To enable an easier interpretation of the indicator, it is rescaled such that its mean is 100 and its standard deviation 10. Values above 110 or below 90 thus indicate extremely positive/negative values, when compared to the indicators' usual readings. The resulting measure will henceforth be referred to as UNC1. Given that UNC1 measures the current level of uncertainty prevailing at the time when the

indicator is constructed, it delivers an ex-ante assessment of uncertainty in the economy.

The second indicator proposed is a further development of Bachmann et al.'s (2013) measure of ex-post forecast errors.<sup>5</sup> Their idea is to compare survey participants' expectations for the development of a given economic variable (e.g. production) in month  $t$  with their retrospective assessment of that variable's development, as communicated in month  $t+x$ . The underlying logic is that respondents' assessments of developments in the past should, by definition, be free of any uncertainty. Accordingly, the question-specific dispersion of a backward-looking question does not measure uncertainty, but the degree to which developments of economic variables objectively differ across respondents. The dispersion of forward-looking questions, by contrast, can be interpreted as a measure of uncertainty, since it contains a component reflecting (i) the 'natural' degree of dispersion resulting from a given distribution of positive and negative answers, which are perfectly justifiable by economic fundamentals, but also (ii) a residual degree of dispersion which simply represents the fact that respondents cannot know with certainty whether things will improve or deteriorate and therefore give answers largely determined by their subjective perception. Scaling the dispersion of the forward-looking question of month  $t$  by the dispersion of its backward-looking counterpart (as inquired in month  $t+x$ ), one gets a measure of the extent of uncertainty, expressed as a share of the 'natural' dispersion across the economy.

In keeping with Jurado et al. (2015),<sup>6</sup> the strategy is applied to a multitude of variables, in our case all questions from the EU BCS programme, which are asked both in respect of developments over the next, as well as the past three/twelve months. These questions cover a variety of concepts, namely production in industry, demand and employment in services, retail trade business activity, as well as

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<sup>4</sup> Bachmann, R., Elstner S. and Sims E.R. (2013), "Uncertainty and Economic Activity: Evidence from Business Survey Data", *American Economic Journal: Macroeconomics*, 5, pp. 217-249.

<sup>5</sup> Bachmann, R., Elstner S. and Sims E.R. (2013), *ibid.*

<sup>6</sup> Jurado, K., Ludvigson S. and Ng S. (2015), "Measuring Uncertainty", *American Economic Review*, 105, pp. 1177-1216.

consumers' assessments of their financial position, the general economic situation and consumer prices (see the Appendix).

The formal construction method of the indicator starts with the calculation of question-specific dispersions for the forward- and backward-looking versions of the above survey questions, and then taking the log-ratio of the two standard deviations. All resulting time-series are subsequently standardised to equalise their means and their degree of volatility, before the average across all series is calculated. The latter is, in a final step, standardised once more and rescaled to have a mean of 100 and a standard deviation of 10 (UNC2). According to this alternative measure, the level of uncertainty in the economy at time  $t$  can be only assessed with a lag of three/twelve months, so that UNC2 represents an ex-post indicator of uncertainty.

As for the third proposed measure, the focus on question-specific dispersion is discarded in exchange for a focus on inter-question dispersion. Concretely, it looks at the dispersion of changes in balance scores at time  $t$ , compared to a preceding survey wave, across a number of survey. The rationale is that, in times of certainty (e.g. during an upswing, when the economy is growing at increasing rates), the assessment of most economic variables should change in a more or less uniform direction, causing the inter-question dispersion of changes in the balance scores to be relatively low. The opposite should hold true in cases of uncertainty. When approaching an economic trough, for instance, the variability of changes in question-specific balance series should increase. While the downturn was characterised by balance-scores of virtually all questions deteriorating (thus causing little dispersion in the changes across survey questions), the tentative signs of a rock bottom let some indicators change positively, while others – due to a remaining doubt/uncertainty about the future – stay unchanged or even decrease.<sup>7</sup>

To calculate the measure in practice, all qualitative, monthly, survey questions of the EU BCS programme are used (see the Appendix). The data-set thus stretches across all economic sectors covered by the survey. Each survey question is transformed from levels into changes compared to three months ago.<sup>8</sup> Following standardisation of the resulting time-series, the dispersion (standard deviation) across all question-specific change-series is calculated for each point in time. In a last step, the final indicator (UNC3) is obtained by standardising the time-series and rescaling it to have a mean of 100 and a standard deviation of 10. As for the case of UNC1, also the third uncertainty indicator reflects the current level of uncertainty at a given point in time  $t$ , so that it provides an ex-ante measure of uncertainty.

