

Inflation Expectations and Consumption Decisions

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Abstract

How do households form their expectations about inflation and how do they affect their consumption decisions? We provide new stylized facts based on household surveys: i) inflation expectations are heterogeneous but a large fraction of individuals expect stable prices; ii) a large share of the adjustment in the average inflation expectation comes from the change in the share of households expecting stable prices (the extensive margin); changes in the average expectation of households reporting positive inflation (the intensive margin) contribute much less; iii) the extensive margin is negatively correlated with realized inflation, and increases more for low realizations; iv) individual inflation expectations have a positive effect on individual durable consumption decisions and this effect is mostly driven by the extensive margin of inflation expectations; consumption reacts little to the intensive margin of inflation expectations. We rationalize these facts in a model where households infrequently adjust their consumption to idiosyncratic noisy signals on underlying inflation.

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1 Introduction

Since the early contributions of Phelps [1967], Friedman [1968] and Lucas [1972], inflation expectations have been recognized to be a crucial determinant of macroeconomic outcomes. In modern macroeconomic theory, an important channel whereby they do so is households' inter-temporal decisions embedded in the Euler equation. Everything else being constant, a higher expected inflation lowers households' perceived real interest rate thereby inducing them to save less and to consume more today. The standard version of the Euler equation postulates no impediment to intertemporal substitution at the aggregate level and a perfect reaction of inflation expectations to changes in macroeconomic conditions. Inflation expectations react quickly to shocks and have a strong impact on aggregate consumption. This reaction is a key determinant of the effects of monetary and fiscal policies in macroeconomic models.

Several recent theoretical contributions have argued in favor of incorporating wedges in the transmission of inflation expectation to private consumption. That channel is otherwise too powerful in the baseline setup. Frictions can affect the reaction of consumption to inflation expectations in particular due to financial constraints (McKay et al. [2016]; Kaplan et al. [2018]) and adjustment costs (Berger and Vavra [2015]); the reaction of inflation expectations to new information due to imperfect information (Reis [2006]; Wiederholt [2015]; Angeletos and Lian [2018]) or cognitive limits (Garcia-Schmidt and Woodford [2019]; Gabaix [2016]); or a combination of the two (Alvarez et al. [2012]; Farhi and Werning [2017]).

In this paper, we use individual data from the French household monthly survey to document several new facts on households' inflation expectations and their consumption decisions. First, households report heterogeneous inflation expectations, but a large share of them expects future stable prices (no inflation). Second, the associated *extensive margin* of aggregate inflation expectation (i.e. variations in the share of households expecting stable prices) accounts for an important fraction of its time variations. By

contrast, the *intensive margin* (i.e. changes in the average expected inflation within households expecting positive inflation) contributes relatively less. Third, the extensive margin correlates negatively with realized inflation and this correlation is stronger when realized inflation is low (typically below 2%). By contrast, the intensive margin correlates less with inflation when it is low. Fourth, large differences in inflation expectations do explain individual differences in the propensity to consume durable goods. By contrast, small differences in individual inflation expectations do not explain cross-section differences in the propensity to consume durable goods.

These facts are consistent with models where households adjust their consumption in reaction to variations of real interest rates but incur some adjustment costs when doing so. As a consequence, they only adjust when they consider that the change is sufficiently large and or permanent. In addition, our evidence is also consistent with households having access to imperfect information when forming their inflation expectations. These two imperfections reinforce each other to limit the effects of expected inflation on consumption decisions.

Literature Our paper is related to the literature using survey data to characterize the formation of private inflation expectations. Several contributions have shown that the large dispersion in the distribution of individuals' inflation expectations is consistent with models of imperfect information (see Mankiw et al. [2003]; Coibion and Gorodnichenko [2012]; Andrade and Le Bihan [2013]; Andrade et al. [2016]). These papers mostly focus on the expectations of professional forecasters. Some other papers also looked into the formation of household survey expectations (see Carroll [2003]; Coibion and Gorodnichenko [2015]; Armantier et al. [2015]; Andrade et al. [2018]; Vellekoop and Wiederholt [2018]).

We focus on households and emphasize that, despite being heterogeneous, households also tend to report similar rounded numbers, in particular zero inflation. Furthermore we

underline that the fraction of zero inflation varies with realized inflation and contributes to a large extent to the variations in the average inflation expectation. We relate this to important and/or persistent changes in individual views on future inflation.¹

Our paper also contributes to the empirical literature testing the link between households' inflation expectations and their consumption decisions. Bachmann et al. [2015] find no impact of variations of US households' inflation expectations on their durable consumption choices, a result that is at odds with the prediction of a standard Euler equation. Duca et al. [2018] find similar results on euro area data and Coibion et al. [2019] on Dutch data. D'Acunto et al. [2016] find a positive impact of a change in German households' inflation expectations driven by large pre-announced inflationary VAT shocks. Our results are consistent with these previous studies. Individuals tend to adjust their durable consumption when they perceived a major change in future inflation, in particular when they expect inflation to move from zero to a positive value. D'Acunto et al. [2019a,b] exploit Finnish household data and report a stronger effect for households with higher cognitive capacities as captured by IQ test. We also find a stronger reaction of households with better forecasting capacity. However the discontinuity between positive and zero expected inflation remains for these categories as well. Crump et al. [2018] report that, consistent with the prediction of the Euler equation, individual US households' expected total – including non-durable – consumption growth reacts negatively to their inflation expectations.² Likewise, Vellekoop and Wiederholt [2018], show that households save less when their own inflation expectations decline, again consistent with the prediction of a standard Euler equation. We emphasize non-linearities in individuals' reaction of durable consumption to their own inflation expectations.

