Consumers' quantitative inflation perceptions and expectations in the euro area: an evaluation[†]

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Abstract

Information on quantitative inflation estimates by consumers is available for countries such as the United States and the United Kingdom, but is still embryonic for the euro area. Using a novel dataset collected for research purposes by the European Commission in the context of its well-established Harmonised Programme of Consumer Surveys, this paper documents that euro area consumers hold very different opinions of inflation depending on their income, age, education and gender. Quantitative inflation estimates are relatively insensitive to outliers and broadly consistent with the corresponding qualitative estimates, in the sense that the two sets of responses are highly correlated over time. However, the paper also highlights several concerns related to the data, namely that respondents tend to overestimate actual inflation developments, particularly in terms of inflation perceptions, and that they do so by more than in comparable surveys conducted outside the euro area. Arguably, the large overestimation bias by euro area consumers can be traced back, at least in part, to the design of the survey questionnaire, which includes open-ended questions with a generic reference to "consumer prices" and does not probe unusual replies. Possible ways to address the overestimation bias are discussed.

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Executive summary

Since May 2003, the European Commission (EC) has been collecting, on an experimental basis via its consumer opinion survey, direct quantitative information on consumers' inflation perceptions and expectations throughout the euro area. Two questions have been added to the existing, qualitative, monthly questionnaire, asking households to provide quantitative estimates of their perceived and expected inflation. These quantitative estimates are collected for research purposes and are not regularly published. This paper reviews the main methodological aspects of the survey and assesses the information content of the experimental data set. The dataset consists of the individual replies at a monthly frequency from 15 euro area countries (all but the Netherlands); results from European Union (EU) member states not belonging to the euro area are also available, but are not evaluated in the paper. In the euro area, more than 70% of surveyed consumers articulate the perceived and expected value of the inflation rate, but significant variations exist across countries.

The results indicate that consumers hold very different opinions of inflation: perceptions and expectations of inflation range from high, or in some cases very high, to low and close to the official rate of inflation. For the euro area as a whole, consumers generally tend to overestimate actual inflation developments, particularly in terms of inflation perceptions, and they tend to do so by more than in comparable surveys conducted outside the euro area. In this respect, a comparison with the University of Michigan survey of consumer attitudes for the United States, as well as with the Bank of England / NOP survey and the YouGov / Citigroup surveys for the United Kingdom indicates that the divergence may be partly driven by the use of open-ended questions in the EC survey, which allows outliers, while predefined answers limit ex ante the range of responses, but may therefore also unduly influence the judgement of the respondents. The possibility to reduce the overestimation bias by means of ranges of reply, probing unusual replies and asking about inflation (as opposed to price levels) is discussed.

The paper documents that respondents reveal very different perceptions and predictions of inflation depending on their income, age, education and gender. Furthermore, the quantitative information provided by consumers is not severely affected by outliers, although a number of large outliers exist, and it is broadly consistent with the replies to the qualitative questions, in the sense that the two sets of responses are highly correlated over time.

The deviation of euro area aggregated consumer inflation estimates from actual measures of inflation has considerably narrowed in the most recent period. However, questions remain as to whether the narrowing represents a structural shift or a transitory phenomenon, linked to the low inflation outturns recorded recently. Furthermore, the distribution of replies continues to show a non-negligible number of extreme replies, in stark contrast with past inflation developments, whereas less of such outliers are included in the replies on future inflation developments.

1. Introduction

Since May 2003, the European Commission (EC) has been collecting, on an experimental basis and via its consumer opinion survey, direct <u>quantitative</u> information on consumers' inflation perceptions and expectations in the euro area (and the European Union (EU)). Two questions have been added to the existing, <u>qualitative</u>, monthly questionnaire, which provide a subjective measure of (perceived and expected) inflation sentiment as expressed by households. These questions convey information about consumers' opinions of inflation, complementary to those derived from the qualitative measures contained in the EU harmonised survey, and broaden the data set available for the analysis of inflation developments in the euro area. However, they do not provide an objective measure of inflation, alternative to that embedded in more formal indices of consumer prices, such as the Harmonised Index of Consumer Prices (HICP). The data set is for research purposes and is not regularly published.

Expectations about future inflation developments have a central role in many fields of macroeconomic theory. In monetary policymaking, inflation expectations help to gauge the public's perception of the central bank's commitment to maintain stable and low rates of inflation – and hence provide a measure of policy credibility. When inflation is high, monitoring expectations and perceptions provides a tool to assess the risk of second-round effects on inflation. Furthermore, in the current environment, where several major central banks have embarked in unconventional policy actions, ensuring that inflation expectations remain well anchored, particularly in the medium to long run, is a key policy objective. Information on quantitative inflation estimates by consumers is available for major economies such as the United States and the United Kingdom, but is only at an experimental stage for the euro area.

A preliminary assessment of the EC quantitative dataset is provided in Lindén (2006)[6], which highlighted a large overestimation of actual inflation by euro area consumers, both in terms of inflation perceptions and expectations, as well as a wide dispersion of individual responses. The assessment covered the short time span between May 2003 and July 2005. In light of the additional data collected since July 2005, and of the sharp fluctuations in the actual inflation rate during the period, the aim of the present paper is to provide an updated view and evaluation of the data set, focusing in particular on recent developments, and to contribute to the ongoing discussion on the relevance and usefulness of such quantitative measures of inflation sentiment. By contrasting the results with those of similar surveys conducted outside the euro area, the paper also attempts to understand the reasons for the large overestimation of actual inflation by euro area consumers and offers an input to the thinking on how to possibly refine the monitoring of consumers' inflation sentiment in the euro area.

The paper is structured as follows. Section 2 reviews the main methodological aspects of the EC consumer opinion survey and details the aggregation of survey results at euro area level. Section 3 presents the empirical and statistical features of the experimental data set, highlighting the different

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[6]   An earlier version of this paper is also available in Sinclair (2010), pp. 196-218. For further references, see also European Commission (2006), Part C, Chapter 4.

approaches to measure qualitative and quantitative price developments. Section 4 compares the quantitative replies from the experimental dataset with the traditional qualitative indicators of inflation sentiment. Section 5 offers some concluding remarks and discusses a possible way forward.

2. The EC consumer survey

Consumers' <u>qualitative</u> opinions on inflation developments in the euro area are polled regularly by national institutes of the EU Member States on behalf of the European Commission (DG ECFIN) as part of the "Joint EU Harmonised Programme of Business and Consumer Surveys".[7] The surveys are designed to be representative at the national level. For the euro area, every month, around 23,000 randomly selected consumers are asked two questions about inflation.[8] The first question refers to consumers' perceptions of past inflation developments:

"How do you think that consumer prices have developed over the last 12 months? They have:

    [1] risen a lot;
    [2] risen moderately;
    [3] risen slightly;
    [4] stayed about the same;
    [5] fallen;
    [6] don't know."

The second question polls their expectations about future inflation developments:

"By comparison with the past 12 months, how do you expect that consumer prices will develop over the next 12 months? They will:

    [1] increase more rapidly;
    [2] increase at the same rate;
    [3] increase at a slower rate;
    [4] stay about the same;
    [5] fall;
    [6] don't know."

Chart 1 shows the distribution of the various response categories for the two questions in the euro area since 1999.

[Insert Chart 1 here]

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[7]   The consumer survey was integrated in the Joint EU Harmonised Programme in 1971. Its main purpose is to collect information on households' spending and savings intentions, and to assess their perception of the factors influencing these decisions. To this end, the questions are organised around four topics: the general economic situation (including views on consumer price developments), the households' financial situation, savings and intentions with regard to major purchases. The survey is entirely qualitative. National institutes – statistical offices, national central banks and market research agencies – conduct the survey using a set of harmonised questions defined by the Commission, which also recommends comparable techniques for the definition of the samples and the calculation of the results. Further information can be found in European Commission (2006) and in the Methodological User Guide, which is available for download from DG ECFIN's website at: http://ec.europa.eu/economy_finance/db_indicators/surveys/method_guides/index_en.htm.

[8]   The survey method is via telephone, combined with Computer Assisted Telephone Interviewing (CATI) system in most countries. However, face-to-face interviews are conducted in Portugal and the Slovak Republic.

An aggregate measure of consumers' opinions – the "balance statistic" – is calculated as the difference between the frequencies of responses falling in different categories. Answers are weighted using a scheme that attributes to the extreme answers [1] and [5] half the weight of the moderate responses [2] and [4]; the middle response [3] and the "don't know" response [6] are attributed zero weight. The balance statistic is thus computed as:

$$P[1] + \tfrac{1}{2} P[2] - \tfrac{1}{2} P[4] - P[5],$$

where P[i] is the frequency of response [i] (i = 1, 2, …, 6). The balance statistic ranges between ±100.

Given the qualitative nature of the questions, the series only provide information on the directional change in prices over the past and next 12 months, but with no indication of the magnitude of the perceived and expected rate of inflation.

Chart 2 plots the percentage balances on the two qualitative price questions. A well-known feature of the series is the close correlation that prevailed between 1985 and the beginning of 2002. Then, in the aftermath of the euro cash changeover, a gap opened up between actual and perceived inflation, which persisted until very recently. The gap narrowed progressively in the wake of the global economic crisis that followed the demise of Lehman Brothers in the US in September 2008, and has virtually disappeared in the most recent outturns.