### A snapshot of the proposed uncertainty indicators

Graph 2.1 plots the uncertainty measures over the period from 1999q1 to 2014q4. To enhance the interpretability of the graphs, the underlying series are presented as quarterly averages. Given the latent character of the concept of uncertainty, there is no track record of 'known' uncertainty levels in the past, with which to compare the shape of the uncertainty indicators. A graphical inspection of the graphs can therefore only inquire whether the shape is plausible. The point of departure is the identification of peaks in the uncertainty indicators (i.e. quarters in which the uncertainty indicator raises by at least 1.65 standard deviations above its mean) and subsequently the corroboration of whether or not they coincide with potentially relevant political/economic events. The grey bars in the graphs flag such high uncertainty periods.

In the case of UNC1, there are only two striking deviations from the mean, notably in 2008q4

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cycle (e.g. employment plans, structurally, tend to lag production expectations).

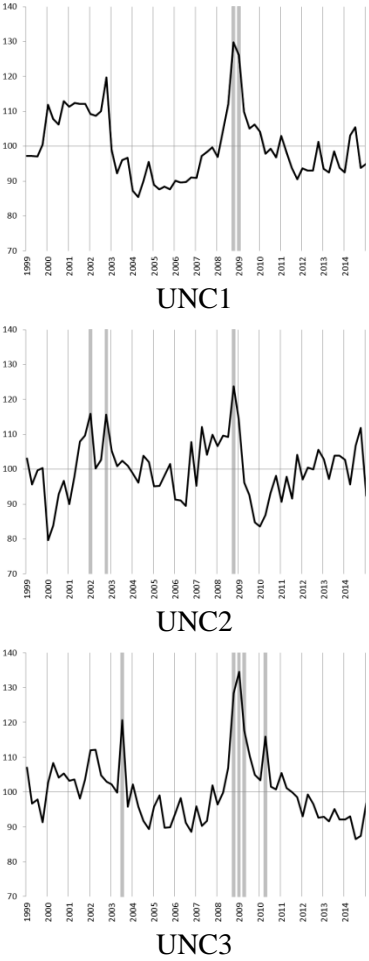
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<sup>7</sup> Of course, this non-uniformity of the questions' behaviour does not only reflect uncertainty, but also the fact that the survey questions differ in terms of the degree to which they typically lead or lag the business

<sup>8</sup> In the case of industry question 4, retail trade question 2 and consumer question 7, the sign of the balance is inverted to ensure that an uptick is associated with positive economic developments.

and 2009q1. These are clearly in line with a commonly-held view that the period surrounding the eruption of the financial crisis (Lehman Brothers bankruptcy in 2008q3) and the subsequent quarters of turmoil, which saw quarter-on-quarter GDP growth dipping to almost -3.0% (in 2009q2), is among the potentially most uncertainty-generating events of the last decades. In that sense, it is reassuring that also the other two uncertainty measures (UNC2 and UNC3) show a clear reaction to the financial crisis. While the indicator based on businesses' and consumers' forward-backward looking pairs (UNC2) peaks in 2008q4, the one summarising the dispersion of changes in BCS questions (UNC3) signals exceptionally high uncertainty levels also in the following two quarters.

**Graph 2.1: Uncertainty indicators and major uncertainty periods**



Turning to UNC2 in more detail, it also flags 2002q1 and 2002q4 as exceptionally uncertain periods. The former might be interpreted as a consequence of the terrorist attacks of 9

September 2001. After all, the peak is the result of three subsequent quarterly rises in uncertainty, of which the first one (2001q3), which coincides with the terrorist attacks, was the sharpest one, driving up uncertainty from a level one standard deviation below to one standard deviation above average uncertainty. The fact that uncertainty mounted even further after the initial shock of 2001q3 is likely attributable to the Afghanistan war, which ensued from the attacks. As regards 2002q4, the peak in uncertainty is likely to reflect the beginning discussions about a US-invasion in Iraq, which eventually materialised in March 2003.

