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Quantified Perceived and Expected Inflation in the Euro Area - How Incentives Improve Consumers Inflation Forecasts

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- First draft autumn 2005 -

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1.   Introduction

The ability to accurately measure inflation expectations is more than of an academic interest; it is an integral part of central bank policy. According to the present approach to monetary policy making, founded on inflation targeting, central banks should be forward-looking, framing their policies today on basis of forecasts of the future rate of inflation one to two years ahead. This approach requires access to reliable and frequently reported data on inflationary expectations of the public. Furthermore, expectations about the future course of the price level are important to decision-makers in all markets: for goods, labour, money, financial assets and currencies. Decisions on these markets determine the actual rate of inflation, nominal wage rates, interest rates, exchange rates as well as real variables such as the rate of unemployment. Expectations actually determine all types of economic behaviour, as human action is forward-looking. Such information, however, is difficult to compile for the simple reason that inflationary expectations are not directly measurable in a way similar to variables such as interest rates, monetary aggregates, rates of unemployment, consumer and producer prices etc. The expectations of the future behaviour of prices are held by individuals in their minds. To measure them in a representative way is a major challenge for economists and for policy-makers.

A straight forward way to measure the inflation expectations of the public is to ask people about their expectations, and in fact, a few surveys do exactly that. Examples of such surveys are the Swedish Household Survey, the University of Michigan survey of consumer attitudes, and the Inflation Psychology Survey conducted by the Federal Reserve Bank of Cleveland in association with the Ohio State University. Other countries, such as Australia and South Africa, have also included direct questions on inflation in their respective consumer surveys. In November 2002, it was decided to introduce two new questions into the Harmonised Consumer Survey for the European Union, thus adding to the number of surveys that explicitly ask a selection of respondents (representing the public at large) about their inflation perceptions and expectations. The two new questions were introduced on a voluntary and experimental basis. They aimed at obtaining point estimates of the perception and expectation, using a quantitative formulation on past (perceived) and future (expected) inflation.

There are some common features that are usually obtained with these kinds of surveys of inflation expectations and perceptions. Based on the Swedish Household Survey, Jonung (1981) and Palmqvist and Strömberg (2004) report on the demographic properties of inflation perceptions and expectations. They find that low-income households say inflation is higher than respondents in higher income classes, both for perceptions and expectations. Education matters in the same way: the higher the education, the lower the inflation rate reported, and women reports higher inflation than men. Furthermore, young and old people perceive and expect inflation to be higher than their middle-aged counterpart, i.e. a U-shaped relationship. The same patterns are present in US data. Using the Inflation Psychology Survey, Bryan and Venkatu (2002a) show that reported inflation rates fall with rising income and education, the relationship between age and inflation is U-shaped, and women report higher values than men. In another paper, Bryan and Venkatu (2002b) reports similar results for the University of Michigan consumer survey. Increasing income corresponds to lower perceived and expected inflation, and women reports higher inflation rates than men.

One obvious problem with these surveys is that the questions asked concerns variables that are difficult to asses, or even understand. Inflation, for example, is a macro-variable measuring the aggregate price level, but as respondents' consumption baskets do not necessarily correspond to the one used for calculating the consumer price indices, the answers obtained with the surveys can differ substantially from the official inflation rates. This is often the case; surveys do in general result in showing perceptions and expectations that are very different from the actual rates.

The objective of this paper is to investigate in what way incentives can explain these deviations between perceived and expected inflation and the official inflation rate. Since it is costly to both gather and analyse data to make a prediction of inflation, only those people with strong incentives to do so will attain this information, and thus be able to give informative answers to the surveys. The Harmonised Consumer Survey for the European Union has become a unique database, with information on respondents' views of past and future inflation, but it also contains information on respondents' likelihood to buy a new car, a house, and making major home improvements, questions on activities that give strong incentives to form correct expectations on inflation.

As the dataset used is new, a substantial part of this report will be devoted to presenting the data, analysing it, and comparing it to other measures of perceived and expected inflation from the same survey, as well as to the results of other surveys. The results will mainly focus on the euro-area aggregate.

In the following section a review of the data set is given. First, the answers to the qualitative questions are studied in order to establish a benchmark for comparison with the quantitative answers. The behaviour of the qualitative answers sets a level for what can be expected from the quantitative answers. Second, the results from the quantitative answers, broken down by socioeconomic subgroups, are presented. Third, the results are compared with similar breakdowns from other datasets, to see if similar patterns arise in both the national surveys and in the euro-area aggregate. Finally, some preliminary results are given concerning the time series properties, which are compared with the qualitative data. Section 3 discusses the role of costly information, and how incentives to collect information matter for respondents when forming their expectations. The empirically obtained answer to the main hypothesis in this paper, whether incentives to collect costly information improve respondents' inflation expectation, is given in section 4. Finally, the last section concludes the paper.

2.   Data

The data employed in this paper come from the Harmonised Consumer Survey for the European Union. The surveys are conducted by national institutes in each of the 27 participating institutes. The harmonised questionnaire contains questions on the economic situation of the household and the country where respondents reside. It also contains information on income, occupation, education, age, and sex. Suited for the purpose of this study, there are also four questions on price developments: two questions that respondents give qualitative answers to, and two that respondents give a quantitative answer to. Furthermore, the questionnaire contains questions that aim at establishing respondents' likelihood to buy a new car, a house, and to make home improvements. A more comprehensive description of the harmonised-EU-survey program can be found in the European Economy No. 6 (1997).

The questions asking for a qualitative answer (called the qualitative questions) regarding price developments are implemented in all participating surveys, and most of the data dates back to the beginning of 1985. The two questions where respondents are asked to put a real number on their perceived or expected change in the price level were introduce on a voluntary and experimental basis in 2003 (called the quantitative questions).

The quantitative formulation of the price questions are currently implemented in 24 out of 27 national questionnaires, i.e. almost all institutes carrying out the consumer survey have included the two new questions. In most cases the questions were introduced from May 2003, but some countries began already in January 2003. France and the UK included the questions from January 2004. The only three countries that do not include the questions are the Netherlands, who stopped asking the questions in July 2005, and Portugal and Hungary that has not yet included the questions in their surveys.

The quantitative price questions (labelled Q51 and Q61 in the harmonised survey) are based on the individual responses to the qualitative price questions (labelled Q5 and Q6 in the harmonised survey). The formulation of these questions and their respective possible responses are as follows:

Q5   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
N	9	don't know

Q51   If question 5 was answered by 1, 2, 3, or 5:

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……,…%.

Q6 By comparison with the past 12 months, how do you expect that consumer prices will develop in 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
N	9	don't know

Q61 If question 5 was answered by 1, 2, 3, or 5:

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……,…% / decreased by……,…%.

The data employed in this paper is a subset of the 24 national surveys containing quantitative questions, and comprise the results from 9 euro-area countries. The nine country-surveys are used to form inflation perceptions and expectations for an aggregate resembling the euro area. The included countries are: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Luxembourg, and Spain, and make up 73 % of the euro area. Data from Italy, the Netherlands and Portugal are excluded from this study: Italy because of an eight-month interruption in 2004, when the quantitative questions were not part of the survey, the Netherlands for ending the experiment with quantitative questions in July 2005, and Portugal because they never participated in the experiment. Since the results differ substantially between different countries, in terms of the level of inflation reported, the data from the former two countries distorts the results if included.