[Insert Chart 2 here]

Qualitative opinion surveys are subject to a number of drawbacks. The interpretation of the survey questions may vary across individuals and over time and therefore the aggregation of the individual responses may be problematic. The survey results as summarised by the balance statistics depend on the weighting of the frequency of responses, which is inevitably arbitrary. Furthermore, as qualitative surveys of inflation sentiment are fundamentally different from indices of inflation, a direct comparison of these indicators is not possible. The qualitative responses of the EC Consumer survey can be mapped into quantitative estimates of the perceived and expected inflation rates (for example, using the methodology described in Forsells and Kenny, 2004), which can be directly compared with the HICP, but the quantification is sensitive to the technical assumptions underlying the mapping. So, this approach also presents drawbacks.

To overcome these problems, several major economies have introduced quantitative indicators of inflation sentiment. For example, this paper will often refer to the University of Michigan survey of consumer attitudes for the United States, the Bank of England / NOP survey of inflation attitudes for the United Kingdom, and the YouGov / Citigroup survey of inflation expectations, also for the United Kingdom. For the euro area, the collection of this type of data is still in its infancy. A data set consisting of the individual replies at a monthly frequency from 15 euro area countries (all but the Netherlands) has been collected by the European Commission since May 2003. The data set is for research purposes and

is not regularly published. Results from EU member states not belonging to the euro area are also available, but are not evaluated in this paper.

2.1 The experimental dataset on quantitative inflation perceptions and expectations

Directly collecting quantitative estimates of inflation perceptions and expectations from consumers was first considered by DG ECFIN in 2002, and has been implemented since May 2003 on an experimental basis. DG ECFIN asked the national institutes carrying out the qualitative survey to add two questions on consumers' quantitative inflation perceptions and expectations, to be posed whenever a respondent perceives or expects changes in consumer prices.[9] Respondents are then confronted with the following two questions:

- By how many percent do you think that consumer prices have gone up/down over the past 12 months? (Please give a single figure estimate): consumer prices have increased by……,…% / decreased by……,…%.

- By how many percent do you expect consumer prices to go up/down in the next 12 months? (Please give a single figure estimate): Consumer prices will increase by……,…% / decrease by……,…%.

Respondents have to provide their own quantitative estimate of inflation. They are not ¨helped¨ in any way by the interviewer or by the design of the questionnaire, for example by having to select their answer from a number of ranges, as it is done in the Bank of England / NOP survey of inflation attitudes in the United Kingdom, or by probing unusual replies, as in the University of Michigan survey of consumer attitudes for the United States.[10] However, there is evidence that the results are sensitive to the formulation of the question: a Spanish experiment in mid 2005 – during which the open-ended question was dropped and a possible choice of answers between 0% and 10% was suggested – introduced a break in the time series, but it temporarily provided a range of answers that was much closer to actual inflation developments, without any significant drop in the response rate. By being open-ended, the current wording of the survey questions allows for a more dispersed range of replies.

Moreover, the survey questions are deliberately vague as regards the meaning of prices, implying that respondents are left to make their own interpretation as to what basket of goods to consider. For example, they may interpret the questions as being about the goods they purchase more frequently, a mix of goods and services, or some measure of the cost of living more generally. In 2007, DG ECFIN

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[9]   The two questions are not asked if the response to the qualitative questions is "don't know" or that prices will "stay about the same", as in this latter case it is assumed that the respondent perceives or expects no change in "consumer prices". When the respondent says that prices will "stay about the same", the interviewer is instructed to automatically input a zero inflation rate in response to the quantitative questions.

[10] In the University of Michigan survey of consumer attitudes, if the respondent gives an answer to the quantitative inflation expectations question that is higher than 5%, a further question is asked where the respondent is requested to confirm that he expect prices to go (up/down) by (x) percent during the next 12 months.

set up a Task Force to check the respondents' understanding of the questions, verify their answers, and to test alternative wording of the questions. In this framework, additional questions were included in both the French and the Italian consumer surveys and some laboratory experiments were conducted by Statistics Netherlands in 2008 to study the concept of prices that is actually used by consumers when responding to the surveys. The results show that consumers do rely on various baskets of goods when judging past price developments and forming their opinions about the future. Furthermore, the results show that only a minority of people make use of a larger set of products that incorporates also irregular purchases. Based on the findings, the task force concluded that a broad set of consumer price indexes (such as the index of frequently purchased goods) should be used as a benchmark when evaluating this kind of data.

Following a common practice in inflation expectation surveys, the survey questions are phrased in terms of 'consumer prices', which, taken at face value, implies a reference to price levels and not to inflation rates. However, this is not to say that respondents understand the questions in this way or, indeed, that they all interpret the questions in the same way. In fact, results from probing tests carried out by INSEE in France and ISAE in Italy in 2008 show that, when answering "stay about the same", a non trivial share of respondents in both countries has in mind inflation rates rather than price levels – notwithstanding the wording of the questions. Because respondents are not asked to provide a quantitative estimate of inflation when they choose the answer "stay about the same", but are simply assumed to expect or perceive a zero rate of inflation, this misinterpretation leads to a downward bias in the response, in case the benchmark inflation rate is positive, and an upward bias in case the recorded inflation rates are negative. In this respect, it should also be mentioned that in an analysis of the University of Michigan survey of consumer attitudes for the United States, Van der Klaauw et al. (2008) find that respondents react differently, depending on whether they are asked about expected changes in "prices in general" or about expectations for the "rate of inflation". In particular, asking for inflation rates yields results that are closer to the Consumer Price Index (CPI). Their interpretation of the difference is that asking about prices in general leads respondents to focus on salient price changes of items that are more relevant for the individual, for example because they are purchased more frequently, while the question about inflation leads respondents to focus on changes in the general price level.

The full dataset used in this paper consists of the individual replies at a monthly frequency from 15 euro area countries (all but the Netherlands), comprising around 95% of euro area consumption. The sample starts in May 2003 for all countries, except France, which first ran the survey in January 2004. Spanish data are also missing between April and August 2005 due to some temporary technical changes made by the Spanish statistical institute in carrying out the survey. In both cases, and in order to keep a homogenous euro area aggregate, missing data have been calculated on the basis of replies made to the

qualitative questions.[11] Missing observations (e.g. August 2004 and 2005 in France, June 2004 in Spain and August 2005 in Luxembourg) are computed by linear interpolation of the previous and the following month.

The data collection for the quantitative questions is embedded in the established framework of the EC consumer survey. The experience of the national institutes, the well-developed survey methodology and the long-standing tradition of this particular survey contribute to the quality and reliability of the experimental dataset. Available metadata, however, are not always detailed enough for a comprehensive analysis of specific questions, e.g. on the treatment of non-response and its implications on the overall results. There are also a number of outliers and "implausible" replies, which raise questions on the appropriate wording of the questions, the possible need for probing of answers and improving the controls at the data entry point (on which, see Section 3).

Several features of the dataset are worth highlighting. First, besides euro area totals, detailed results are available for a number of useful categories: level of income, gender, age, occupation and education. Second, the participation rate varies significantly across countries: consumers who are asked to provide a quantitative estimate of the inflation rate (past or future) have already replied to the qualitative question. They have therefore the opinion that consumer prices have changed or will change. It is, however, remarkable that in some countries, the consumers will refrain from providing a quantitative estimate more than in other countries. For example, in France nearly half of the surveyed consumers refuse to translate their qualitative assessment of inflation perceptions into a quantitative estimate, whereas nearly all Slovak consumers provide an estimate (see Chart 3). On average, in the euro area, around 75% of surveyed consumers articulate the perceived value of the inflation rate and around 73% declare a quantitative expectation of inflation.

[Insert Chart 3 here]

The interpretation of such participation behaviour across countries can only be speculative. The way the interviewer asks the question (for example, insisting to have a reply), country-specific factors such as mentality and the press coverage of price information could impact the response rate. It may also be that, among those who provide a reply, some tell arbitrary numbers rather than admit their inability to complete the survey. Such behaviour could be associated with an increase in the measurement error in the survey, which calls for extra care when interpreting the results. However, it is worth mentioning that according to experiments carried out in France and Italy within the Task Force framework, respondents who are able to provide a fairly close estimate of the official rate (around 25% of the total), still perceive inflation to be several percentage points higher than the officially published figure.[12]

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[11] Available quantitative estimates were regressed on qualitative estimates summarised by the balance statistic published by the European Commission.

[12] These findings are consistent with those in studies by the Federal Reserve Bank of Cleveland (Bryan and Venteku, 2001a and 2001b) and the University of Michigan (Curtin, 2007), which show that US consumers are to mostly unaware of the official inflation rate, and that those that do have knowledge of it, still perceive inflation to be higher.

2.2 The aggregation of survey results at euro area level

Since the surveys are conducted on a country basis, a weighting scheme is required to compute aggregate results for the euro area. There are two different ways to view the data, leading to (at least) two different aggregation schemes, each of them being more suited to a specific purpose. Treating each national dataset as a random sample drawn from an independent country specific distribution allows a comparison with other euro area indicators, while considering all individual observations from all countries as an unbalanced random draw from a single euro-area distribution enables a more complete statistical analysis.