A focus on UNC3 shows that it does not only differ by flagging a total of three (rather than one/two) quarters in the financial crisis as characterised by significantly elevated uncertainty levels, but also by introducing two new high-uncertainty periods. One of them, 2010q2, most probably captures fears of a Greek default, which climaxed in EU Member States adopting a first rescue package in May 2010. The other sharp uncertainty surge indicated by UNC3 concerns the period 2003q3. While the Iraq war is still ongoing, a new element entering public consciousness was that all three largest EU economies, i.e. Germany, France and Italy, had entered recession. The bad news was released in August 2003, which a look on the monthly data underlying the quarterly graphs shows to be the month with the highest ever uncertainty level outside the financial crisis period of 2008/09.

Table 2.1 shows that the correlation between the two ex-ante measures (UNC1 and UNC3) is at 0.66 and thus suggesting that the two measures gauge, to a certain extent, the same uncertainty, while UNC2 correlates at less than 0.30 points with the other two uncertainty measures. Another interesting finding emerging from basic descriptive statistics is that the indicators display a solid, negative, correlation with GDP growth (no matter if expressed in quarter-on-quarter or year-on-year rates). All measures thus seem to have a countercyclical association with real GDP. Furthermore, the indicators tend to move in opposite direction with respect to current economic sentiment, suggesting that uncertainty is higher when agents' appraisal of the economic stance worsens, and vice-versa. These insights are important pre-conditions for the ensuing

empirical analysis, which introduces the proposed uncertainty indicators in VAR models to assess what impact on GDP they would exert in the case of an uncertainty shock and whether this effect persists when controlling for the level of economic sentiment. Obviously, one can only expect to find significant effects of uncertainty on GDP, if the former has a clearly dominant direction of impact on real activity (in this case, a negative one, the higher uncertainty gets).

**Table 2.1: Correlation between uncertainty indicators and GDP growth rates and ESI**

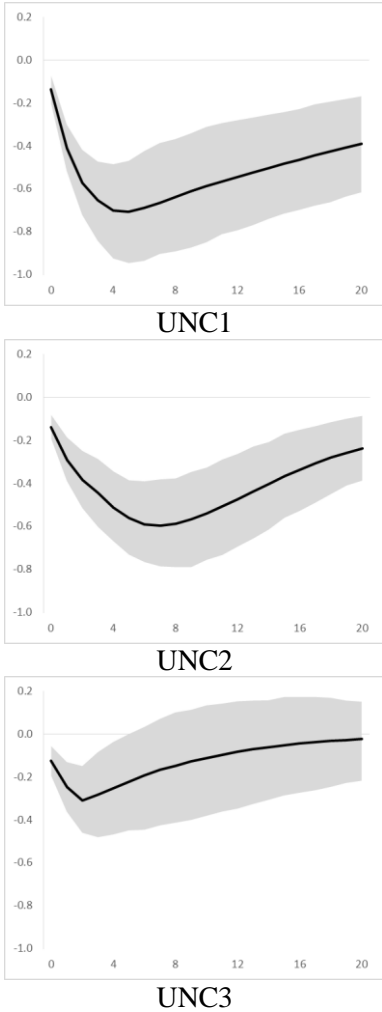
|           | GDP (qoq) | GDP (yoy) | ESI  | UNC1  | UNC2  | UNC3  |
|-----------|-----------|-----------|------|-------|-------|-------|
| GDP (qoq) | .         | 0.72      | 0.67 | -0.46 | -0.53 | -0.46 |
| GDP (yoy) |           | .         | 0.95 | -0.31 | -0.27 | -0.44 |
| ESI       |           |           | .    | -0.20 | -0.29 | -0.40 |
| UNC1      |           |           |      | .     | 0.27  | 0.66  |
| UNC2      |           |           |      |       | .     | 0.08  |

**Baseline specifications**

Benchmark models are based on bivariate VAR systems which include, separately, one of the three proposed measures of uncertainty and (the log-level of) GDP as a measure of overall economic activity. The frequency of the series is quarterly, while the VAR systems are estimated with four lags over the period from 1999q1 to 2014q1. The uncertainty series are ordered first in a recursive identification scheme. Simulations are evaluated over a horizon of 20 quarters (five years).