For most countries the time series begin in May 2003 and continues through October 2005, comprising a total of 30 months. All inflation figures are presented as weighted averages[1], and no adjustments have been made to take care of outliers. The euro-area inflation figures are calculated as the weighted average of the individual country averages. The country weights used are the same as those that are used for calculating the harmonised index of consumer prises (HICP). For the first eight months the euro-area average does not include all the Member States, as France did not introduce the quantitative questions until January 2004[2].

As this dataset of answers to the quantitative price questions is new, it is worth while to present the data more thoroughly than otherwise would be done, and establish some of its properties. The answers to the survey questions using a quantitative formulation can be evaluated along several dimensions. One way is to study the overall values of perceptions and expectations, and compare them with the target variable, the HICP inflation rate. Another would be to compare the answers to the quantitative questions to those of the qualitative questions; and a third would be to compare with other recognised datasets.

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[1] At the country level, each individual response is weighted to correct for under or over representation in the sample. When aggregating across time, each monthly value is also weighted by the sample size for the respective month.

[2] The exclusion of France in the beginning of the dataset over-estimates perceived euro-area inflation, as French perceptions are below the euro-area average. For expectations the difference is less pronounced.

2.1. Qualitative price questions

The qualitative answers can serve as a benchmark for what can be expected from the quantitative answers. To make the comparison, the qualitative data have to be quantified in one way or another. There are several methods that can be employed.

Three different quantification methods are used in this paper: (1) the balance statistic, (2) the Carlson–Parkin method with constant thresholds, and (3) the Anderson method. For a literature review on quantification methods see Nardo (2003). (1) The balance statistic is defined as the difference between the weighted proportions of answers that perceived (expected) an increase in the price level and the proportion of answers that perceived (expected) a decrease. (2) The Carlson-Parkin method is an example of the so called probability methodology, which is a set of methods that derives an estimate of quantitative expectations starting from the "Increase" and "Decrease" survey answers and the movements in the actual reference series, e.g. the HICP inflation rate. It is assumed that there exists an indifference interval such that a respondent to a question reports an increase in prices if his expectation is above the upper threshold, and a decrease if his expectation is below the lower threshold, while he reports a no change if the expectation is within the threshold interval. Further, assuming that respondents' subjective probability distribution for future changes in the inflation rate is normal, it is possible to derive an expression for the estimate of the true expectation. (3) The Anderson method is an example of the regression approach, which uses the relationship between the actual inflation rate and respondents' perceptions of the past price developments as a yardstick for the quantification of respondents' expectations about future inflation developments. Supposing that the individual perceived inflation rate is a function of the change in the HICP, it is possible to derive an expression that relates inflation to the observed survey answers to past price developments. Assuming that the relationship between the inflation rate and the respondents perceived prices changes also holds for expected changes, the estimated equation for perceptions can be used as an expression for approximating expected inflation by just replacing surveyed perceptions for surveyed expectations in the estimated equation.

Table 1 :   Quantified inflation rates of perceived and expected inflation in the euro area using qualitative answers from question 5 and 6

Question refer to, survey month	HICP	C-P	And
Past 12 months, September 2005	2.6	2.6	2.7
Next 12 months, September 2004		1.9	1.8
Next 12 months, September 2005		1.9	1.9

Table 1 shows the most recent quantified inflation rates for the euro area using the Carlson-Parkin and the Anderson methods. The balance statistic is excluded from the table since it does not have the same unit of measure as inflation, and therefore cannot be used for a direct comparison. The actual inflation rate for the euro area, as measured by HICP, was 2.6 % over the period September 2004 to September 2005. Depending on the method used, the expected rate for this period was 1.9 % or 1.8 %, and at the end of the period the perceived rate for the period was 2.6 % or 2.7 %. The last line in the table shows the September 2005 expectation for the inflation rate over the following 12 months. The expectation is 1.9 % for both methods used. These values cannot be evaluated before the HICP figures are released some time in mid September 2006.

Figure 1 :   The Balance Statistic for perceived (Per BS) and 12 months lagged expected inflation (Exp BS) in the euro area, and the actual rate of inflation
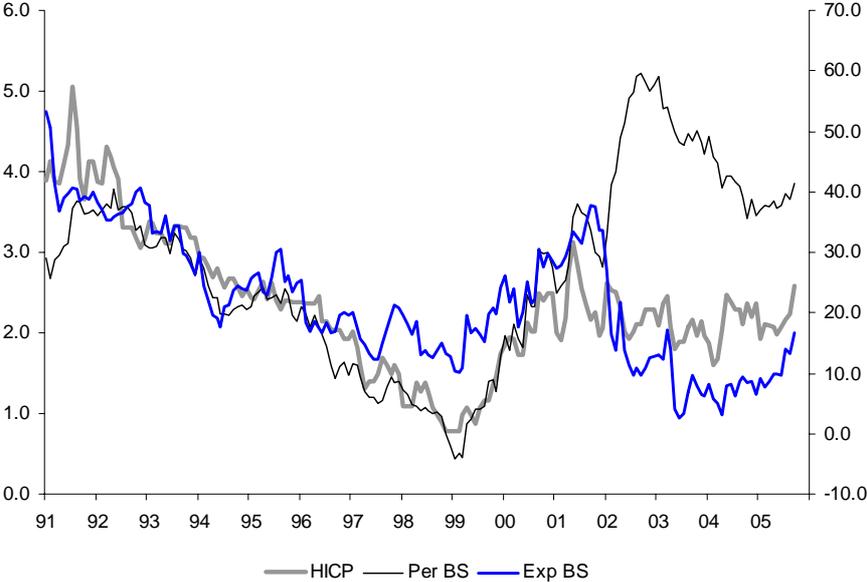

Figure 1 shows the time series of the year-on-year growth rate of the HICP and the balances to the answers on perceived and expected inflation. Before the introduction of the euro notes and coins, the balance series tracks the HICP fairly well. The correlation between the balances and the HICP is around 0.85 for both perceived and expected inflation. After the introduction of the euro, there is a clear de-linkage between the time series. The correlation coefficient for expectations declines to 0.08, and for perceived inflation it even becomes negative.

Figure 2 :   Perceived inflation rates for the euro area, quantified by using the Carlson-Parkin (C-P) and the Anderson methods, and the actual inflation rate
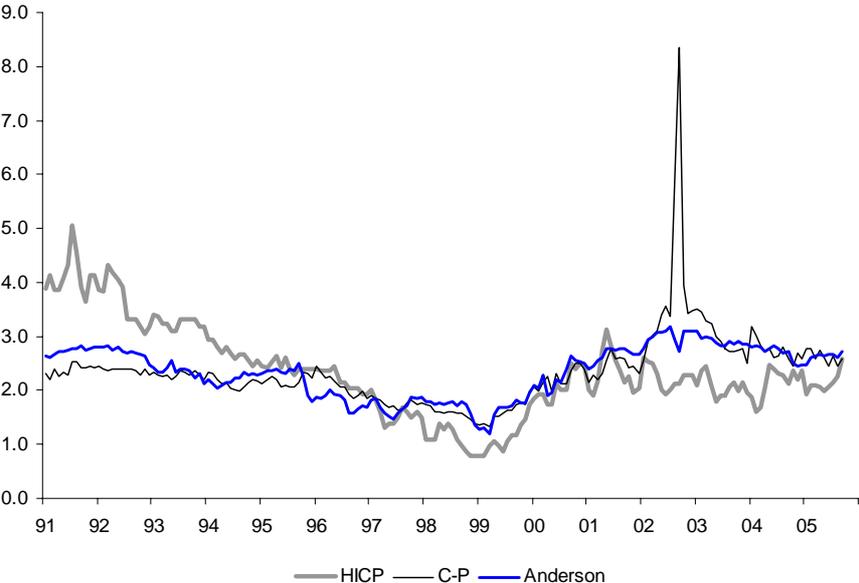
Figure 2 presents the time series of the HICP inflation rate and the quantified perceived inflation rates over the past 12 months using the Carlson-Parkin and the Anderson methods. The shift to a higher perceived inflation after the introduction of the euro in January 2002 is also visible using the other two quantification methods. After the initial increase in the first half of 2002, perceived inflation has been converging towards the actual rate as measured by the HICP.