For comparison purposes: independent country distributions

In the method used by the EC to aggregate consumer survey results, each national survey is assumed to provide results that are representative of the country, i.e. the individual responses are treated as random draws from independent country distributions. Each country result is assigned a specific country weight, which, given the focus of this paper on inflation, is derived from the HICP country weights (i.e. it is based on private consumption expenditure).

One issue with this weighing method is that it cannot be used to derive higher moment statistics for the euro area. For example, the aggregate skewness for the euro area cannot be calculated as a weighted sum of the individual countries' skewness statistics since skewness is not a linear statistic. Consequently, this weighting scheme can only be used to calculate means and standard deviations of perceived and expected inflation for the total sample and for the social and economic breakdowns considered in the surveys. The calculations are done on a monthly basis and averaged over the available observation period (from May 2003 to June 2010). The monthly means and standard deviations also generate time series of consumers' inflation perceptions and expectations and their variability.

For statistical analysis: a euro area distribution

An alternative way to consider consumers' replies is to take the whole sample of individuals at euro area level and treat it as a sample from an overall euro area distribution. Keeping in mind a number of caveats,[13] the following approach may be taken: the monthly country samples are put together into a single dataset, where individual responses are re-weighted by the respondent's corresponding weight,

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[13]   First, the survey questions do not specify which economic area respondents should take into account when forming their perceptions and expectations. Second, inflation developments are quite different among Member States, ranging from 1.8% in Malta to -1.7% in Ireland on average in 2009. Third, general economic developments are also different. In 2009, for example, amid the global financial crisis and a deep economic recession, GDP contracted by -1.5% in Malta and -7.6% in Ireland. Fourth, business cycles is not fully synchronised across euro area Member States (as argued, for example, by European Central Bank, 2007 and Giannone et al, 2009).

which is based on the total population of the country.[14] This re-weighting is comparable to what many national institutes do when they weight the individual answers by the size of the commune or the region of the country in order to balance the national samples. This aggregation method allows for the provision of more elaborate descriptive statistics, e.g. higher moments, as discussed in the next section.

3. Empirical features of the experimental dataset: consumers' quantitative estimates of inflation

Chart 4 plots the quantitative inflation perceptions and expectations reported by euro area consumers over the sample period (May 2003 to June 2010). The time series are based on aggregated country means, where missing data have been calculated on the basis of the replies to the qualitative questions. The chart confirms that quantitative estimates of inflation sentiment are higher than the official euro area HICP inflation over the entire sample period. However, the size of the gap has tended to narrow over time and, for perceptions, the overestimation at the beginning of the sample was not repeated, even when actual inflation peaked at the all time high of 4% in July 2008. Between July 2008 and June 2010, both perceptions and expectations have eased sharply, mirroring the moderation in HICP inflation from the commodity-driven peak reached in July 2008. However, in line with HICP developments, both measures have increased somewhat since Spring 2010. In June 2010, perceived inflation was 5.6% and expected inflation was 3.8%, compared with an actual inflation rate of 1.4%.

[Insert Chart 4 here]

Bearing in mind that the quantitative questions ask about generic movements in "consumer prices" and that respondents may not refer to the HICP consumption basket when answering the questions, Chart 5 compares consumers' quantitative inflation sentiment with alternative measures of consumer price inflation and one-year ahead inflation expectations. Clearly, the overestimation has remained substantial for both indicators when the entire sample period is considered. For example, consumer perceptions, at 11.9% on average over the period, have been much higher than both the average official HICP inflation rate (2.0%) and the average "out-of-pocket" HICP[15] (2.5%). Consumers' inflation expectations have been much higher than those of professional forecasters, such as those participating in the ECB Survey of Professional Forecasters (SPF) and those polled by Consensus, as well as those extracted from financial instruments. However, the chart also shows that the degree of overestimation has narrowed substantially in the recent period, consistent with the moderation in HICP inflation. The fall in consumers' expectations since the outbreak of the financial crisis in September 2008, has been

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[14] Since the surveys are designed to produce a representative national but not euro area sample, the "ex-ante stratification" per country results in different selection probabilities for consumers depending on the country they live in. Strictly speaking, the individual results would need to be grossed up by the inverse of these selection probabilities, which is approximated here by the share in the resident population. Refining this grossing-up factor could be considered but might have only a small impact on the final results.

[15] Assuming consumers attach greater importance to price developments in the goods and services they buy more frequently, the so-called "out-of-pocket" index covers only items such as food, tobacco, non-durables goods, transport services and related-costs (e.g. fuel) and services such as hairdressing, restaurants and cafés. The index is compiled by Eurostat.

particularly noticeable (see Chart 5b). Looking forward, it is open to debate whether the fall in the overestimation bias recorded in the period since mid 2008 represents a structural shift or whether it is a transitory phenomenon, linked to the low inflation outturns recorded in the period.

[Insert Chart 5 here]

The fact that consumers overstate actual inflation is not surprising and is often observed in quantitative surveys of inflation sentiment (see Table 1). What is remarkable in the EC survey is the large size of the overestimation bias in the euro area (amounting to more than 10 percentage points in the case of perceptions of past inflation), particularly in comparison with similar surveys conducted outside the euro area. In this respect, Table 1 reports the results for three countries (Denmark, Sweden and the UK) that participate in the EC experiment of collecting quantitative estimates of inflation sentiment, but do not belong to the euro area. Interestingly, the size of the overestimation bias in these countries is much smaller than for the euro area, suggesting that the latter may still be under the influence of the euro cash changeover. Although there is evidence that the sharp surge in inflation perceptions in the immediate aftermaths of the introduction of the euro coins was partly corrected in subsequent years, qualitative measures of inflation sentiment still point to a persistent gap, which did not disappear even several years after the event (see European Central Bank, 2005).

[Insert Table 1 here]

3.1 The overestimation bias and the design of the survey questions

When comparing the results of different surveys, an important caveat is that the size of the overestimation bias may be sensitive to how the question is asked. For example, since it was first launched in 1978, the Michigan University Survey of Households for the United States – which instructs interviewers to probe all unusually large responses – has provided a range of expectations that has been consistently close to actual inflation rates (see Chart 6a).[16]

In the Bank of England / NOP survey of inflation attitudes in the UK (conducted quarterly since 1999), measured inflation expectations have also followed relatively closely actual inflation developments in the country, ranging between 1.9% and 4.4% (against an average CPI inflation of 1.9% over the period; see Chart 6b). In this survey, respondents are confronted with ranges of price changes, from which they are asked to select the range that best summarises their expectations. The use of ranges for the replies is also meant to capture the respondents' uncertainty about future inflation.

The YouGov / Citigroup survey of UK inflation expectations also asks respondents to choose among predefined intervals of price changes. The survey is more recent, as it has only been conducted monthly

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[16]   Expected inflation rates higher than 5% are probed in the Michigan Survey. Recent studies show that such probing might also lead to bias and results could equally be influenced by the survey mode; offering respondents ranges for their replies rather than asking for point estimates also matters.

since November 2005, but so far replies have been fairly close to actual inflation (see Chart 6b). Interestingly, in addition to the usual question on inflation expectations in the next 12 months, this survey asks respondents about their inflation expectations in the long run (five to ten years). The survey is regularly monitored by the Bank of England and is quoted in their Inflation Report.

[Insert Chart 6 here]

Overall, drawing from the experience of the US and the UK with quantitative surveys, we may conjecture that the overestimation of inflation developments by euro area consumers may have to do with the design of the survey questionnaire: by being open-ended and not probed, the quantitative survey of the EC may call for a wider range of replies and may emphasise the outliers.

The hypothesis is not easy to validate, but some evidence that the survey results may be sensitive to the formulation of the question can be drawn from the UK, by comparing the results of the Bank of England / NOP survey – which asks respondents to select their expected inflation rate within predefined ranges – with those of the national results for the UK derived from the EC survey – where questions are open-ended. Intuitively, as the two surveys poll the same population of UK consumers, any difference in the responses must be primarily ascribed to the methodological differences between the two surveys.[17] The comparison is also not affected by any cash changeover effect.

Chart 7 compares the two quantitative surveys for the UK and shows that when the open-ended question of the EC survey is asked, expectations tend to be significantly overstated. By contrast, when consumers are asked to select their reply from given ranges, expectations tend to track actual inflation more closely.

[Insert Chart 7 here]

By forcing consumers to select their replies within pre-defined ranges, the Bank of England / NOP survey rules out outliers. A similar argument is likely to apply also to the probing question technique in the Michigan survey for the US. Predefined ranges also present drawbacks, for example, they may need to be changed over time as inflation changes (or many ranges may be needed); there may be a need to give different ranges for different countries; aggregating ranges requires assumptions, for example that on average the respondents in a range all mean the middle of the range. In this respect, it is useful to recall that, following a preliminary assessment of the dataset (summarised in Lindén, 2006), a task force was set up by DG ECFIN in 2006 to understand the sources of the large overestimation of current and future inflation, which appears to be a peculiar feature of euro area consumers, and to explore possible remedial actions. The work of the Task Force consisted in making use of probing questions, i.e. asking follow-up questions to specific respondents to check their understanding of the questions and verify their answers, and testing alternative wordings of the question. Two conclusions from the work of the Task Force are worth highlighting in this context.

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[17] The Bank of England / NOP survey polls "a random location sample designed to be representative of all adults in Great Britain". Similarly, in the EC consumer survey the sample is designed to be representative of the population aged 16 and above.