Finally, our results are consistent with the recent works emphasizing that there is less intertemporal substitution in the data than what the aggregate Euler equation obtained

¹Binder [2017] also underlines time varying roundings in households' inflation expectations but relates this to more uncertainty about future inflation.

²See also Ichiue and Nishiguchi [2015] and Dräger and Nghiem [2018] for similar results on Japanese and German households.

under the assumptions of complete markets and full information together with rational expectations would predict. More credible impacts can be obtained if one considers limited intertemporal substitution undiversifiable idiosyncratic risk and credit constraints – i.e. limited adjustment of consumption due to limits in inter-temporal substitution – (see Berger and Vavra [2015]; McKay et al. [2016]; Kaplan et al. [2018]) or deviations from rational expectation under full information – i.e. limited adjustment of consumption due to limited adjustment of inflation expectations (Angeletos and Lian [2018]; Farhi and Werning [2017]; Gabaix [2016]; Garcia-Schmidt and Woodford [2019]; Wiederholt [2015]). We emphasize a discontinuity in the link between expected inflation and consumption which remains valid even if one focuses on households which are less financially constraint or which have better cognitive capacities.

The remainder of the paper is organized as follows. In section 2, we present our data set and the French survey on consumer confidence. Section 3 documents findings on the formation of inflation expectations and on consumption decisions. Our empirical model is presented in Section 4. We also document our empirical results. Section 5 concludes.

2 The French Survey of Households

This section presents the main features of the French survey individual data that we use in this paper.

2.1 General Design and Sample

We use the underlying individual data from the monthly consumer confidence survey conducted by INSEE (Institut National de la Statistique et des Etudes Economiques). This survey is part of the harmonised European household confidence indicators released by the European Commission for all countries in the European Union. The micro data are

collected at a monthly frequency over the period January 2004 – December 2017.³ Every month about 2,000 interviews are carried out via phone calls. Every household is surveyed during three consecutive months, so our data set contains a panel dimension but quite limited. Every month, a new sample of households is surveyed (about 1,100 new calls) to replace households disappearing after three interviews and to replace households that do not answer to the second or third interviews. The sample is designed by INSEE to be representative of the overall French population (sampling weights are calculated by city size, age, household composition, job occupation, socio-professional category, diploma). Overall, our sample contains a little more than 310,000 individual observations over the 15-year period, i.e. about 2,000 observations per month on average. The total number of households surveyed is about 150,000; most of them are surveyed three times, 24% are surveyed twice and 16% only once.

The questionnaire contains a little more than 20 questions and most of the questions are qualitative. They refer to households' perception of the current and future macroeconomic situation, their quality of life, unemployment and on the evolution of prices but also on their own financial situation, and their saving and consumption behaviour or intentions. In addition, at the first interview of the household, the survey collects a lot of socio-demographic information on households like age, diploma, income, employment status, gender...), composition. The full questionnaire is reported in Appendix A.

2.2 Expected Inflation and Consumption Decisions

Our empirical analysis will mainly focus on two types of questions in the survey: *(i)* households' expectations about future inflation over the next 12 months and *(ii)* households' purchases of durable goods.

³Before 2008, the survey was not conducted in August.

Expected inflation. The survey asks two types of questions on households' inflation expectations. First, households are asked to provide a *qualitative* answer on the expected evolution of prices:

In comparison with the past 12 months, how do you expect 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 9/Dont Know

And second, households are asked to give their *quantitative* estimation (in percentage) of expected inflation:

By how many percent do you think consumer prices will go up/down over the next 12 months? Consumer prices will increase/decrease by XX.X%

Note that, unlike what is done in more recent surveys like the NYFed CEX survey or the DNB survey, the answer to the quantitative questions is not restricted to help eliciting households' expectations. This might make the individual responses more noisy than in these other data. Another important point is that, when households answer "stay about the same" to the qualitative question, a 0% inflation is imputed to the quantitative question.⁴ Finally, a specificity of the French survey is also to ask for similar qualitative and quantitative questions on households' perceived inflation over the past 12 months.⁵

The response rate to the quantitative question is much lower than the response rate to the qualitative question (a little more than one half of households answering something different than "Stable prices" do not answer to the quantitative question (Appendix Ta-

⁴A quite similar procedure is used in the Michigan Survey for the quantitative question on expected inflation.