Graph 2.2 shows the response of GDP to shocks to the different uncertainty measures. To ensure comparability across models, the size of the uncertainty impulses is fixed at 5 points (corresponding roughly to one standard deviation of the identified error in the VAR models). The shaded areas represent the 68% bias-corrected bootstrap confidence intervals computed as suggested by Kilian (1998).<sup>9</sup>

**Graph 2.2: Impulse-response from bivariate specifications**



The upper graph shows that a shock in the dispersion of ex-ante expectations (UNC1) reduces the level of aggregate activity by about 0.1% on impact. The contraction peaks one year after the shock (at -0.7%) and then is gradually absorbed. After five years, the level of activity is still below its pre-shock level of 0.5 percentage points. The response of GDP to an innovation in the ex-post uncertainty measure (UNC2) reveals similar dynamics, with a decrease in output peaking six quarters after the shock (at -0.6%) followed by a subsequent rebound. Also the third dispersion measure (UNC3) confirms the hitherto observed pattern, albeit with some deviations. While GDP responds negatively to the uncertainty spike, the negative effect reaches its peak already after 2 quarters and the subsequent fading-out happens quicker. Furthermore, the magnitude of the effect is less pronounced (minimum at -0.3% after two quarters). All in all, the results suggest the effect

<sup>9</sup> Kilian, L. (1998), "Small-Sample Confidence Intervals for Impulse Response Functions", *Review of Economics and Statistics* 80, pp. 218-230.



of uncertainty on GDP is temporary, rather than permanent.

Compared to the existing literature on the empirical impact of uncertainty on economic output, the results appear in line with the evidence reported in Bloom (2009) for the US and Bachmann et al. (2013) for the German economy.<sup>10</sup> Contrasting with Bloom's paper though, the results do not corroborate the existence of an over-shooting phenomenon, where a rise in uncertainty at first depresses real activity and then increases it above the pre-shock level. At the level of theoretical literature, the results are consistent with the commonly held view of a detrimental effect of uncertainty on consumption and investment decisions which may induce a (temporary) decline of the level of demand for goods and services in the economy.

As for consumers, Romer (1990), among others,<sup>11</sup> shows that under the assumption of convex marginal utility higher uncertainty can induce households to build up a 'buffer stock' of savings to draw on in periods of relatively low income, thereby reducing their current consumption levels (especially for durable goods, since they are costly to reverse). However, this effect is likely to be transitory since it lasts until households have saved the amount they require as insurance against future fluctuations in their income. The irreversibility effect is also at the heart of the expected negative relationship between uncertainty levels and (private) investments:<sup>12</sup> with greater uncertainty the value of the option to postpone investment (in order to wait for new information) increases, so that the decision to invest is delayed (the "perpetual call option" value of an investment plan), thus temporarily depressing investment spending.

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<sup>10</sup> Bloom, N. (2009), "The Impact of Uncertainty Shocks", *Econometrica* 77, pp. 623-685; Bachmann, R., Elstner S. and Sims E.R. (2013), *ibid.*

<sup>11</sup> Romer, C. (1990), "The Great Crash and the Onset of the Great Depression", *Quarterly Journal of Economics* 105, pp. 597-624.

<sup>12</sup> Bernanke, B.S. (1983), "Irreversibility, Uncertainty and Cyclical Investment", *Quarterly Journal of Economics* 98, pp. 85-106.

## Extending the baseline models

In order to test whether the documented temporary negative effect of uncertainty shocks on real activity is robust, the baseline setup can be extended by including a number of additional series in the estimated models. Namely, we augment the benchmark specification by an overall measure of confidence (the economic sentiment indicator, ESI). This is warranted against the evidence reported above of uncertainty measures peaking during the 2008/09 crisis, a period coinciding with a major blow to confidence. The clearly negative correlation between confidence and the three uncertainty measures (see Table 2.1) suggests that, in times of crisis, households and firms tend to (i) revise down their central expectation of the economic outlook, while, at the same time, (ii) attach a higher probability to extreme events occurring to either side of the (more pessimistic) central tendency. Bachmann et al. (2013) reacted to this phenomenon with the "by product" hypothesis,<sup>13</sup> according to which high uncertainty might be a consequence of poor economic performance, rather than its driving force.

Given that uncertainty or 'second moment' shocks are unlikely to occur independently of shocks to other moments, uncertainty shocks may coincide with shocks to the first moment of the distribution (that is changes in the level of 'confidence'). This calls for assessing whether the proposed uncertainty indicators can indeed be interpreted as true measures of uncertainty, or whether, instead, they simply pick up the effect of changes in confidence regarding future outcomes.<sup>14</sup> To address the question, we extend the baseline setup to control for possible 'first moment' effects, namely by including the (level of) the ESI in the VAR model, ordering, first, the measure of confidence under a recursive identification scheme.