First, the Task Force found a lack of relationship between knowledge of the official rate and the "private" information people possess on prospective trends in the inflation rate – a result that is consistent with the literature for the US (Bryan and Venteku, 2001a and 2001b; Curtin, 2007). It confirmed that people with knowledge about the official rate of inflation have a tendency to give higher estimates for their own perceptions of inflation. However, it also found that for this specific group of respondents, the size of overestimation is much smaller than the overestimation of the group of generic respondents who lack the knowledge of the official inflation rate. Second, the Task force tested the performance of an alternative wording of the survey questions, based on absolute amounts, as opposed to the percentage price increases and decreases embedded in the current questionnaire. The alternative wordings did not perform better than those currently in use. Indeed, in many cases they performed significantly worse and posed even more challenges for respondents. Therefore the task force recommended that such changes should not be taken on board.

The possibility to ask probing questions for unusual replies, to provide ranges of replies, and to frame the questions in terms of inflation rates (as opposed to consumer prices) were not explicitly examined by the task force. In light of the better performance of such methodologies, in terms of reducing the overestimation bias in surveys conducted outside the euro area, it would seem appropriate to trial these methodologies also for the euro area.

3.2 Distribution of replies, outliers and trimming measures

Turning to the detailed distribution of individual replies to the survey, Table 2 provides some descriptive statistics on the inflation estimates for the euro area. These are based on the assumed euro area distribution, re-weighting individual replies with national population weights. This explains the slight difference in the means implied by the euro area distribution (11.9% for perceived inflation and 6.4% for expected inflation) and those derived by aggregating the country means with HICP weights (12.3% and 6.1% respectively).

As indicated by the 25th and 75th percentile responses, half of the respondents perceived past inflation to have been between 2.0% and 15.0% on average over the observation period. The inter-quartile difference, i.e. the difference between the 25th and the 75th percentiles, is a rough proxy for the dispersion of the monthly replies. With the exception of the months surrounding the heights of the commodity-driven pick-up in inflation in 2008, this statistic has been on a downward trend over the observation period, implying a gradual decrease in the dispersion of replies. The fall in the inter-quartile difference may be seen as a further indication of the slow and gradual downward correction of inflation perceptions in the euro area. A similar narrowing of the range of replies has occurred for inflation expectations. On average during the observation period, half of the respondents expected the one-year ahead inflation rate to lie between 0% and 8.0%.

[Insert Table 2 here]

The mode of the distribution, i.e. the most frequent value, is 0.0% for both perceived and expected inflation (18.4% of replies for perceived inflation and 39.1% of replies for expected inflation). However, this reflects the embedded rule to impute 0.0% whenever a respondent perceives or expects consumer prices to "stay about the same" (see Chart 8). Beside 0.0%, the most preferred estimates reported for perceived inflation are 5%, 10% and 20%. For inflation expectations, other often quoted values are 2%, 5% and 10%. As in similar quantitative surveys, the distribution of responses shows a prevalence of rounded digits (such as 0, 5, 10, and 20). This tendency, which is common to many open-ended numeric surveys, has been termed "digit preference" by Curtin (2005) and has been interpreted as a rounding owing to the costs of providing more exact responses. It has led some researchers to argue that inflation expectations are more qualitative than quantitative in nature (see Bryan and Palmqvist, 2005).

[Insert Chart 8 here]

The fact that the median is much lower than the mean suggests that extreme replies — in particular those extremely high — distort the reported euro area mean and that the distribution is heavily and positively skewed. The presence of a high number of outliers may be due to several factors. Respondents may misunderstand the question or the concept of percentages and may find it difficult to formulate inflation rates. They may choose provocative replies or tell random numbers owing to lack of interest or information, or there may be errors in entering the data. Regardless of the source, the outliers play an important role in shaping the outcome, especially when the analysis focuses on subsets of the data. In the experimental dataset, it is not possible to distinguish between various types of outliers.

One way to correct for the impact of outliers is to trim the distribution. Table 3 presents alternative means and standard deviations using different trimming schemes. The trimming mechanically leads to downward revisions in the reported means, but the overall overestimation of inflation remains, particularly for perceptions of past inflation.

[Insert Table 3 here]

Looking at the evolution of various trimmed mean measures over time it appears that they are very closely correlated with one another. The main effect of trimming is to progressively lower the mean as more outliers are excluded from the trimmed distributions (see Chart 9). For example, the trimming method that excludes the top/bottom 25% of the distribution – which is applied, for example, in the Michigan Survey for the US – gives an average expected inflation rate of 0.7% in 2009 and of 0.8% for the period Jan – June 2010.

[Insert Chart 9 here]

While trimming the distribution corrects for the effect of outliers, the choice of the method is open to debate and depends on the intended use of the analysis. For example, trimming could be motivated by the desire to exclude less informed responses – those far away from the centre of the distribution.

However, a too narrow trimming method may disproportionately cut out the inflation replies reported by certain groups of the population (lower income, less educated, female) which tend to give more extreme answers, as will be discussed in the next section.

Further efforts to reduce the number of outliers could be considered (including rephrasing the question, additional data entry validation procedures, the use of brackets of responses, and the introduction of probing questions at interviews in case of unusually large replies). However, the fact that the size of the overestimation bias remains significant even for trimmed distribution signals that the quantitative information provided by consumers is not severely affected by outliers. Hence, the overestimation of measured inflation emerging from quantitative data should not be considered as a "statistical accident", but as a proper feature of consumers' opinions. Nevertheless, the fact that the overestimation in the euro area is so much higher than in surveys outside the euro area is remarkable and quests an explanation.

Trimming is a standard method to summarise skewed distributions. Alternatively, it is possible to use summary statistics that are less sensitive to outliers, such as the median. Chart 10 shows the evolution of the median perceived and expected inflation rates for the euro area over the observation period. Owing to the prevalence of round digits in the consumers' replies, the median tends to be stable over time and to exhibit discrete jumps. Thus, this statistic may not be very informative until a jump actually occurs – although jumps do represent a strong signal and are relevant.

It is also possible to scale the survey-based measures of perceptions and expectations for the euro area, such that they have the same mean as actual HICP inflation over a comparable period. The intuition for doing so is that the survey questions ask about perceived and expected changes in prices over the past and next twelve months, but without referencing any specific price index. Scaling is thus a way to eliminate the bias due to the ambiguity of the survey question with respect to the reference basket. Scaled expectations and perceptions are reported in Chart 11 and are close to HICP inflation by construction. This method is followed by the Bank of England when commenting the results of the Bank of England / NOP survey in its quarterly Inflation Report.

[Insert Charts 10 and 11 here]

Overall, the number of outliers (i.e. responses that cannot be related to plausible assessments of actual inflation) has remained substantial in the EC consumer survey, particularly for inflation perceptions.

3.3 Different people, different inflation assessments?

Empirical evidence shows that particular demographic groups systematically expect prices to rise more quickly or slowly than other groups (see Bryan and Venkatu, 2001; Lombardelli and Saleheen, 2003; Del Giovane, Fabiani and Sabbatini 2008). This seems to be the case also in the euro area, as illustrated in Chart 12. In part, these differences are likely to reflect differences in consumption patterns and financial literacy among the various socio-economic groups.

Generally speaking, high-income earners tend to perceive and expect lower inflation rates than low-income earners (Chart 12a). Similarly, women tend to report consistently higher inflation estimates than men (Chart 12b). Older people expect lower inflation than younger ones (Chart 12c).[18] Finally, reported inflation estimates tend to decrease with the educational attainment of the respondents (Chart 12d). The various features are clearly related. A closer look at the responses by group reveals that the differences are not the product of a few extreme views, but are broadly shared within the group.

[Insert Chart 12 here]

3.4 Country results

The features highlighted for the euro area aggregates tend to be also valid across individual euro area countries. In particular, inflation perceptions and expectations have fallen over time across most reporting countries. Furthermore, they are robust to trimming and depend on demographic factors in much the same way as the euro area aggregates. Importantly, Table 4 shows that consumers hold rather different opinions of inflation across individual countries, ranging from high, or very high in some cases, to low and close to the official rate of inflation, particularly for inflation expectations in Finland, France, Belgium and Luxembourg. However, the reasons for such divergences are not well understood and may be worth investigating in depth.

[Insert Table 4]

4. Comparative assessment of quantitative versus qualitative replies

An interesting exercise is to cross check the average inflation estimate provided by consumers with their qualitative inflation assessment. Chart 13 confirms that euro area consumers are consistent with their inflation sentiment when providing a quantitative estimate: those who perceive inflation to have "risen a lot" are also those who, on average, provide the highest inflation estimates of perceived inflation (see Chart 13a). A similar consistency check holds for inflation expectations (Chart 13b). Interestingly, the mean estimates by category of reply have tended to decrease over time, providing *prima facie* evidence of increasing consensus among euro area consumers when they make their quantitative assessments of inflation. This suggests that euro area consumers may be still in a learning mode, correcting their inflation sentiment to become more in line with actual developments.

[Insert Chart 13 here]

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[18]   But *contra*, see Bryan and Venkatu (2001) and Lombardelli and Saleheen (2003).