⁵See the Appendix A for the full questionnaire.

ble A). Table B in the Appendix provides estimates of a qualitative model of the main determinants of the non-response probability for the quantitative questions on inflation expectations (as well as perceptions). Households with a higher income and better educated are more likely to respond. Older people and women are more likely not to respond.

A drawback of imputing 0 to the quantitative question when households answer “stay about the same” to the qualitative question is that there will be no missing values associate to this particular response. By definition, the response rate conditional on giving this answer is 100%. This can bias the share of zeros in the quantitative inflation expectations. However, we can use the determinants of the non-response model to correct the share of 0-inflation answers in the quantitative question. We impute missing values so that the response rate is similar than the ones observed for other answers to the qualitative question.

Durable goods. The survey asks several questions on households’ durable good consumption. A specificity of the French survey is to have questions on households’ *own* and *general* consumption of durable goods. More specifically, the survey asks a qualitative question on households’ purchases of durable goods over the past 12 months:

Have you made any major purchase over the last 12 months? (washing machine, refrigerator, furniture, dishwasher, ...)

1/Yes 2/No 3/Don't know

Another qualitative question is about their intention to purchase durable goods over the next 12 months:

How likely are you to make major purchases over the next 12 months?

1/Very likely 2/Fairly likely 3/Not likely 4/Not at all likely 9/Dont know

A third question isolates the intention to buy a car over the next 12 months:

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

1/Very likely 2/Fairly likely 3/Not likely 4/Not at all likely 9/Dont know

Finally, in addition to these questions on households' own durable consumption, there is also a question on whether the household think it is the right time for people in general to make major purchases of durable goods. The exact wording is the following:

In view of the current general economic situation, do you think now is the right time for people to make major purchases (such as furniture, washing machines, electronic or computer equipment ...)?

1/Yes, now is the right time 2/It is neither the right time nor the wrong time 3/No, it is the wrong time 9/Dont Know.

As illustrated in Appendix Table A, non-response rates are very low for the questions regarding one's household own consumption (less than 1% in general). There is less frequent answer to the questions on the right time to make purchases of durable goods in general (the non-response rate is about 5%). Surveys used in several recent works assessing the impact of households' inflation expectations on households' consumption decisions often only provide information on whether households think that the time is the right time to make purchases of durable goods (see for instance Bachmann et al. [2015] or Duca et al. [2018]). Having access to information on households' own consumption decision is better suited to that exercise, even though one can expect that answers to the two questions are positively correlated. Questions on households' own durable consumption can be found in the Japanese survey (see Ichiue and Nishiguchi [2015]) but

only in terms of growth rates. The New-York Fed survey asks about quantitative growth rate of own overall consumption (see Armantier et al. [2015]; Crump et al. [2018]).

3 Some Stylized Facts On Inflation Expectations and Consumption Decisions

In this section, we report some stylised facts on both inflation expectations and durable good consumption in the French survey of households.

3.1 Inflation Expectations

One first finding which is often reported using this type of survey data is that the average expected inflation rate overestimates the actual inflation rate. Table 1 reports the average expected inflation rates: the average inflation expectation is 2.8% whereas the average inflation rate over the sample period is about 1.5%. This overestimation is much smaller when we consider the median expected inflation instead of the mean, suggesting that very large - non-plausible - inflation expectations (larger than 20%) contribute a lot to this overestimation when we use the mean expected inflation rate.⁶

However, a second finding is the strong correlation between the actual inflation rate and the average expected inflation. Figure 1 plots the average and the median of inflation expectations (calculated date by date over all households) and the actual headline inflation rate. The correlation between the average expected inflation rates and the actual headline inflation rate is about 0.8. Part of this correlation comes from large fluctuations of energy prices but even when we exclude energy prices, this correlation is still quite strong (about 0.6).⁷ When we look at dynamic correlations (Figure 2) between

⁶In the Appendix, Table D shows that the difference between average expected inflation decreases quite rapidly when we exclude large inflation expectations.

⁷Excluding large inflation expectations does not modify this strong correlation between average expectation and actual inflation, see Appendix, Figure A and Table D.

the average expected rate of inflation with the actual headline or core inflation rates, the maximum correlation of average expectation with inflation is obtained for dates $t - t + 1$. If we consider inflation excluding energy, the largest correlation is obtained for dates between $t + 3$ and $t + 6$. This evidence suggests that expected inflation contains some information on future inflation rates.

A third stylised fact is the asymmetry in the cross section distribution of individual inflation expectations (Figure 12). A very small share of households reports negative inflation rates (about 1% of all households, Table C in Appendix) and the share of negative inflation remains quite constant over time.⁸ About one third of households reports “stable prices” (i.e. a zero-inflation) as expected inflation. This pattern of the distribution is also observed in other surveys like the Michigan survey for the US.⁹ Another characteristic of this distribution is the presence of several peaks in the distribution for values of expected inflation equal to 5, 10, 15, 20 (overall, a little more than 20% of answers).