Figure 3 plots the actual inflation rate and the quantified expected inflation rate lagged 12 months. For example, the May 2003 expectation is compared with the May 2004 outcome. Again there is a shift in expectations that starts in mid 2001. Initially there is an increase in expected inflation for the coming 12 month period, but as the date of the introduction of the euro approaches, expectations decline. Inflation expectations fall to the extent that quantified expectations are below the realised inflation rate.

Figure 3 :   Expected inflation rates for the euro area lagged 12 months, quantified by using the Carlson-Parkin (C-P) and the Anderson methods, and the actual inflation rate
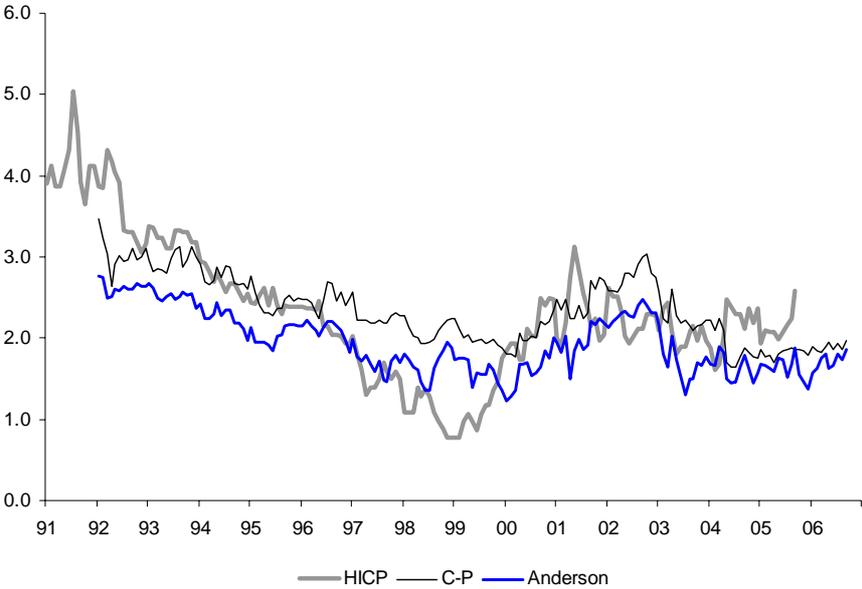
For the total sample period, the correlations between the HICP inflation rate and the balance statistic and the other quantification methods range from 0.22 with the Carlson-Parkin method to 0.55 with the Anderson approach. These figures are presented in Table 2. Splitting the sample in two, where the dividing date is 1 January 2002, the introduction of euro notes and coins, the correlations with HICP are much different. Before the euro introduction, the correlations range between 0.80 and 0.89 for perceptions and between 0.79 and 0.83 for expectations. After 1 January 2002, the correlations range between -0.19 and 0.03 for perceptions and between -0.03 and 0.20 for expectations. The breaks in perceptions and expectations are established to be significant by introducing a dummy variable into the Anderson methodology. Adjusting the estimated perceptions and expectations for this shift in the time series, the Anderson statistic presented in Figure 2 and Figure 3 change, and looks like the series presented in Figure 4. In the figure the time series for perceptions and expectations, scaled by using the Anderson method including a dummy variable, are labelled "Exp And+Dum" and "Per And+Dum" respectively.

Table 2 : Correlations between perceived and expected inflation and the actual euro-area inflation rate, for the total sample and two sub-samples split 1 January 2002, the introduction of the euro

Correaltion between HICP rate of inflation	Perceived inflation for the past 12 months			
	BS	C-P	And	And & Dum
Jan 1991 to Sep 2005	0.48	0.22	0.55	0.55
Jan 1991 to Dec 2001	0.89	0.80	0.82	0.80
Jan 2002 to Sep 2005	-0.19	-0.05	0.01	0.03
Apr 2004 to Sep 2005	0.40	-0.17	0.24	0.25

Correaltion between HICP rate of inflation	Expected inflation for the next 12 months[1]			
	BS	C-P	And	And & Dum
Jan 1991 to Sep 2005	0.64	0.65	0.71	0.71
Jan 1991 to Dec 2001	0.83	0.80	0.80	0.79
Jan 2002 to Sep 2005	0.08	-0.03	0.15	0.20
Jul 2004 to Sep 2005	0.11	-0.09	0.04	0.06

1 Expected inflation is lagged by 12 months

Table 3 presents the demographic properties of the qualitative data. The figures in the tables are averages of the balances over the period May 2003 to October 2005. In the Harmonised Consumer Survey for the European Union people are categorised according to five variables: income of the household (4 categories), occupation (9 categories), education (3 levels), age (4 age groups), and sex (male or female). Excluding occupation, Table 3 shows clear patterns for how the answers are distributed depending on demography. Both inflation perceptions and expectations decline with increasing household income and increasing education. Perceived inflation seems to increase with age, but expectations are hump-shaped. Furthermore, women have higher perceptions and expectations of inflation than men have.

Figure 4 : Perceived (Per And +Dum) and 12 month lagged expected (Exp And+Dum) inflation for the euro area, quantified by using the Anderson method adjusted for the structural break in 1 January 2002, and the actual inflation rate
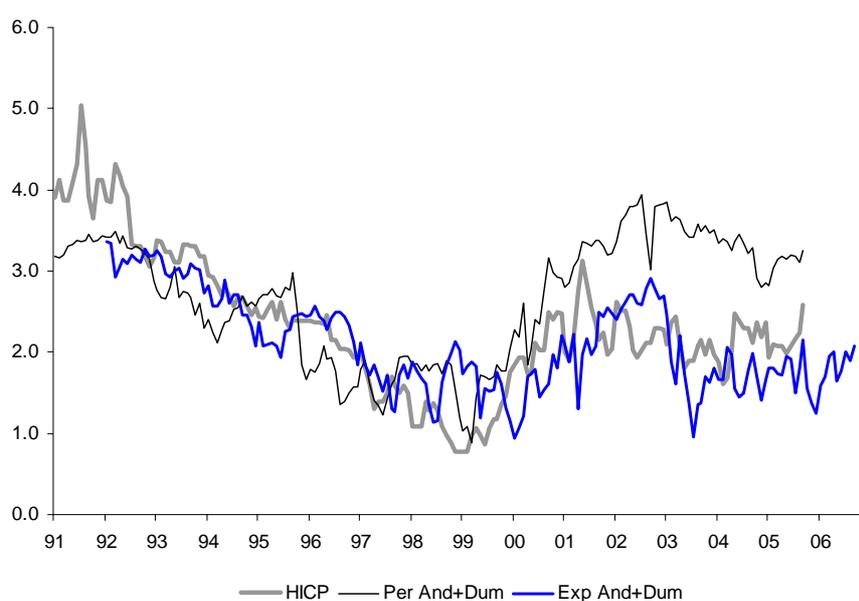
Table 3 :   Balance Statistic for perceived and expected inflation in the euro area for different demographic groups