5. Concluding remarks and proposed way forward

This paper offers a contribution to the ongoing debate on how to improve the monitoring of quantitative inflation perceptions and expectations of the public in the euro area. Using a dataset collected for research purposes by the European Commission in the context of the Harmonised Programme of Consumer Surveys, the paper documents a number of interesting stylised facts. Euro area consumers hold very different opinions of inflation depending on their income, age, education and gender. The quantitative inflation estimates of the public are not severely affected by outliers, in the sense that the means of the perceived and expected inflation estimates of the public are relatively robust to various trimming schemes that progressively eliminate the more extreme values from the distribution of responses. Furthermore, the quantitative inflation estimates are consistent with the corresponding qualitative estimates, in that the two sets of responses are highly correlated over time and respondents who indicate rising inflation to the qualitative questions generally report higher inflation rates also to the quantitative questions.

However, the paper also highlights several concerns related to the data. Respondents significantly overestimate actual inflation developments, particularly in terms of inflation perceptions, and they tend to do so by more than in comparable surveys conducted outside the euro area. Although the size of overestimation has narrowed considerably in the more recent period, it is not clear whether this is a transitory phenomenon, linked to the low inflation outturns recorded recently, or a normalisation after the sharp increase in uncertainty in the wake of the euro cash changeover in 2001 – and hence a structural shift. Furthermore, the distribution of responses continues to show a high density in the tails (particularly to the right of the mean), and to include a significant number of responses far beyond any "rational" assessment of past inflation developments. By contrast, less of such extreme responses are included in the replies on future inflation developments.

Arguably, the large overestimation bias by euro area consumers can be traced back, at least in part, to the design of the survey questionnaire, which includes open-ended questions with a generic reference to 'consumer prices' and does not probe unusual replies. The reference to 'consumer prices', which laboratory tests have shown to be understood in different ways by different respondents, is also likely to be an important driver of the wide dispersion and the fat tails of the distributions of responses.

Some evidence that the survey results may be sensitive to the formulation of the question can be drawn from quantitative surveys conducted outside the euro area. In the Michigan University Survey of Households for the US, fore example, interviewers are instructed to probe all unusually large responses and extreme answers are trimmed from the distribution. Similarly in the UK, both the Bank of England / NOP survey and the YouGov / Citigroup survey ask respondents to choose among predefined intervals of price changes, which are also meant to gauge the respondents' subjective uncertainty about future inflation. In all these surveys, the overestimation bias has been significantly reduced and measured inflation expectations have tracked actual inflation developments in the respective country relatively

closely. In light of these encouraging outcomes, it would seem appropriate to trial similar methodologies also for the euro area survey.

In a similar vein, one might experiment with different question wordings, testing how these are understood by respondents. A study by Van der Klaauw et al (2008) shows that reference to the 'rate of inflation' (as opposed to 'prices in general') successfully reduces the overestimation bias and the observed dispersion of responses in quantitative surveys of inflation sentiment, in addition to ensuring a more homogeneous interpretation of the survey question among respondents, while it leads to only minimal drops in the response rates. A homogenous interpretation of the survey question is important because, as argued in related research by De Bruin et al (2009), 'reliable measurement requires that respondents agree with one another, and with economic modellers, on what the survey question (as well as their responses to it) means. If respondents have different interpretations of a question, then their responses may indicate greater disagreement'. Arguably, the disagreement in the interpretation of the survey question might also be reduced if the respondents, before being asked to provide an estimate of the expected inflation rate, are informed about the latest official inflation rate, the central bank's inflation target or the official definition of price stability. This information might further dissipate ambiguity in the reference basket and might act as an anchor for the responses.

Other lines of research could further investigate (i) the underlying reasons for the national differences in the responses in the EC survey, with the objective to explain why in some countries answers are closer to the official HICP than in others; (ii) for monetary policy purposes, inflation expectations in the medium term (from 2 to 5 years ahead), in addition to the short-term horizon (of 12 months) considered in the current questionnaire; (iii) wage expectations, which have been trialled, for example, in a pilot study for the US (see de Bruin et al, 2009) with encouraging initial results.

Finally, a more ambitious research plan could pursue the issues of disagreement and uncertainty. While disagreement can be measured by the dispersion of responses across individuals, subjective uncertainty is a lot more difficult to gauge. Yet uncertainty is likely to affect the survey responses in important ways, because only very seldom do consumers have a precise estimate of their expected and perceived inflation rate, owing to the difficulty and the costs of gathering and processing price information – even for prominent consumption goods. One way to measure subjective uncertainty is to collect inflation expectations in a probabilistic way, prompting consumers to attribute probabilities to various ranges of expected inflation, much in the same way as forecasters are asked to do in the ECB's Survey of Professional Forecasters. An important issue in this respect, and one that is certainly worth exploring more in depth, is how to propose such a question in a way that is intuitively and easily understood by the public, which includes individuals with different levels of education and financial literacy, and indeed whether the concept of probability is widely understood at all. It would also be interesting to know whether asking such a question would lead to a significant drop in the response rate.

Laboratory tests might give some clue as to which solutions might work in practice on euro area consumers. Implementing such changes on the existing surveys would deliver more reliable and accurate measures of consumers' inflation sentiment in the euro area, thereby improving our ability to monitor and analyse the phenomenon. Beyond measurement issues, much remains to be learned about the formation of the public inflation perceptions and expectations and the impact that they have on macroeconomic variables. Future research might also explore these issues.

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Tables and Charts

Table 1   Households' estimates of inflation in various surveys and actual inflation

Survey	Country	Observation period	Inflation perceptions	Inflation expectations	Actual inflation
			(annual percentage changes)		
Michigan Survey of Households	USA	1990 – 2009	-	3.0	2.8
		2000 – 2009	-	3.0	2.6
Bank of England / NOP	UK	2000 – 2009	2.8	2.5	1.8
YouGov / Citigroup	UK	2006 – 2009	-	2.5	1.8
EC Survey of Consumers	Sweden	2003 – 2009	2.5	2.5	1.8
EC Survey of Consumers	Denmark	2003 – 2009	3.0	2.3	1.9
EC Survey of Consumers	UK	2003 – 2009	7.7	6.6	2.2
EC Survey of Consumers	Euro area	2003 – 2009	12.9	6.5	2.1

Table 2 Euro area consumers' quantitative estimates of perceived and expected inflation [1]
(annual percentage changes, unless otherwise indicated; January 2004 – June 2010)

	Inflation perceptions	Inflation expectations
Mean [2]	12.3	6.1
Mean of euro area distribution	11.9	6.4
Median	5.0	2.0
Mode	0.0	0.0
Relative frequency of the mode	18.4 %	39.1 %
Standard deviation	17.4 p.p.	12.2 p.p.
Minimum	-200.0	-199.0
Maximum	900.0	899.0
25th percentile	2.0	0.0
75th percentile	15.0	8.0
Skewness	3.1	4.4
Kurtosis	29.0	59.1
Participation rate	75 %	73 %

Notes: 1) all statistics are based on the overall euro area distribution of individual replies, re-weighted using population weights, unless otherwise stated. 2) Based on independent country distribution using HICP country weights for the aggregation.
Source: European Commission.

Table 3   Effect of different trimming methods on the mean and standard deviation of euro area consumer's inflation estimates (January 2004 – June 2010)

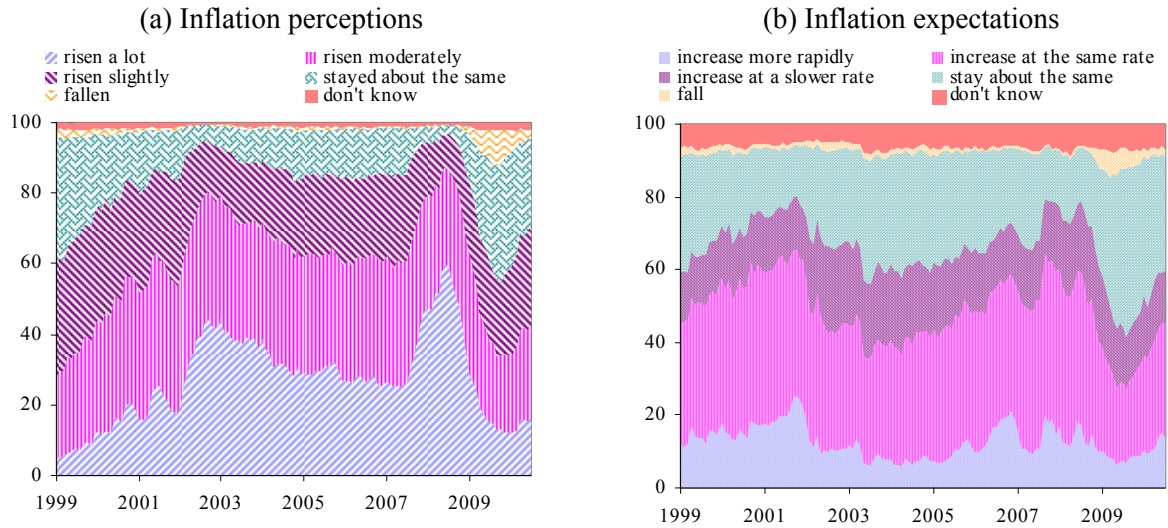|	Inflation perceptions			Inflation expectations		
Trimming method used:	Mean	Standard deviation	% of replies excluded	Mean	Standard deviation	% of replies excluded
Excludes all values ≥ 100%	11.1 %	15.0 pp	0.5	6.1 %	11.0 pp	0.2
Excludes all values ≥ 50%	8.4 %	9.8 pp	3.6	5.1 %	8.0 pp	1.7
Excludes top/bottom 10% of the distribution on replies	8.5 %	9.5 pp	8.1	4.0 %	5.5 pp	8.3
Excludes top/bottom 25% of the distribution of replies	6.9 %	5.8 pp	30.0	2.3 %	3.0 pp	21.9
Memorandum: No trimming	*11.9 %*	*17.4 pp*	-	*6.4 %*	*12.2 pp*	-

Source: European Commission.