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<sup>13</sup> Bachmann, R., Elstner S. and Sims E.R. (2013), *ibid.*

<sup>14</sup> See on this Haddow, A., Hare C., Hooley J. and Shakir. T. (2013), "Macroeconomic Uncertainty: What Is It, How Can We Measure It and Why Does It Matter?", *Bank of England Quarterly Bulletin* 2013 Q2.

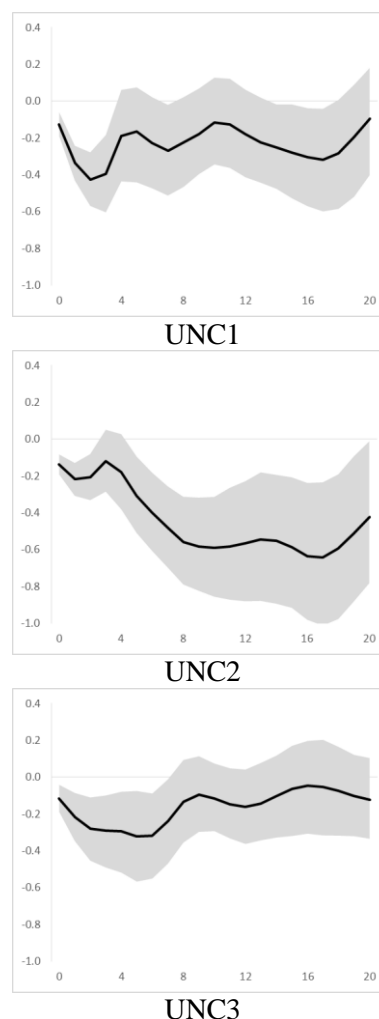
Furthermore, uncertainty can also impinge on the potential output level of the economy: uncertainty may make workers less willing to seek new jobs, which in turn could lessen productivity growth through less efficient matching of skills to jobs, and/or cause companies to postpone hiring (and firing) decisions.<sup>15</sup> In addition to this, the irreversibility of investments, which makes their level particularly sensitive to uncertainty, may be somewhat alleviated by the reversibility of production factors, like labour inputs.<sup>16</sup>

In operational terms, the baseline VAR system is augmented by including not only the ESI but also extensive and intensive measures of labour inputs (the (log of) euro-area employment levels and the (log of) hours worked), as well as the (logs of) the wage level, the harmonized index of consumer prices and the nominal short-term interest rate. Graph 2.3 shows the impulse-response functions relative to the eight-variable systems.

In line with the findings from the baseline specifications, an unexpected shock in uncertainty leads to a contraction in real GDP: in the case of UNC1, the drop in real activity is clearly short-lived, with GDP forming a trough already two/three quarters after the impulse and, subsequently, following a more or less horizontal path, which is statistically not significantly different from zero. As for UNC2, we observe a more pronounced (negative) deviation from the pre-shock level, both in terms of size and persistence, with the (relatively wide) confidence region approaching the horizontal axis only towards the end of the simulation span. Finally, also the specification based on the second ex-ante measure (UNC3) results in a negative effect of an uncertainty hike on real GDP. The effect is similar to the one of UNC1 in so far as it is rather short-lived. Deviating from the latter though, the

specification suggests a somewhat smaller drop in GDP due to uncertainty.

**Graph 2.3: Impulse-response from eight-variable models**



## Concluding remarks

Using survey data for the euro area, this special topic has presented three novel uncertainty measures. Graphical inspection of the shape of the proposed survey-based uncertainty indexes suggests that they adequately capture major uncertainty-creating events. The measures are shown to be counter-cyclical with major uncertainty peaks coinciding with periods of low growth. Dynamic simulation exercises have documented that shocks to the proposed indicators are quantitatively important drivers of economic fluctuations. Generally, the immediate aftermath of the shocks is associated with (statistically significant) drops in GDP, which gradually fade out over time. There are no indications of an overshooting effect, i.e. GDP

<sup>15</sup> Bloom, N. (2009), *ibid.*; Lazear, E.P. and Spletzer J.R. (2012), "Hiring, churn and the business cycle", *American Economic Review* 102, pp. 575-579.

<sup>16</sup> See Eberly, J.C. and van Mieghem J.A. (1997), "Multi-factor Dynamic Investment and Uncertainty", *Journal of Economic Theory* 75, pp. 345-387.

rebounds do not result in GDP growth rates higher than prior to the shock.