EURO AREA		Q5	Q6
Income of the household	1st quart	46.3	11.1
	2nd quart	43.3	9.2
	3rd quart	41.1	8.9
	4th quart	37.5	8.0
Occupation	Self employed professionals	38.5	4.9
	Self employed farmers	36.5	4.6
	Clerical & office empl.	38.8	8.1
	Skilled manual workers	44.5	9.1
	Other manual workers	46.1	10.2
	Other occupations	42.3	7.2
	Unemplyed	40.6	8.2
	Work full-time	44.1	9.3
	Work part-time	47.9	11.2
Education	Primary	46.2	8.8
	Secondary	41.7	8.0
	Further	35.9	8.1
Age	16-29	37.7	5.1
	30-49	42.5	8.4
	50-64	43.6	10.5
	65+	43.8	8.0
Gender	Male	39.5	8.5
	Female	45.3	8.1
Total		42.4	8.4

To summarise these results and to form a benchmark for what to expect from the answers to the quantitative questions Q51 and Q61, the stylised facts are the following:

1. There is a structural shift in perceptions and expectations after 1 January 2002, the introduction of the euro notes and coins.
2. Perceived inflation is overestimated after January 2002.
3. There is a clear de-linkage between perceived inflation and the change in the HICP after January 2002. Correlations fall a lot after the introduction of the euro.
4. Perceptions are converging towards the observed inflation rate.
5. The level of expected inflation is more in line with the HICP inflation rate than perceived inflation after January 2002.
6. Inflation perceptions and expectations fall as income increases.
7. Inflation perceptions and expectations fall as education increases.
8. Perceived inflation seems to increase with age, and expected inflation is hump-shaped.
9. Women perceive and expect higher inflation than men

2.2.   Quantitative price questions

2.2.1. Comparison with the qualitative data

A first step to evaluate the new dataset is to compare the results from the quantitative survey questions to those of the qualitative questions. Table 4 shows the answers to the quantitative

questions in the two columns labelled Q51 and Q61. The numbers in the two columns are inflation rates in percent, and the demographic breakdown is the same as in Table 3. The first two columns show the balances from the answers to the qualitative questions.

Table 4 :   Quantitative perceived and expected inflation in the euro area and the balance statistic for different demographic groups (averages for May 2003 to October 2005)

EURO AREA		Q5	Q6	Q51	Q61
Income of the household	1st quart	46.3	11.1	12.8	6.8
	2nd quart	43.3	9.2	11.7	6.3
	3rd quart	41.1	8.9	11.4	6.1
	4th quart	37.5	8.0	10.0	5.5
Occupation	Self employed professionals	38.5	4.9	11.5	5.6
	Self employed farmers	36.5	4.6	9.2	4.8
	Clerical & office empl.	38.8	8.1	10.6	5.7
	Skilled manual workers	44.5	9.1	12.1	6.4
	Other manual workers	46.1	10.2	12.3	6.9
	Other occupations	42.3	7.2	11.4	5.9
	Unemplyed	40.6	8.2	14.0	7.6
	Work full-time	44.1	9.3	11.2	5.9
	Work part-time	47.9	11.2	12.5	6.6
Education	Primary	46.2	8.8	12.2	6.3
	Secondary	41.7	8.0	11.6	6.0
	Further	35.9	8.1	9.3	5.1
Age	16-29	37.7	5.1	11.8	6.3
	30-49	42.5	8.4	12.1	6.3
	50-64	43.6	10.5	11.3	6.0
	65+	43.8	8.0	10.7	5.4
Gender	Male	39.5	8.5	10.6	5.7
	Female	45.3	8.1	12.6	6.4
Total		42.4	8.4	11.6	6.1

During the considered data period from May 2003 to October 2005, the average actual inflation rate is 2.1 %, which can be compared to the perceived rate of 11.6 %. The average actual inflation rate for May 2004 to October 2005 is 2.2 %, which are the 17 months that have been realised and overlaps with the expectations formed since 2003, and thus can be compared to the expected rate of 6.1 %. Clearly, perceived inflation is heavily overstated, while the difference is much less for expectations, although still very high. A similar effect can be seen in the qualitative data. The balances for perceptions are much higher than the balances for expectations, confirming the similarities with points 2 and 5 in the summary points at the end of section 2.1.

Splitting the answers according to different demographic categories, several familiar patterns emerge from the quantitative answers. Perceived and expected inflation falls as income rises. Perceptions fall by as much as 2.8 % from the 25%-lowest-income earners to the 25%-highest earners. The difference for expectations is 1.3 %. The same pattern can be observed for education; inflation rates fall as education increases. The difference between people with primary schooling and those with an education that goes beyond secondary schooling is 2.9 % for perceptions and 1.2 % for expectations. Gender also matters. Women have higher perceptions and expectations than men. The differences are 2.0 % for perceptions and 0.7 % for expectations. Furthermore, answers sorted by occupation are also similar between the

quantitative and qualitative datasets. These results confirm the similarities with points 6 through 9 in the summary at the end of section 2.1.

2.2.2. Comparison with other studies

An alternative comparison is to use other datasets, similar to that of the harmonised EU programme of consumer surveys, which are recognised and used both academically and in practice. For this purpose three surveys will be mentioned: the University of Michigan consumer survey, the Inflation Psychology Survey conducted by the Ohio State University, and the Swedish Household Survey. The data from these surveys are not used directly in this paper. Instead results reported by others, using these data sets, are cited and compared to the ones presented here.