Table 4 Consumers' quantitative estimates of inflation by euro area country
(annual percentage changes; January 2004 – June 2010)

	Inflation perceptions	Inflation expectations	Actual inflation
Austria	10.6	6.5	1.9
Belgium	8.6	4.0	2.1
Germany	8.0	5.5	1.7
Greece	18.5	14.4	3.1
Spain	16.8	11.4	2.7
Finland	3.6	2.9	1.5
France	7.7	3.6	1.8
Ireland	8.8	7.4	1.6
Italy	18.3	5.2	2.1
Luxembourg	7.9	4.8	2.8
Portugal	7.1	6.1	1.9
Slovenia	11.5	8.0	3.1
Cyprus	16.1	12.9	2.2
Malta	9.1	9.2	2.4
Slovakia	10.2	10.4	3.3
Memo: euro area	*11.9*	*6.4*	*2.0*

Note: For comparison purposes, arithmetic means of monthly rates are included in the table, although multi-year averages of actual inflation are usually calculated by applying the geometric mean. However, the differences between these two measures for the data presented in the table are very small and do not impact the overall findings.

Sources: European Commission and Eurostat.

Chart 1 – Consumers' qualitative opinions on inflation developments in the euro area: categories of replies *(percentages, not seasonally adjusted)*

(a) Inflation perceptions

risen a lot   risen moderately
risen slightly   stayed about the same
fallen   don't know

(b) Inflation expectations

increase more rapidly   increase at the same rate
increase at a slower rate   stay about the same
fall   don't know

Note: last observation July 2010.
Source: European Commission.

Chart 2 – Price trends over the last and next 12 months in the euro area *(percentage balances; seasonally adjusted)*

Inflation perceptions
Inflation expectations
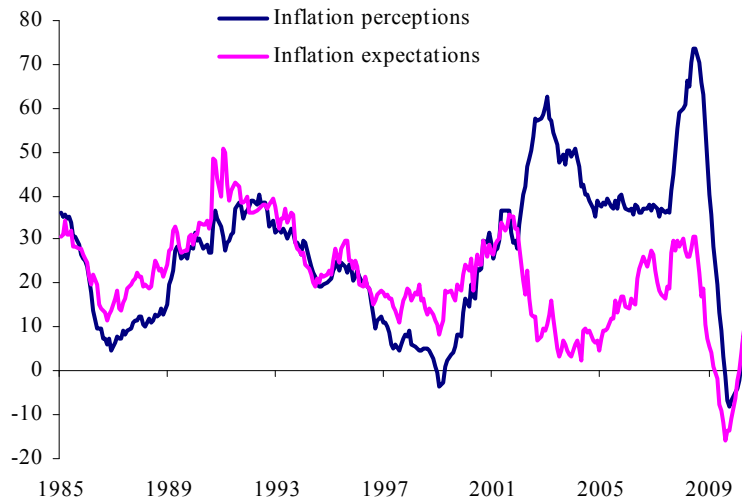
Note: last observation July 2010.
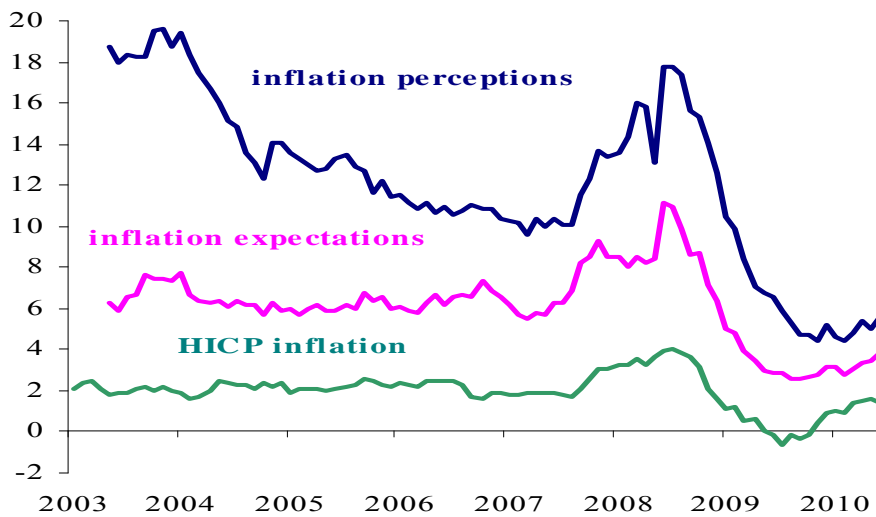*Source:* European Commission.

Chart 3 – Participation rate to quantitative questions *(as a percentage of respondents who believe that the inflation rate has changed or will change)*
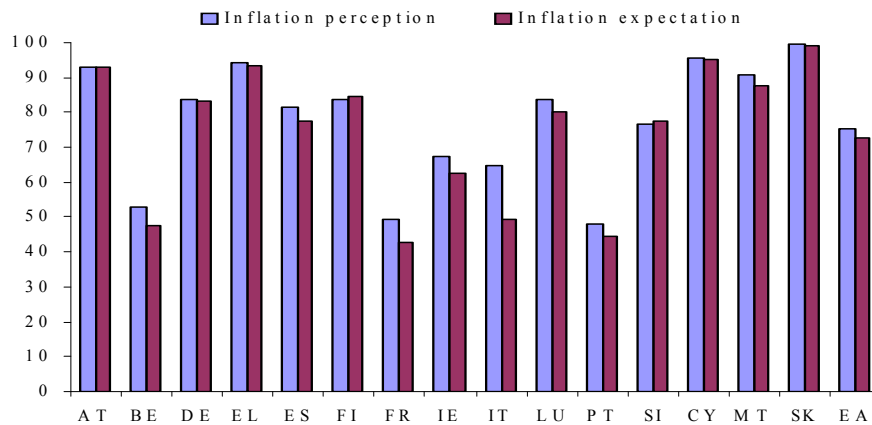
Note: average response rates over the period from May 2003 to June 2010.
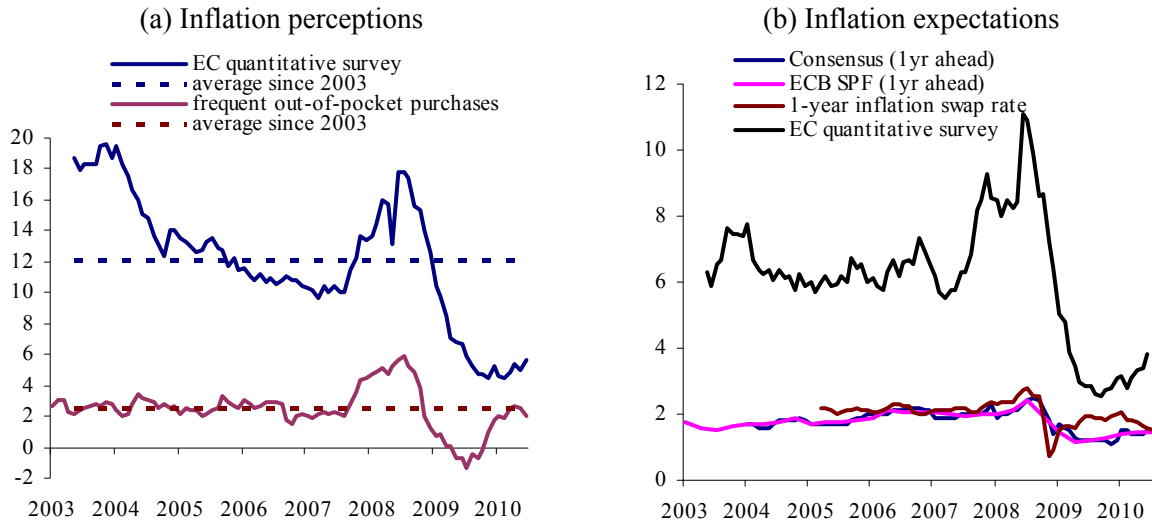*Sources:* European Commission.

Chart 4 – Euro area consumers' quantitative estimates of inflation perceptions and expectations *(annual percentage changes)*

Note: last observation June 2010.
*Sources*: European Commission and Eurostat.

Chart 5 – Inflation sentiment compared with alternative measures of actual and expected inflation
(annual percentage changes)

(a) Inflation perceptions

(b) Inflation expectations

Note: last observation June 2010.

Sources: European Commission, Eurostat, Consensus Economics and ECB calculations.