A last finding is that over time, the proportion of answers equal to 0 but also the proportion of rounded answers are pretty well correlated to the actual inflation rate. The correlation between the actual inflation rate and the proportion of stable prices is about -0.7 for expected inflation (Table 1). Figure 3 plots the average proportion of answers ‘stable prices’ against inflation. The relation is quite non-linear: the proportion of “stable prices” quickly decreases when the actual inflation rate goes from 0 to 2% but for higher levels of inflation, the curve is flatter. On the contrary, the average non-zero inflation expectation is rather flat for inflation between 0 and 2% whereas it increases quite sharply when inflation is above 2%.

In Appendix Table E, we have reported similar evidence for the share of rounded numbers (i.e. integers multiple of 5, 10,...): the share of rounded answers is quite corre-

⁸Baqae [2019] provide similar evidence on US data, inflation expectations react less to negative shocks.

⁹The proportion of households answering “stable prices” and so 0% for the expected inflation rate is however much smaller 13% but 72% of households expect inflation to go up and 11% to go up at the same rate.

lated with inflation (0.7 to 0.8) whereas the average rounded number is not and the share of non-rounded numbers is less correlated with inflation than the average non-rounded expected inflation (excluding zeros). Figure 5 reports a quite linear relationship between the share of rounded numbers and inflation. Since rounded numbers are higher than non-rounded numbers, the increase in the share of “rounded” inflation drives the correlation between the average size of inflation expectations and the actual rate of inflation (Figure 5).

We finally calculate contributions of the share of answers reporting a positive inflation (i.e. extensive margin) and of the average non-zero inflation expectation (i.e. intensive margin) to time variations of the aggregate expected inflation. Figure 6 plots the result of this simple calculation: the extensive margin matters a lot for variations of the aggregate inflation expectation, in particular when the average inflation expectation is below its long-run average. When we decompose the intensive margin between contribution of non-plausible values (i.e. multiple of 5) and other values (Figure 7), we find that the contribution of implausible values of inflation expectations transits mainly through the share of households reporting answers equal to multiple of 5. However, this share contributes only a little to overall time variation of aggregate inflation expectation.

To sum up, households’ inflation expectations are very heterogeneous and upward biased on average. However, variations in the average inflation expectation of households is correlated with realized inflation and also signals future inflation movements. An important component in these variations of the average inflation expectation is variations in the share of households answering positive vs zero inflation. As we will see later on, fluctuations in this extensive margin in average inflation expectation is quite important to understand the link between expected inflation and consumption decisions.

3.2 Consumption of Durable Goods

The survey asks households about their consumption of durable goods and more specifically “major purchases” of furniture, washing machines, electronic or computer equipment. The answers to the question are only qualitative so that we observe whether households have decided to adjust their stock of durable goods (beyond depreciation) or not. However, we do not observe the amount of money spent by households.

There are several interesting aspects in this households’ consumption variable. First, as emphasized recently by Berger and Vavra [2015], durable goods consumption is the most important driver of total consumption fluctuations over the business cycle. In actual aggregate French household data, durable consumption represents about 25% of the overall consumption and 50% of manufactured good consumption (i.e. when we exclude food, energy products).¹⁰ Moreover, as illustrated in Figure 8, the annual growth of durable consumption is much more volatile than the growth of overall consumption. Combining these two empirical properties makes durable consumption contributing strongly to the pro-cyclicality of aggregate overall consumption. Second, as durable consumption is a lumpy decision, a large share of aggregate consumption variations comes from variations in the frequency of purchases of durable goods [Berger and Vavra, 2015]. Third, as emphasized by Alvarez et al. [2012], information on durable consumption choices gives a way to assess the importance of transaction cost as opposed to information costs in the transmission of macroeconomic fluctuations.

Looking at summary statistics, one observes that only a minority of households made major purchases over the past 12 months (about 31%), a similar observation can be made for planned purchases (only 21% of households are likely to make major purchases over the next 12 months), car purchase (12% of households) or on their opinion about the right time to make large purchases (15%) (Table 2). This result is consistent with infrequent

¹⁰Within durable goods, a little more than 50% consists of transport equipment (mainly cars), 35% of housing equipment (electronic devices, computers, furniture, household appliances), and 15% of other durable goods (clocks, jewelry, glasses...).

durable purchases. In Appendix Table F reports some simple statistics on household spending in durable goods (including home appliances, TV, computers, phones, furniture but excluding cars) in France for the years 2005 and 2011 (overall and by category of products): only 60% of households report durable spending. Among households reporting durable spending, the median amount is a little less than 750 euros. This implies that about 30% of households reports durable consumption of more than 750 euros (which would correspond to the threshold for 'large purchases' in the household survey). For the US, Berger and Vavra [2015] find that on average, a little more than 10% of households adjust their durable consumption during the year but their measure only includes housing and cars, extending the coverage to furniture or electronic equipment should increase this probability.

Over time, the proportion of households answering they made major purchases is quite correlated with the annual growth of consumption (Table 2). The correlation is even larger when we consider the annual growth of durable consumption excluding transport equipment. This is consistent with the fact that a large share of aggregate consumption variations comes from variations in the frequency of purchases of durable goods as emphasized in [Berger and Vavra, 2015].