Figure 5 : Quantitative perceived and expected inflation in the euro area (left) and Sweden (right) – depending on income of household, education, gender, and age
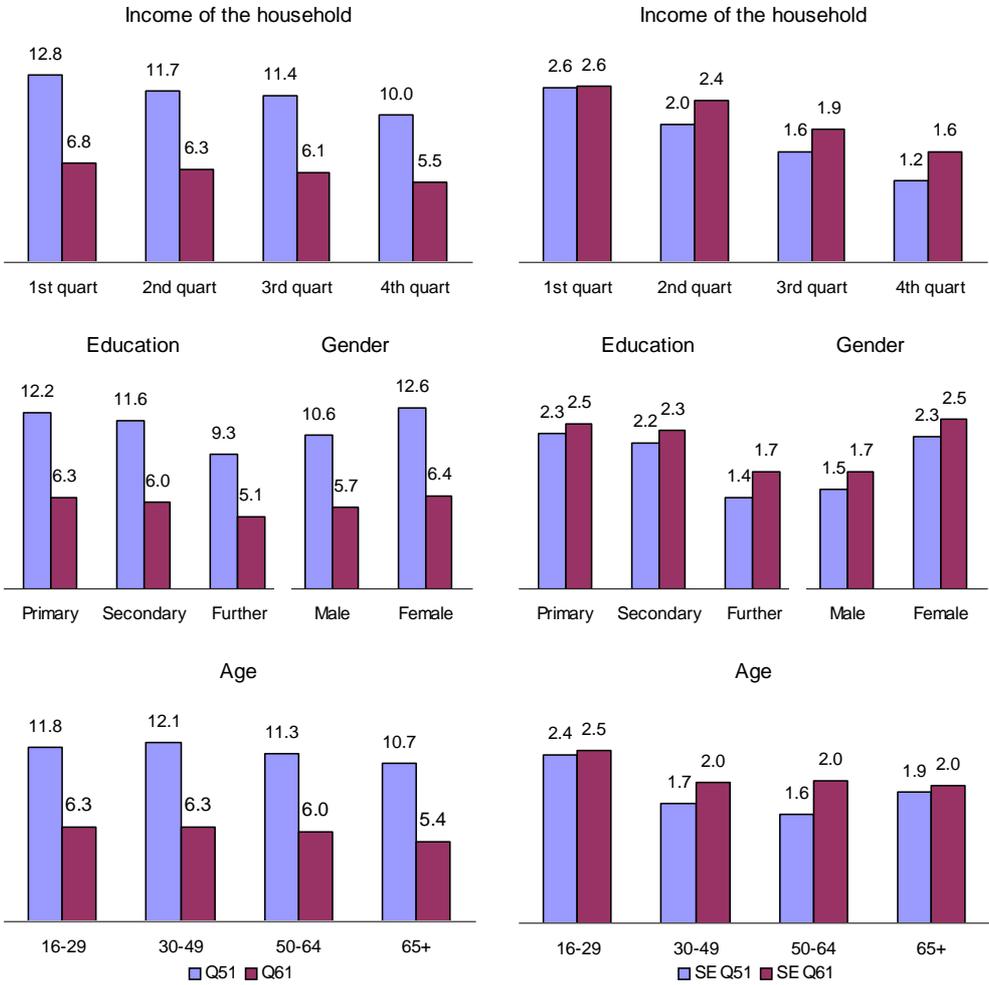
Using the Inflation Psychology Survey, Bryan and Venkatu (2002a) report on the demographic properties of inflation perceptions and expectations. They find that low-income households give higher inflation rates than respondents in higher income classes, both for perceptions and expectations. Education matters in the same way: the higher the education, the lower the inflation rate reported, and women reports higher inflation than men. Furthermore, young and old people perceive and expect inflation to be higher than their

middle-aged counterpart, i.e. a U-shaped relationship. In another paper, Bryan and Venkatu (2002b) reports similar results for the University of Michigan consumer survey. Increasing income corresponds to lower perceived and expected inflation, and women reports higher inflation rates than men.

Based on the Swedish Household Survey, Jonung (1981) and Palmqvist and Strömberg (2004) reports the results of perceived and expected inflation broken down in demographic groups. The same patterns are present in the Swedish data as in the US data. Reported inflation rates fall with rising income and education, the relationship between age and inflation is U-shaped, and women report higher values than men.

The properties described above of the quantified perceived and expected inflation rates are basically replicated by questions 51 and 61 in the harmonised EU consumer survey. For income, education, and gender the same results are obtained as with the other datasets, but there is very little dependence on age in the EU survey. If age matters at the EU level, the dependence is rather hump-shaped than U-shaped.

2.2.3. Time-series analysis of quantitative price questions

Since the time series with quantitative answers are still rather short, only 30 observations, it is difficult to say anything conclusive about the time-series properties. The main focus must be on the perceptions, as these observations can be compared with the HICP inflation rate. For expectations, there are only 17 months with corresponding HICP observations (the HICP series ends in September 2005).

Figure 6 :   Quantitative perceived and 12 month lagged expected inflation rates for the euro area, and the actual inflation rate
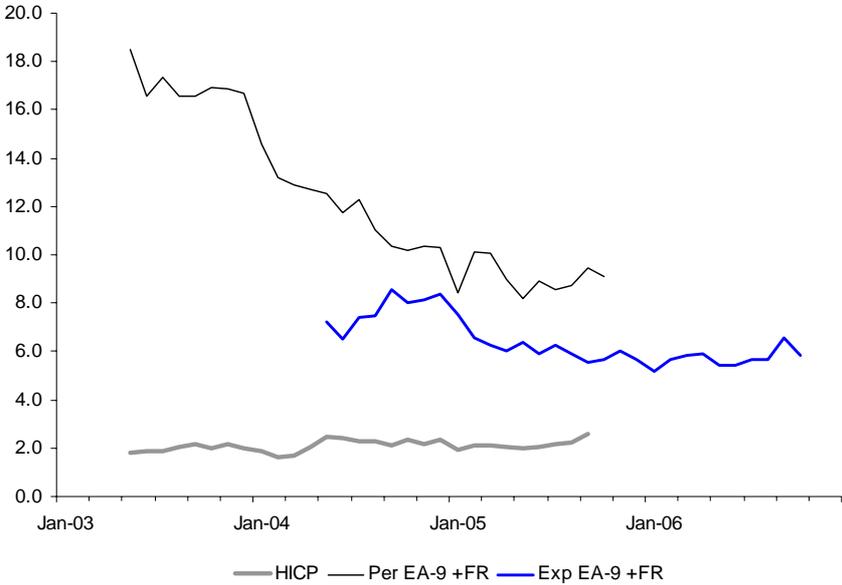

Figure 5 shows the time series for the HICP inflation rate, perceived inflation, and expected inflation. The expectations series is pushed forward 12 months. As expectations are forward looking, the expectations formed in May 2003 correspond to the outcome observed in May 2004. The graph shows that especially perceptions have so far very little to do with the HICP series. As the qualitative data show that there has been a de-linkage between perceptions and

the HICP following the introduction to the euro, it can not be expected that the answers to the quantitative questions should do any better. But, the figure also shows that perceptions have been converging towards the actual rate of inflation, at least until the second quarter of 2005. This is similar to what can be observed for the qualitative data in figures 1 and 4. It is difficult to say whether expectations are converging towards the HICP rate of inflation, but the trend is downward sloping and significant.

Table 5 presents the serial correlations between perceived and expected quantified inflation rates on one side, and the HICP rate of inflation and the different quantification techniques on the other. Perceptions, as measured by question 51, show a high correlation with the qualitative perceptions. With the balances, the correlation is as high as 0.91, but correlations are also high using the regression approach. Just as for the qualitative data, the quantitative data show low and negative correlation with the official inflation rate for the euro area. This result can be attributed to the convergence process towards the HICP rate of inflation.

Table 5 : Correlations between quantitative perceived and expected inflation and the actual euro-area inflation rate, and between quantitative perceived and expected inflation and the qualitative data

Correlation between	Perceived inflation for the past 12 months (May03-Sep05)				
	Q51	BS	CP	And	And & Dum
Percieved inflation Q51	1.00	0.91	0.58	0.78	0.74
HICP rate of inflation	-0.42	-0.43	-0.57	-0.33	-0.29

Correlation between	Expected inflation for the next 12 months (May03-Sep05)				
	Q61	BS	CP	And	And & Dum
Expected inflation Q61	1.00	-0.15	-0.14	0.04	0.06
HICP rate of inflation	-0.12	0.53	0.46	0.23	0.17
HICP rate of inflation (lag 6)	-0.03	0.01	0.01	0.11	0.11
HICP rate of inflation (lag 9)	0.39	0.51	0.49	0.09	0.01
HICP rate of inflation (lag 12)	-0.35	-0.14	-0.30	-0.17	-0.13

The correlations for the quantitative expectations are in general low. This is true both for the correlations with the qualitative data as well as for the HICP rate of inflation. The highest correlation coefficient is obtained when the time series are lagged against each other. It turns out that expected inflation is forward looking with a lead of six months, with a correlation coefficient of 0.39.