Chart 6 – Inflation expectations and CPI inflation outside the euro area
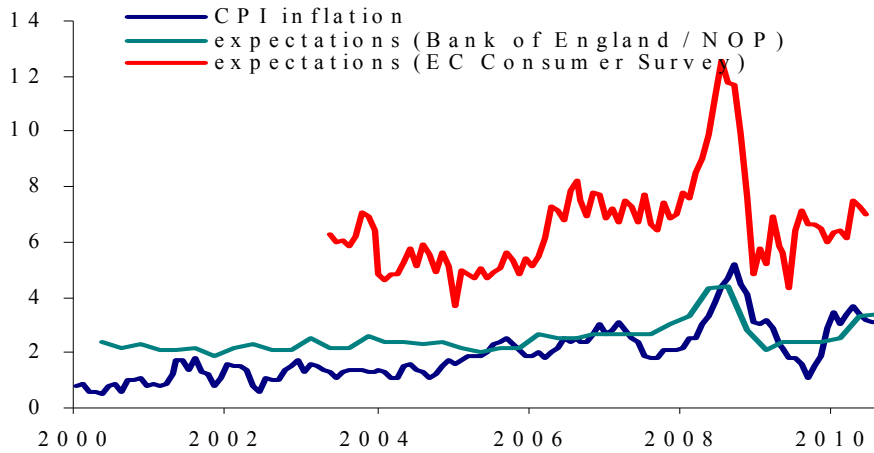*(annual percentage changes)*

(a) United States

(b) United Kingdom
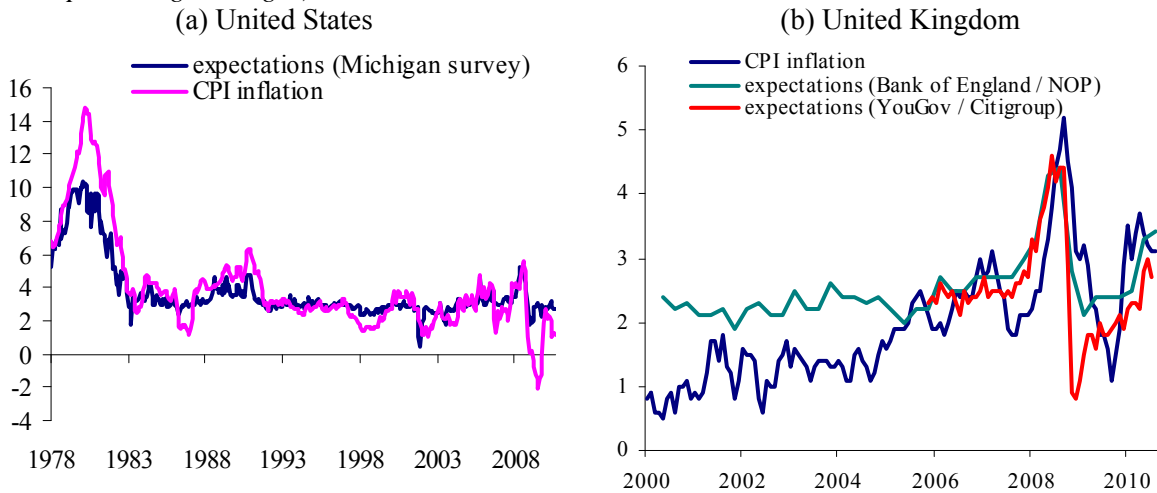
Note: last observation August 2010.

Sources: University of Michigan and Bureau of Labor Statistics.
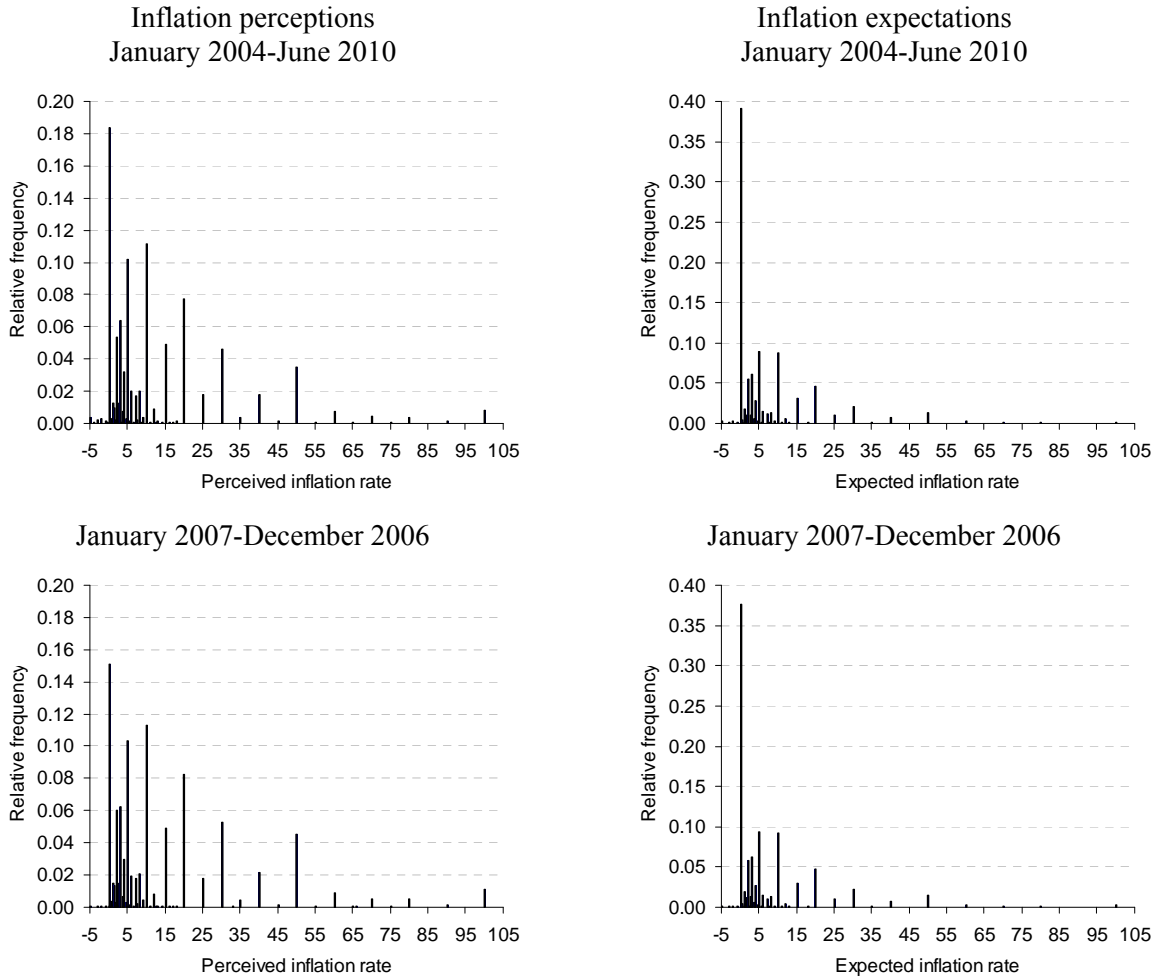
Note: last observation August 2010.

Sources: Bank of England/NOP, YouGov/Citigroup and ONS.

Chart 7 – UK consumers' quantitative estimates of inflation expectations
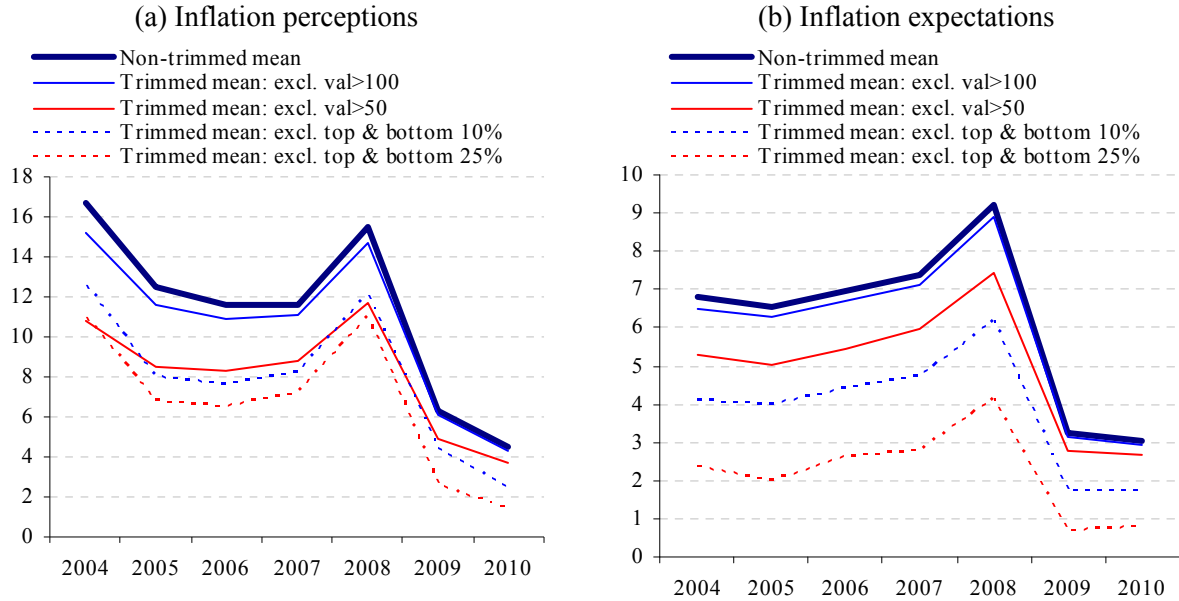*(annual percentage changes)*

Note: last observation June 2010 for the EC Consumer survey, August 2010 for the other series.
Sources: European Commission and Eurostat.