Figures 9 and 10 plot the dynamic correlation between actual durable consumption growth rate and the share of individuals answering positively to survey questions on consumption. The correlation between aggregate durable consumption growth is a little higher for the lagged series of past own purchase decisions whereas for the question "Right time to purchase", the maximum correlation with aggregate consumption growth is obtained at $t + 6$, suggesting that the question 'right time to purchase' captures better intentions of future purchases. The main conclusions are quite similar if we look at the correlation with aggregate consumption growth excluding transport equipment.

4 The Impact of Inflation Expectations and Durable Consumption Decisions

In this section, we use empirical micro-econometric models to relate decision to make major purchases with inflation expectations of households. Our main objective is here to provide evidence on the empirical relevance of the Euler equation. The Euler equation predicts that higher expectations of inflation for tomorrow would affect positively consumption at date t : all other things equal, when the representative agent expects higher prices for tomorrow, he will substitute intertemporally and consume more today than tomorrow. The standard Euler equation can be written as:

$$c_t = E_t c_{t+1} - \sigma^{-1}(i_t - E_t \pi_{t+1}) \quad (1)$$

where $c_{i,t}$ is the log consumption at date t , $E_t c_{i,t+1}$ is the expected consumption at date $t + 1$, i_t the nominal interest rate and $E_t \pi_{t+1}$ the expected inflation rate.

One should note that the questions on consumption are qualitative, we have information on the decision to buy durable goods but not about the overall spending. This implies that we are not able to recover directly from our estimates the structural parameters of this Euler equation. However, assuming that aggregate variations in durable spending mainly comes from the extensive margin (i.e. more households buying durable goods) rather than the intensive margin (i.e. households spending more), we can extract from these questions important evidence on the relevance of the Euler equation. To obtain aggregate structural parameters from our qualitative information, it would require to aggregate lumpy individual decisions of durable spending.

4.1 Empirical Model

Our empirical model will consist of estimating the marginal effect of expected inflation on the individual decision to make major purchases. For that, we will use cross sectional differences between households in terms of consumption decision and inflation expectations. We will link individual answers to the question on the decision to buy durable goods over the last 12 months to the expected decision to buy durable over the next 12 months and expected inflation rate over the next 12 months.

Following most of the recent literature, we here estimate non-linear models. In this type of model, we assume that there is a unobserved continuous variable (that would have been observed if the durable consumption was a continuous process and not a lumpy decision) c_{it}^* (household i and date t). The latent variable c_{it}^* is unobserved and we only observe the discrete survey answers c_{it} which is the decision to buy durable goods over the last 12 months. This question has only two outcomes Yes or No and we can treat this variable as a binary process.

$$c_{it} = \begin{cases} = 1 & \text{if } c_{it}^* > 0 \\ = 0 & \text{otherwise} \end{cases} \quad (2)$$

The latent variable c_{it}^* will depend on several determinants: the expected decision to buy durable goods tomorrow (over the next 12 months), the expected inflation rate over the next 12 months but also several controls. Overall, we can write this unobserved consumption process as:

$$c_{it}^* = \alpha + \beta E_t(\pi_{it+1}) + \gamma E_t(c_{it+1}) + \nu x_{it} + \lambda_t + \mu z_i + u_i + \epsilon_{it} \quad (3)$$

where $E_t(\pi_{it+1})$ is the inflation expectation formed at date t for the period $t + 1$ by household i , $E_t(c_{it+1})$ is the qualitative answer to the question about the household's own plan to make major purchases over the next 12 months (this variable takes 4 values,

'Very likely' 'Fairly likely'; 'Not likely'; 'Not at all likely'), x_{it} is a set of controls which will include households answers to other questions on the macroeconomic environment (unemployment, general French economic situation (past and future), living standard in France (past and future)) and also their personal plans (plan for buying durable goods) and financial situation (past, current and future) and we also include the household inflation perception π_{it}^p , λ_t are fixed time effects controlling for all aggregate variations, z_i is a set of household observed controls such as age, composition of the household, job occupation, income, working regime, education, gender, region, city size and u_i a random household effect.

We estimate Probit or Ordered Probit models to obtain parameter estimates of the latent variable using maximum likelihood technique, and we allow for potential heteroscedasticity in the error term. We then report marginal effects obtained from this model and estimated at the mean, marginal effects are reported for values corresponding to a positive decision to make purchases. Marginal effects should be read as the effect (in pp.) of a 1% deviation of an exogenous variable on the probability to answer positively to have made major purchases over the last 12 months.

In this model, we investigate the role played by non-linearities in the inflation expectation process. For that, we test different measures of inflation expectations. First, we introduce the quantitative answer for inflation expectations without any restriction on implausible values of inflation expectations, we then introduce quantitative inflation expectation but in interaction with a dummy variable equal to 1 if the inflation value is below 10% (considering that higher answers are implausible), then we have recoded the quantitative variable into a qualitative variable taking 6 values: below 0, 0%, between 0 and 3%, between 3 and 5%, between 5 and 10% and higher than 10%. We also use qualitative questions on inflation expectations: we first consider a dummy variable equal to 1 if the household answers "stable prices" to the question on future development of inflation, then we have considered the qualitative variable with the five values "Increase

more rapidly”, ”Increase at the same rate”, ”Increase at a slower rate”, ”Stay about the same”, and ”Fall”.