3. Costly information and incentives to form expectations

If informational efficiency is defined as a situation where confidence indicators contain all available information at a particular point in time, is it possible that confidence indicators are informational efficient, such that they give perfect information regarding, for example, expected inflation? Clearly not, if information is costly, all people would have to spend resources on acquiring and processing information that would not necessarily be beneficial to them. Because information is costly, prices and other indicators that are bearer of information cannot perfectly reflect all available information, since if it did, those who spent resources to obtain it would receive no compensation. There is a fundamental conflict between the efficiency with which markets spread information and the incentives to acquire information (Grossman and Stiglitz 1980).

For each question in the harmonised consumer survey, the amount of relevant information one respondent possess depends on the relevance of the question to the respondent and his incentive to obtain the necessary information. Most of the questions in the harmonised consumer survey ask respondents for their opinions about issues that they have readily information on, e.g. the economic situation of the household, their employment situation, or their intentions to save money. For other questions it is less obvious to what extent consumers have the information necessary, or the incentives to acquire it, to form relevant opinions.

The four questions on price developments are of the kind where it is not clear what information respondents actually have. For example, respondents have different consumption baskets, which might not correspond to the one measured by the HICP. Furthermore, the general price level of a country is not a simple variable to forecast; it requires a vast amount of information and complex analysis. It also seems reasonable to assume that the more detailed the response demanded to a survey question, the more information is necessary to answer it. It is therefore reasonable to assume that it is more costly to attain the information needed to assess general price developments, as compared to, for example, the household budget, which a respondent would have almost full knowledge about.

The poor performance of the survey questions in measuring inflation might be explained by the relatively weak incentives people face in their daily lives to gather information on inflation, i.e. most of the answers to the surveys are noisy signals. Especially at fairly low inflation rates, as the ones the euro area is experiencing now, it is not very important for people to have correct conjectures about future inflation on a daily basis. This is especially true when information is costly and has to be weighed against an alternative use of the available resources. On the other hand, there are instances when decisions have to be made where inflation becomes a very important variable in people's lives, e.g. when a major investment is going to be undertaken, like the purchase of a house.

The hypothesis investigated in this paper is whether incentives to form inflation expectations can explain the deviations between surveyed inflation expectations and the actual rate of inflation. Detailed questions in the Harmonised Consumer Survey for the EU on household-purchasing plans of cars, houses, and home improvement, make it possible to study this issue. It is assumed that purchases of these asset-goods have a high probability to induce the respondents to take on new loans or cause them to rebalance their portfolio, which increases the incentives to collect information on interest rates, the risk-premium, and inflation rates. Thus, the more likely the respondents are to spend large amounts of money, the closer the answers on inflation should be to the official rate.

4.   Inflation expectations under incentives to gather information

Three questions are used to categorise respondents in terms of their likelihood to perform a major investment in the coming months. The hypothesis is that these investment plans are reasons to form better inflation projections, in order to make better informed investment decisions. The higher the likelihood to invest or spend, the closer the answers to the questions should be to the actual inflation rate. The formulation of these questions and their respective possible responses are as follows:

Q13   How likely are you to buy a car over the next 12 months?

        ++   1   very likely
        +   2   fairly likely
        -      4   not likely
        --   5   not at all likely
        N   9   don't know

Q14   Are you planning to buy or build a home over the next 12 months (to live in yourself, for a member of your family, as a holiday home, to let etc.)?
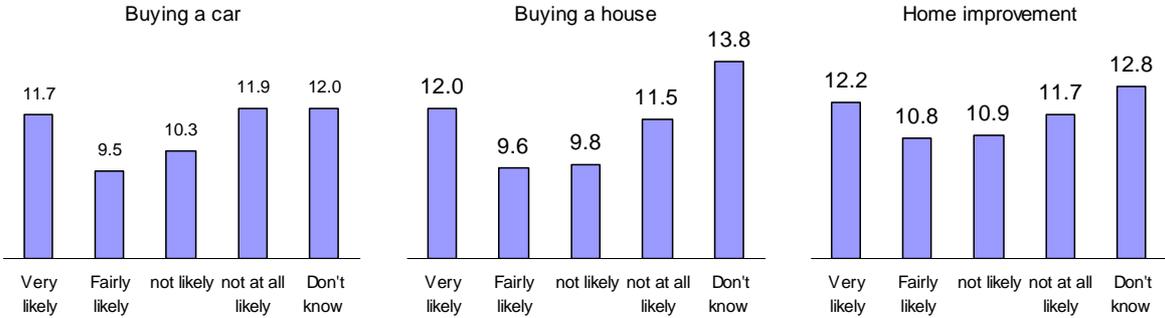
        ++   1   very likely
        +   2   fairly likely
        -      4   not likely
        --   5   not at all likely
        N   9   don't know

Q15   How likely are you to spend any large sum of money on home improvements or renovations over the next 12 months?

        ++   1   very likely
        +   2   fairly likely
        -      4   not likely
        --   5   not at all likely
        N   9   don't know

In the following figures, the answers to these three questions are used to categorise the respondents' answers to the questions on price developments. Based on their likelihood of buying a car, a house, and spending a large sum of money on home improvement, average perceived and expected inflation rates have been calculated. Figure 7 shows the perceived inflation rates for the five different answers to the questions, and Figure 8 shows the expectations. The numbers above the bars are the average inflation rates, and these can be compared with the overall perceived (11.6 %) and expected (6.1 %) rates presented above in Table 4.

Figure 7 :   Perceived inflation rates depending on respondents likelihood to buy a car, a house, or spend a large amount of money on home improvements

For perceived inflation, the bar-charts are U-shaped, but if one disregards the bars labelled 'very likely', the bars in the charts increase as respondents become less likely to invest or

spend large amounts of money. Respondents who are fairly likely to spend money perceive past inflation to be between 0.9 and 2.4 percentage points below those that are not at all likely to spend any money on cars and houses. The biggest differences are for those that are buying cars or houses. The figures also show that respondents that are very likely to spend money perceive and expect inflation to be higher than the overall average, and at least as high as respondents who are not so likely to spend money on cars and houses.

Figure 8 :   Expected inflation rates depending on respondents likelihood to buy a car, a house, or spend a large amount of money on home improvements

For expected inflation, the bar-charts show a similar pattern. Disregarding the bars labelled 'very likely' and 'don't know', the expected inflation rates increase as respondents become less likely to invest or spend large amounts of money. The exception is the home-improvement chart, where the differences in expected inflation rates are small. The inflation expectations for those respondents that are fairly likely to buy a car or a house are almost one percent lower than for those that are not at all likely to buy.

If it was not for the bars labelled 'very likely', these results would show strong support for the hypothesis that incentives matters a lot for respondents to form their views on past and future inflation. The results presented in this paper do not rely on any trimming of the data, all observations are included, and so far no consideration has been taken to outliers. Unfortunately there are many outliers, and some of them are very extreme, e.g. some respondents give inflation rates of as much as 400 percent. There can be many sources to these extreme numbers, e.g. errors when entering data, or reluctance to answer to surveys. Regardless of the cause, the extreme values becomes an issue when selecting data based on respondents likelihood to invest or spend, because there are relatively few observations for the category 'very likely'.