Chart 8 – Euro area distribution of replies to the quantitative question of inflation sentiment
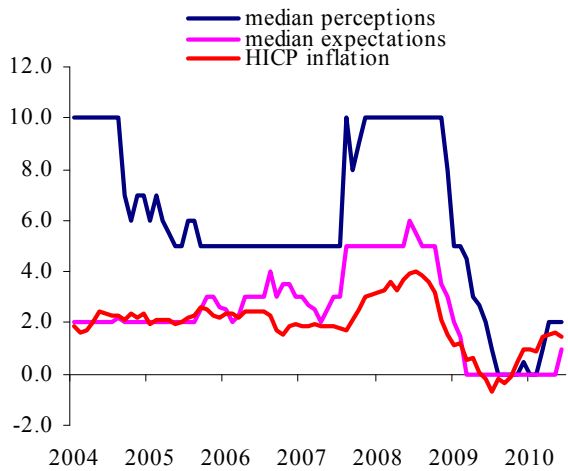
Inflation perceptions
January 2004-June 2010

Inflation expectations
January 2004-June 2010

January 2007-December 2006

January 2007-December 2006

Source: European Commission.

Chart 9 – Trimmed mean measures of inflation sentiment in the euro area
(annual percentage change)

(a) Inflation perceptions

Legend:
- Non-trimmed mean
- Trimmed mean: excl. val>100
- Trimmed mean: excl. val>50
- Trimmed mean: excl. top & bottom 10%
- Trimmed mean: excl. top & bottom 25%

(b) Inflation expectations

Legend:
- Non-trimmed mean
- Trimmed mean: excl. val>100
- Trimmed mean: excl. val>50
- Trimmed mean: excl. top & bottom 10%
- Trimmed mean: excl. top & bottom 25%

Note: annual averages. The 2010 values are averages over H1.
Source: European Commission.

Chart 10 – Median of consumers' inflation assessment in the euro area
(annual percentage change)

Legend:
- median perceptions
- median expectations
- HICP inflation

Note: last observation June 2010.
*Sources:* European Commission and Eurostat.

Chart 11 – Consumers' inflation perceptions and expectations, scaled to match HICP inflation *(annual percentage change)*

Legend:
- perceptions (scaled to match HICP inflation)
- expectations (scaled to match HICP inflation)
- HICP inflation
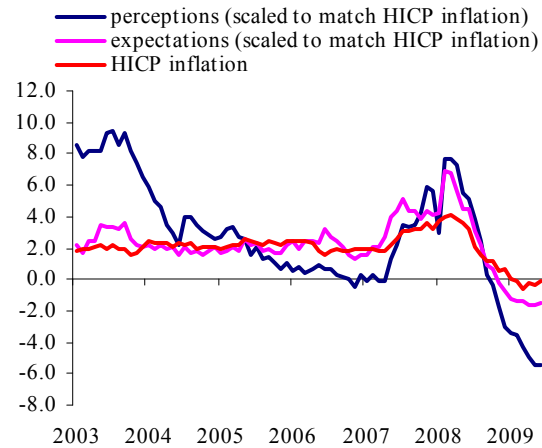
Note: last observation June 2010.
Sources: European Commission and Eurostat.

Chart 12 – Inflation estimates across different socio-economic groups
(in annual percentage change)

(a) Income level

(b) Gender
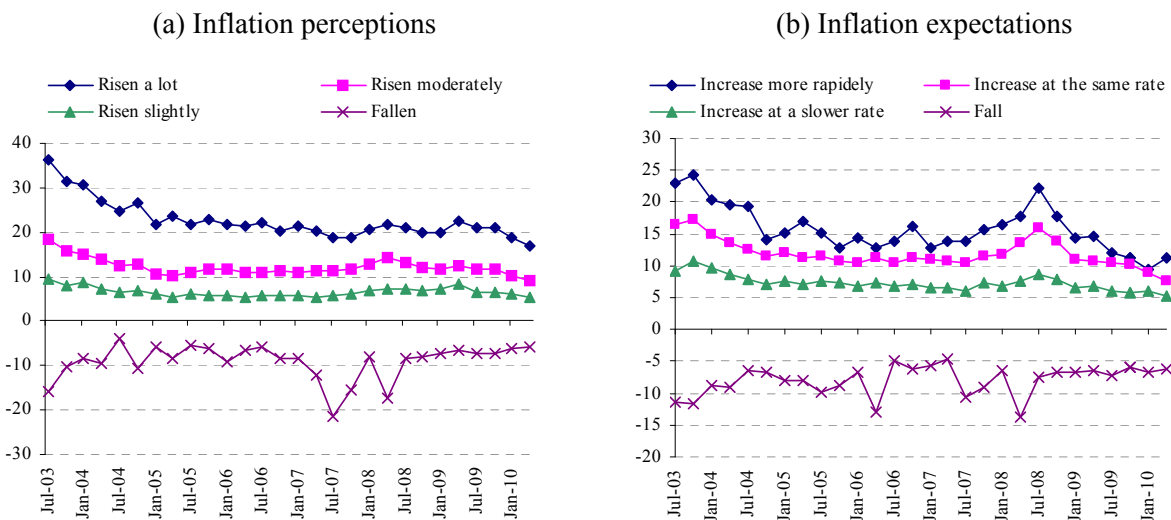

(c) Age group

(d) Education
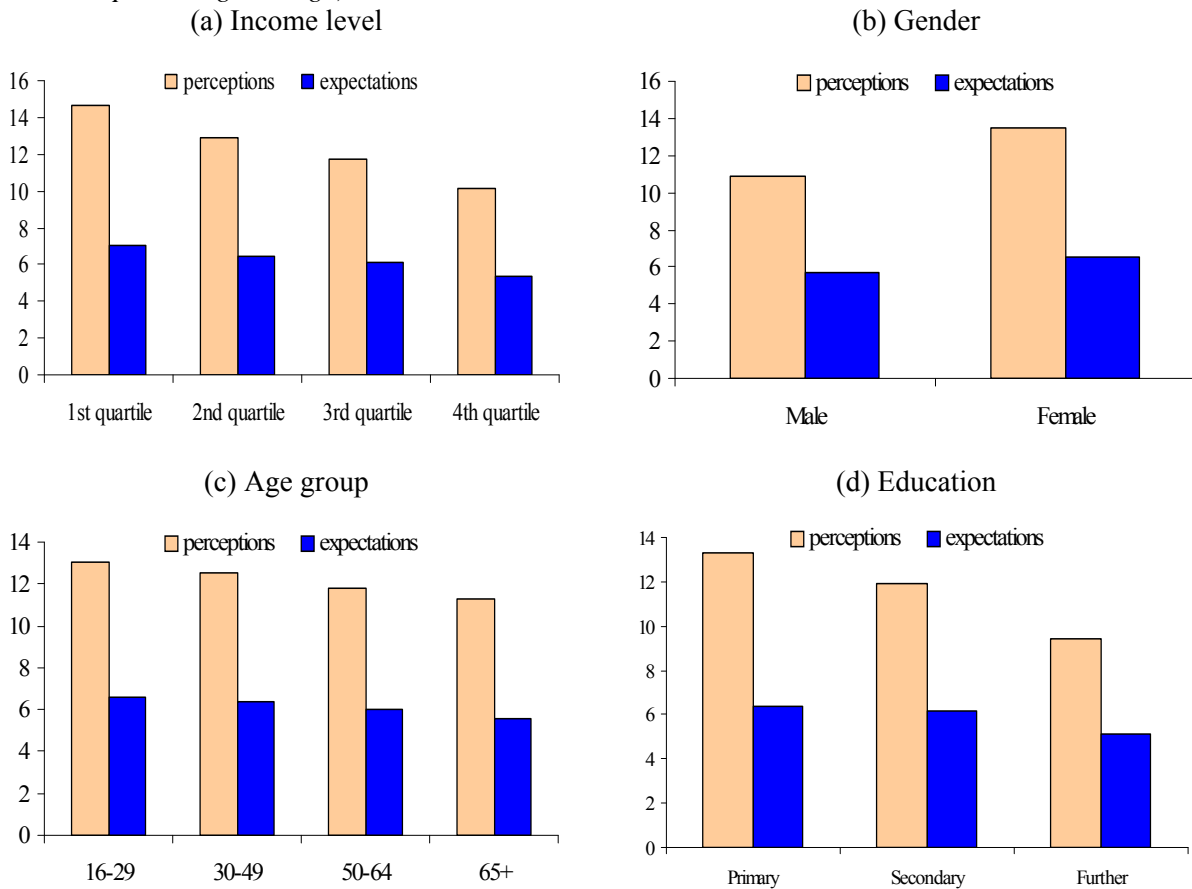
Note: averages over May 2003 to June 2010.
Source: European Commission.

Chart 13 – Mean quantitative estimate of inflation sentiment according to qualitative assessment
(in annual percentage change)

(a) Inflation perceptions

(b) Inflation expectations

Note: quarterly data (collected in January, April July and October). Last observation April 2010.
Source: European Commission.