In our baseline model, the endogenous variable is the answer to the question on durable spending over the last 12 months. We also estimate non-linear models using as endogenous variable answers to other questions related to consumption. In particular, we will consider the variable ”Do you think it is the right time for people to make major purchases”; this variable takes three values, Yes (2), Neutral (1) and No (0). In a third model, we will consider the variable ”Over the next 12 months will you make major purchases” which takes four values: ’Very likely’ (3) ’Fairly likely’ (2); ’ Not likely’ (1); ’Not at all likely’(0). In a last model, we use as endogenous variable the answer to the question ”Over the next 12 months, will you buy a car?”. This variable takes 4 values like for expected spending.¹¹ We will assume that choices are ordered and the relationship between $c_{i,t+1}^*$ and $c_{i,t+1}$ is the following:

$$c_{i,t+1} = \begin{cases} = 2 & \text{if } c_{i,t+1}^* > z_2 \\ = 1 & \text{if } z_1 < c_{i,t+1}^* < z_2 \\ = 0 & \text{if } c_{i,t+1}^* < z_1 \end{cases} \quad (4)$$

where z_j are estimated thresholds.

In our baseline model, we will also investigate the heterogeneity across households of the link between consumption and inflation expectations. For that, we use observable characteristics of households like age, gender... but we also group households according to their degree of attentiveness to inflation. For that, we divide all households into two groups depending on their attentiveness to inflation. For that, we use their inflation perceptions and consider that a household is inattentive to inflation if his perceived inflation is a multiple of 5 and attentive if this household never answers a multiple of 5 for her quantitative perceived inflation. We also propose an alternative grouping considering

¹¹In all three models, we use the answer to the question on durable spending over the last 12 months as control variable.

a group of households where households are attentive to inflation if they have answered at least once a perceived inflation close to the actual inflation, the other group consists of households having never answered a perceived inflation close to the actual inflation rate. Finally, we run regressions by year to test whether the effect of inflation expectations on consumption decisions has moved over the sample period. In particular, we would like to test whether the effect of inflation expectations is stronger during the ZLB period.

4.2 Main Results

Table 3 reports our baseline results when we use the question on household purchases of durable goods over the last 12 months as a proxy for consumption decision. We find no significant effect of expected inflation on the decision to buy durable goods when we consider all answers to the question about inflation expectations (even implausible ones).¹²

When we consider only answers below 10%, we find a positive and significant effect of expected inflation on the decision to buy durable goods. However, this effect is rather limited a 1% increase in inflation expectations raises the probability of buying durable goods by about 0.2 pp. Besides, after having re-coded the quantitative inflation expectation into a qualitative variable, we find that the positive relationship between consumption decision and inflation is highly non-linear: the propensity to consume is higher when inflation expectations are higher but it is far from being linear. Compared to answering stable prices, the probability to adjust the stock of durable goods is higher by about 1.2 to 1.5 pp when inflation expectations are between 0 and 10%. However, the effect of higher inflation expectations is not different when the household answers a value between 0.5 and 3% or a value between 5 and 10%. Finally, answering a value larger than 10% has the same effect on consumption decision as answering "stable prices".

¹²In Appendix Table B, we report results on the determinants of answering inflation expectations higher than 10%. Low-income households, less educated households, younger people, women are more likely to answer that their inflation perception/expectation exceeds 10%

These strong non-linearities are confirmed when we use the qualitative variable. When the household expects something different than stable prices, she is more likely to make major purchases. In that case, the probability of making major purchases is higher by about 1 pp compared to the case where the household answers "stable prices". If we look at the different values of the qualitative variable, we do not find a monotonic relationship. Overall, the main effect of inflation expectations on durable good consumption comes through an extensive margin of inflation expectations. Households are more likely to consume when they expect "non-stable" prices but the propensity to consume is less sensitive to the value of inflation when they expect a positive inflation.

If we now compare these results to alternative proxies for consumption, we find rather similar evidence even if the magnitude of the effects is smaller. In Table 4, we report the results of the Ordered Probit regression using the question "Do you think it is the right time for people...". We find a small positive but non-significant effect of the quantitative inflation expectation on the probability to answer Yes to the question. Once we have re-coded the quantitative variable into a qualitative one, we find again the positive effect of positive inflation expectations on the probability to answer that it is the right time to make major purchases. As before, we find that the main effect of inflation expectations is coming from the fact that households expect a positive inflation instead of answering "stable prices". In Tables 5 and 6, we have reported results for questions on plans to make major purchases and plans to buy a car and we find similar and robust evidence: a positive effect of inflation expectations on consumption decisions but coming mainly from expecting a positive inflation versus stable prices.

4.3 Heterogeneity

We run different types of exercises to test the heterogeneity of the response of consumption to inflation expectations across households.