Though the empirical evidence suggests the three indicators have a broadly similar behaviour, the practical usefulness of the ex-ante uncertainty measures (UNC1 and UNC3) for the purpose of policy-making is arguably higher than that of the ex-post alternative (UNC2). After all, ex-ante indicators measure the degree of uncertainty prevailing at the point in time where the indicator is constructed (rather than three months ago) and are thus genuine real-time uncertainty measures, which could help policy makers have a clearer picture of the real-time stance of the economy.<sup>17</sup>

It is also worth noticing that the proposed uncertainty measures have the particular advantage of not including any variables which are highly country-specific. They can thus easily be applied to measure the level of uncertainty in other economies. Given the character of the EU BCS programme as international best practice, the same survey questions can also be found in a number of extra-European survey programmes, rendering the extension to other countries straightforward.

## Appendix

Table 2.A.1 provides an overview of the survey questions from the harmonised EU BCS programme which have been used for the construction of the proposed uncertainty indicators.

Besides the indicators based on the survey questions listed above, the empirical analysis has been conducted using multivariate time-series models featuring (the log of) real GDP, the economic sentiment indicator, (the log of) total employment, (the log of) total hours worked, (the log of) wages, (the log of) the

harmonised consumer price index and the short-term interest rate. All data are quarterly and taken via DataInsight, except for annual total hours worked which have been taken from the Annual MacroEconomic (AMECO) database compiled by the European Commission's Directorate General for Economic and Financial Affairs ([http://ec.europa.eu/economy\\_finance/db\\_indicators/ameco/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/ameco/index_en.htm)) and then linearly interpolated to get quarterly figures.

**Table 2.A.1: Individual survey questions entering the proposed uncertainty measures**

| Code                       | Component of: |      |      |
|----------------------------|---------------|------|------|
|                            | UNC1          | UNC2 | UNC3 |
| <b>Industry survey</b>     |               |      |      |
| Q1                         |               | X    | X    |
| Q2                         |               |      | X    |
| Q3                         |               |      | X    |
| Q4                         |               |      | X    |
| Q5                         | X             | X    | X    |
| Q6                         | X             |      | X    |
| Q7                         | X             |      | X    |
| Q12                        | X             |      |      |
| <b>Services survey</b>     |               |      |      |
| Q1                         |               |      | X    |
| Q2                         |               | X    | X    |
| Q3                         | X             | X    | X    |
| Q4                         |               | X    | X    |
| Q5                         | X             | X    | X    |
| Q6                         | X             |      | X    |
| <b>Retail trade survey</b> |               |      |      |
| Q1                         |               | X    | X    |
| Q2                         |               |      | X    |
| Q3                         | X             |      | X    |
| Q4                         | X             | X    | X    |
| Q5                         | X             |      | X    |
| Q6                         | X             |      | X    |
| <b>Construction survey</b> |               |      |      |
| Q1                         |               |      | X    |
| Q3                         |               |      | X    |
| Q4                         | X             |      | X    |
| Q5                         | X             |      | X    |
| <b>Consumer survey</b>     |               |      |      |
| Q1                         |               | X    | X    |
| Q2                         | X             | X    | X    |
| Q3                         |               | X    | X    |
| Q4                         | X             | X    | X    |
| Q5                         |               | X    | X    |
| Q6                         | X             |      | X    |
| Q7                         | X             |      | X    |
| Q8                         |               |      | X    |
| Q9                         | X             |      | X    |
| Q10                        |               |      | X    |
| Q11                        |               |      | X    |
| Q12                        |               |      | X    |

<sup>17</sup> Arslan, Y., Atabek A., Hulagu T. and Şahinöz S. (2015), "Expectation Errors, Uncertainty, and Economic Activity, *Oxford Economic Papers* doi: 10.1093/oep/gpv003; Rossi, B. and Sekhposyan T. (2015), "Macroeconomic Uncertainty Indices Based on Nowcast and Forecast Error Distributions", *American Economic Review* 105, pp. 650-55.



## ANNEX

### Reference series

| Confidence indicators | Reference series from Eurostat, via Ecwin (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 it 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 the 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-stage procedure. The first stage consists of building economic climate indicators. These 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 as follows: 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 are equal to 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 on the basis of two broad criteria: the representativeness of the sector in question and historical tracking performance in relation to GDP growth.

In the second stage 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 a 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. In order to make the graphs more readable, two colours have been used for the tracer. The darker line shows developments in the current cycle, which in the EU and euro area roughly started in January 2008.

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