It turns out that the relatively high inflation rates obtained for the category 'very likely' are mainly caused by the answers from the German survey. Since there are only around 450 respondents that answers 'very likely' to questions 13, 14, and 15, compared to 2200 in the French survey and 1350 in the Austrian survey, the German results are more sensitive to extreme outliers. Furthermore the German results enter the euro-area aggregate with a much higher weight than the other countries, almost 40 % for Germany, as compared to 28 % for France and 4 % for Austria. The relatively bad German results for this particular category pass through to the euro-area aggregate.

To alleviate this problem of too few observations, two alternative measures of perceived and expected euro-area inflation are calculated. First, the very-likely and the fairly-likely respondents are grouped together in one category called 'likely', and the not likely and the not

at all likely are grouped in a second category called 'not likely'. This is done by just averaging the results from the two respective categories. Since there are still relatively few respondents saying that they are very likely to invest, as compared to those that are only likely, the former group will be overrepresented in the new average labelled likely in the figures below. The second alternative measure takes into account the differences in observations between the national surveys. When calculating the euro-area averages, individual country results are weighted by the HICP-country weights and the number of observation for each category and survey.

Figure 9 : Perceived inflation rates depending on respondents likelihood to buy a car, a house, or spend a large amount of money on home improvements. The two 'likely' answers are grouped into one category called 'likely', and the two 'not likely' answers are grouped into another category called 'not likely'.
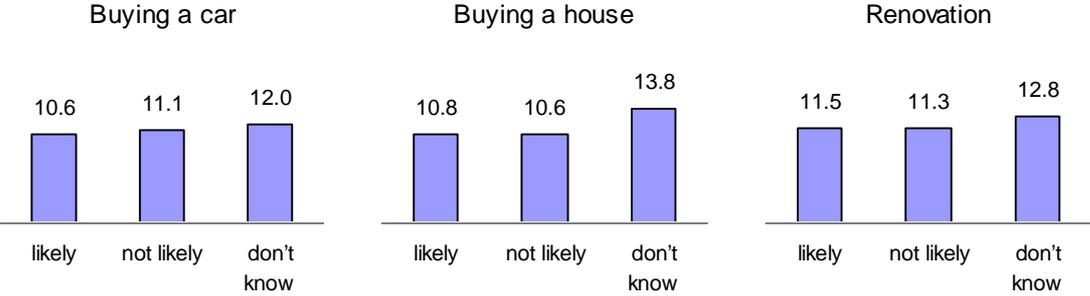

Figure 9 and Figure 10 presents the perceived and expected inflation rates in the new aggregated groupings. In general the differences are less pronounced, and in some cases they are even negligible. Respondents that are likely to buy a car within the next 12 months give answers that are about half of a percentage point less than the those answers given by respondents that are not likely to buy a car. The differences between the two categories in the results for question 14 and 15 are basically negligible.

Figure 10 : Expected inflation rates depending on respondents likelihood to buy a car, a house, or spend a large amount of money on home improvements. The two 'likely' answers are grouped into one category called 'likely', and the two 'not likely' answers are grouped into another category called 'not likely'.
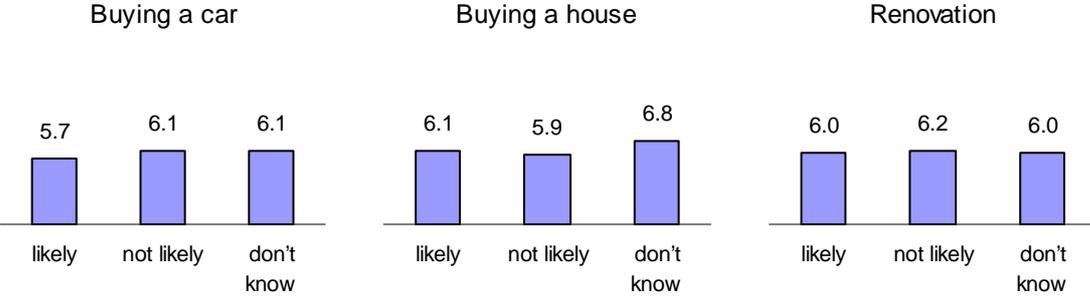
When the euro-area aggregates are adjusted for the country differences in sample size, the results show a strong support for the hypothesis that incentives matter when respondents form their views on inflation. In Figure 11 the results for perceived inflation is illustrated. All three questions show that the more likely respondents are to spend money, the better their

perceptions are, i.e. the inflation rates obtained with the surveys are closer to the realised HICP rate of inflation. The biggest difference is found in the middle graph for house buyers, where the likely house buyers state an inflation rate that is 2.2 percentage points below that of those respondents who are not likely to buy. For the question on car purchases, the difference is 1.7 percentage points, and for the question concerning home improvements the difference is 1.5 percentage points. The lowest level of 8.7 % is still far from the actual rate of 2.1 %.

Figure 11 :   Perceived inflation rates depending on respondents likelihood to buy a car, a house, or spend a large amount of money on home improvements. Individual country results are weighted by the sample size when calculating perceived euro-area inflation. The two 'likely' answers are grouped into one category called 'likely', and the two 'not likely' answers are grouped into another category called 'not likely'.
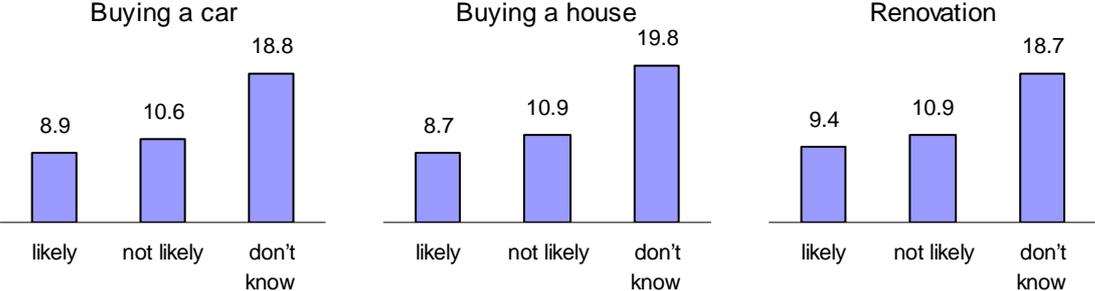
Like for perceived inflation, expectations for future inflation rates are significantly lower when respondents are likely to buy a car or a house, or spend large sums on home improvement. The biggest difference is for house buyers, where likely house buyers report 1.8 percentage points lower inflation than non-likely-house buyers. It is also the house buyers that give the overall lowest inflation figure of 4.6 %. This might not be too surprising as the purchase of a house is probably the biggest investment a household makes, and usually it requires borrowing money for financing the purchase. This would give strong incentives to gather information on interest rates and future inflation. The two other questions, on the likelihood of purchasing a car and spending money on home improvements, show differences of 1 percentage point between the likely and not likely respondents.