First, we run the same regressions as in our baseline exercise but for different groups

of households defined by socio-demographics observed characteristics. Table 7 reports the main results. Looking at the results associated with the question "Did you make large purchases over the 12 past months?", we find first a stronger effect of inflation expectations for women, even if the difference is not statistically different for the two groups. We also find that inflation expectations have a significant effect on the probability to make large purchases for people aged between 30 and 64 years old, whereas the effect is not different from zero for the youngest and the oldest households. We also find a stronger effect for educated people and we obtain that the impact of inflation expectations is higher for households whose income is above the median. This heterogeneity is rather the same whether we use quantitative inflation expectations as a regressor or a dummy variable for "stable prices". When we consider the answer to the question "Is the Right Time for People to Make Large Purchases?", the impact of inflation expectations is often non-significant, the only household categories for which inflation expectations have a significant effect are women and households aged of more than 65 years old.

To test whether this heterogeneity is related to limited attention to inflation or cognitive limitation, we define household categories based on what they answer to the quantitative question on inflation perceptions. We consider that a household is inattentive to inflation if his/her perceived inflation is a multiple of 5 and attentive if this household never answers a multiple of 5 for her quantitative perceived inflation. In Table 8, we report marginal effects for the two groups, the impact of quantitative inflation expectations is a little bit higher for households who do not perceive inflation as a multiple of 5. Differences between the two groups are even stronger when we look at the qualitative variables. However, differences are not statistically different between the two groups. Looking at the results obtained with a slightly different grouping (where we consider a group of households where households are attentive to inflation if they have answered at least once a perceived inflation close to the actual inflation), we find quite similar results: households which are more attentive to actual inflation are more reactive to changes in

inflation expectations.

In Table 9, we have reported the same type of analysis using the answer to the question "Is it the right time for people to make large purchases?", results are broadly similar even if the magnitude of the reaction of consumption to inflation expectations is more limited. Overall, we find that the consumption decision of households whose inflation perceptions are closer to actual inflation is more sensitive to a change in inflation expectations.

Finally, we investigate the heterogeneity of the effects of inflation expectations on consumption decisions over time. For that, we estimate our models year by year. Figure 11 reports the main results. First, we find that the effect of quantitative inflation expectations on the decision to make large purchases has increased since 2014 which corresponds to the ZLB period. However, looking at the qualitative variable "stable prices", the effect is rather stable over the sample period. On Figure 12, we have reported the marginal effects associated with the qualitative variable and also marginal effects when we consider only observations with non missing values for expected inflation or observations excluding outliers. Doing so, we find again a stronger effect of inflation expectations over the recent period.

When we consider the answer to the question "Is it the Right to Purchase Major Purchases?", we do not find such a stronger effect. The response of consumption to the quantitative inflation expectations is quite flat and non-significant all along the period. Looking at the qualitative variable on expected inflation, we also find a quite flat effect which is stronger when we consider only observations with non-missing values and no implausible values for expected inflation.

5 Conclusion

In this paper, we have documented new facts on inflation expectations and on the link between inflation expectations and consumption decisions. For that, we have used a large

micro data set containing more than 300,000 individual answers to a monthly French survey on household expectations over the period Jan. 2003 - Dec. 2017.

We first find that the share of households expecting a positive inflation rate over the next 12 months (i.e. the extensive margin) contributes strongly to time variations of the aggregate inflation expectations. We also find that the share of households answering implausible values (multiple of 5) also contributes to time variations of the aggregate inflation expectation but to a much smaller extent.

We do find a positive link between inflation expectations and decisions to buy durable goods at the household level. This positive link is mainly driven by households moving from expectations of stable prices to positive inflation expectations. The main effect of inflation expectations on durable good consumption comes through the extensive margin of inflation expectations. On the contrary, conditional of reporting a positive inflation expectation, the marginal effect of a higher inflation expectation has almost no effect on the propensity to buy durable goods today.

We also find that this effect of inflation expectation is quite heterogeneous across households: it is stronger for men than for women, for higher income households and also for middle-aged households. We also obtain that households having more accurate inflation perceptions are associated with a higher correlation between inflation expectations and consumption decisions. We do not find large variations over time of this correlation between inflation expectations and consumption decisions.

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Tables

Table 1: Simple Statistics on Inflation Expectations

	Aggregate Moments	Correlation with Headline π π excl. Energy	
Average Expectation	2.81 (0.66)	0.79	0.57
% of Stable Prices	0.33 (0.11)	-0.66	-0.36
Average of non-zero inflation	4.17 (0.47)	0.68	0.69

Note: In this table, we report simple statistics calculated using individual answers to the quantitative question on inflation expectations. We first calculate statistics date by date and then compute the average of this time series. The first column reports simple average of the time series. Second and third columns report correlation coefficients of the aggregate moment calculated date by date and the headline CPI inflation (source Insee) and CPI inflation excluding energy (source Insee). "Average" is the simple average of all answers (including zeros) to the quantitative question. "% of Stable Prices" is the average proportion of answers exactly equal to 0. "Average of Non-Zero Inflation" is the average of inflation expectations when not equal to 0.