Figure 12 :   Expected inflation rates depending on respondents likelihood to buy a car, a house, or spend a large amount of money on home improvements. Individual country results are weighted by the sample size when calculating expected euro-area inflation. The two 'likely' answers are grouped into one category called 'likely', and the two 'not likely' answers are grouped into another category called 'not likely'.
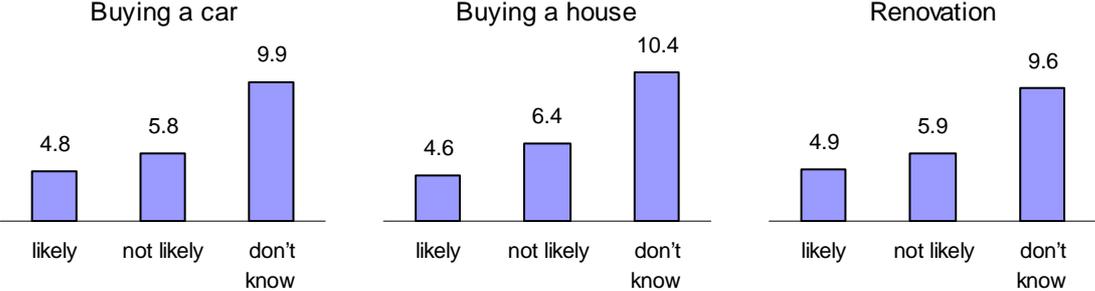
The 'don't know' answers, as presented in Figure 11 and Figure 12, cannot be used for anything purposeful. The 'don't know' answers to the questions are used differently in the national surveys. For some countries the answer is not used at all, and for others it is an answer that is widely used. It turns out that in the Spanish survey a lot of people use the answer for 'don't know' instead of, for example, the 'not at all likely' answer. When weighting the results by the sample size, the Spanish inflation figures completely dominates the results; the weights are between 0.83 and 0.96.

The overall lowest expected inflation rate obtained with this sample is 4.3 %. The figure is obtained by weighting the country results by the country weights and the sample size, but without re-grouping the categories. It is respondents who report that they are very likely to make home improvements that state this figure. The corresponding expected inflation rate for house and car buyers are 4.4 % and 4.8 %. These numbers should be compared to the actual rate, which is 2.1 %. Just looking at respondents who have strong incentives to gather information on price developments improves the measurement of expected inflation from 6.1 % to 4.3 %, closing the gap to the official rate almost half the way.

5.   Conclusions

The main purpose of this paper is to investigate whether incentives to form views on past and future inflation can explain the deviations usually found between surveyed perceived and expected inflation and the actual rate of inflation.

To address the issue, a new dataset is used, which has been developed within the framework of the Joint Harmonised EU Programme of Consumer Surveys, which is managed by the European Commission. Two new questions have been introduced into the questionnaires, explicitly asking respondents to quantify past (perceived) and future (expected) inflation. Included in the survey are also three questions on respondents' likelihood to buy a car, a house, and spend a large amount of money on home improvement. These three questions are used as a device to group respondents in terms of how strong incentives they have to collect information on inflation. The hypothesis is that the more likely respondents are to spend money, the stronger incentives they have to collect costly information, and therefore they would produce better projections. The used time series starts in May 2003 and continues through October 2005, and the main focus is on the euro-area aggregate.

The main results show that stronger incentives to collect information on inflation induce respondents to produce perceived and expected inflation rates that closer correspond to the official rate of inflation. Respondents who say they are likely to buy a house perceive inflation to be 2.2 percentage points lower than those that are not likely to buy a house, and they are 2.9 percentage points lower than the overall average. The results for the other two questions, likelihood of buying a car and making home improvements, are similar, but slightly less pronounced. Still, the perceived level of inflation is heavily overstated 9 %.

The question on expected inflation also supports the hypothesis that incentives to collect information matter when respondents form their views on future inflation. Respondents who are likely to buy a house are expect inflation to be 1.8 percentage points lower than those that are not likely to buy a house, and they are 1.5 percentage points below the overall average. The results for the other two questions are similar, with differences of 1 percentage point. Again, the level of expected inflation is over stated as compared to the official rate, but the

incentive-induced rate of 4.6 % for house buyers, almost cuts the distance between the HICP rate of inflation and the overall expected average in half.

This shows that it is important to ask questions that are relevant to respondents, in the sense that they should have readily available information on the issues they are asked to respond to. Furthermore, the results show that it is a valuable exercise to try to "cut" the data in different ways to reduce the noise introduced by respondents that have less information on a particular issue, this can potentially improve survey results in general and inflation projections in particular.

In addition to answering the main hypothesis, this paper presents an analysis of the data on the price questions 51 and 61 in the questionnaires that arrive at a quantification of inflation perceptions and expectations. Again, the focus is on the euro-area aggregate, and how the answers to the quantitative questions compare to the two qualitative questions 5 and 6 and to other similar datasets.

In general, the euro-area aggregate of the quantitative questions behaves in a similar way as the qualitative data. The main findings are the following ones:

- There is a structural shift in perceptions and expectations after 1 January 2002, the introduction of the euro notes and coins.
- Perceived inflation is overestimated after January 2002.
- There is a clear de-linkage between perceived inflation and the change in the HICP after January 2002. Correlations fall a lot after the introduction of the euro.
- Perceptions are converging towards the observed inflation rate.
- The level of expected inflation is more in line with the HICP inflation rate than perceived inflation after January 2002.
- Inflation perceptions and expectations fall as income increases.
- Inflation perceptions and expectations fall as education increases.
- Perceived inflation seems to increase with age, and expected inflation is hump-shaped.
- Women perceive and expect higher inflation than men.

The conclusion is, therefore, that the quantitative data must be considered to exhibit similar strengths and weaknesses as the qualitative data. Furthermore, the quantitative data in the Harmonised EU Programme of Consumer Surveys for the euro area are able to replicate the results of other datasets.

This quantitative dataset is becoming unique in its richness, almost 400,000 observations just for the euro area. In terms of quality, the answers to these questions actually measure the variable of interest directly. This enables a direct interpretation of the level, as well as the change in the s. Furthermore, the formulation of the new questions follows comparable methodologies of other country-surveys, which makes it possible to compare the developments of the euro area to other countries. Without methodological comparability this would be impossible.

Still, there are various problems regarding the homogeneity of the data on a country level, and there is a clear overestimation of inflation for the euro area, both regarding perceptions and expectations. Several hypotheses for this result can be put forward, e.g. that inflation perceptions of consumers are not directly related to the CPI. Bryan and Venkatu (2002b)

tested this hypothesis by asking the respondents if they have heard of the consumer price index (CPI). The people who had heard of the CPI were also able to give a remarkably correct answer to what the rate of change had been during the past 12 months. Still, these people reported higher inflation rates than the CPI rate, on the general question on prices.

For the euro area there are two mitigating circumstances that should be taken into account when judging this data. First, there seems to be a convergence process going on for perceptions towards the actual inflation rate, as measured by HICP. This is important when evaluating the results, since the effects of the structural breaks following the introduction of the euro still has not petered out. Second, the time series is very short, especially for evaluating the time series properties of expectations.

Even though the quantitative and qualitative data are similar, the qualitative data has one current advantage; it has a long time series. But, there are also some drawbacks. The qualitative answers can not answer questions regarding the level of the inflation rate. There are quantification methods that can be used to quantify the qualitative answers, but in most cases these methods just scales the qualitative data to the target variable, the inflation rate. This means that any information on too high or too low perceptions and expectations are lost, which potentially is important information when forming policy. Furthermore, some quantification methods smooth the data in such a way that any structural shifts in the resulting perceived and expected inflation rates are concealed.

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