Table 2: Stylised Facts on Durable Consumption

	Freq. (in %)	Overall Conso.	Correlation with Durable Consumption		
			All	Cars	excl. Cars
Own Major Purchases - Past 12 Months					
Yes	0.31	0.40	0.45	0.18	0.54
No	0.69	-0.40	-0.45	-0.18	-0.54
Right Time to Purchase					
Yes	0.15	0.43	0.45	0.52	0.18
Neutral	0.50	0.64	0.65	0.42	0.68
No	0.35	-0.67	-0.70	-0.58	-0.56
Own Major Purchases - Next 12 Months					
Very likely	0.11	0.55	0.61	0.39	0.63
Fairly likely	0.10	0.37	0.33	0.39	0.13
Not likely	0.21	-0.19	-0.21	0.02	-0.41
Not at all likely	0.57	-0.14	-0.14	-0.27	0.08
Car - Next 12 Months					
Very likely	0.05	0.44	0.54	0.42	0.47
Fairly likely	0.07	0.42	0.48	0.42	0.35
Not likely	0.08	-0.05	-0.08	0.04	-0.19
Not at all likely	0.80	-0.21	-0.23	-0.28	-0.09

Note: in this table we report simple aggregate statistics using the answers to the questions on durable consumption. We first compute the average proportion of answers in every answer category date by date and then compute the average of these time series. The first column reports the average proportion of answers in a given category. The other columns report correlation over time of the proportion of answers in a given category and annual growth rate of: col 2. overall monthly consumption (source Insee), col 3. durable expenditures (overall), col 4. Car and Transport Equipment expenditures, col 5. durable expenditures excluding cars (source Insee).

Table 3: Marginal Effects of Inflation Expectations on Own Major Purchases Over the Last 12 Months

	(1)	(2)	(3)	(4)	(5)	(6)
<u>π^e Quantitative</u>						
All	0.007 (0.025)					
Less than 10%		0.191*** (0.059)				
By intervals:						
[10%; + ∞ [0.167 (0.526)			
[5%; 10%[			1.490*** (0.460)			
[3%; 5[			1.240*** (0.470)			
]0%; 3%[			1.200*** (0.434)			
0%			Ref.			
< 0%			-0.304 (1.320)			
<u>π^e Qualitative</u>						
Stable				-0.781*** (0.194)		
Stable (π_{quanti}^e non-missing)					-1.020*** (0.308)	
By intervals:						
Increase more rapidly						1.580*** (0.324)
Increase at the same rate						0.677*** (0.214)
Increase at a slower rate						1.360*** (0.271)
Stay about the same						Ref.
Fall						0.772 (0.737)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	130,070	130,070	130,070	305,097	130,070	305,097

Note: In this table, we report marginal effects from Probit regressions where the endogeneous variable is a dummy variable equal to 1 if the household 'YES' to the question "Have you made major purchases during the last 12 months?". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

Table 4: Marginal Effects of Inflation Expectations on the Right Time to Make Major Purchase

	(1)	(2)	(3)	(4)	(5)	(6)
<u>π^e Quantitative</u>						
All	0.000 (0.015)					
Less than 10%		0.043 (0.036)				
By intervals:						
[10%; + ∞ [-0.164 (0.313)			
[5%; 10%[			0.700*** (0.270)			
[3%; 5[			1.060*** (0.277)			
]0%; 3%[			0.799*** (0.253)			
0%			Ref.			
< 0%			-0.024 (0.846)			
<u>π^e Qualitative</u>						
Stable				-0.254*** (0.114)		
Stable (π_{quanti}^e non-missing)					-0.547*** (0.181)	
By intervals:						
Increase more rapidly						0.041 (0.193)
Increase at the same rate						0.313*** (0.123)
Increase at a slower rate						0.815*** (0.160)
Stay about the same						Ref.
Fall						0.381 (0.479)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	127,541	127,541	127,541	293,387	127,541	293,387

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'Not a favorable moment', 2 'Neutral', 3 'Favorable moment' to the question "Is the right time for people to make large purchases?". Marginal effects are calculated for the value "Favorable moment". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

Table 5: Marginal Effects of Inflation Expectations on Own Major Purchase over the Next 12 Months

	(1)	(2)	(3)	(4)	(5)	(6)
<u>π^e Quantitative</u>						
All	0.028** (0.013)					
Less than 10%		0.114*** (0.031)				
By intervals:						
[10%; + ∞ [0.707** (0.278)			
[5%; 10%[			0.872*** (0.239)			
[3%; 5[			0.550** (0.241)			
]0%; 3%[			0.576*** (0.219)			
0%			Ref.			
< 0%			0.947 (0.724)			
<u>π^e Qualitative</u>						
Stable				-0.192** (0.090)		
Stable (π_{quanti}^e non-missing)					-0.625*** (0.157)	
By intervals:						
Increase more rapidly						-0.290* (0.151)
Increase at the same rate						0.341*** (0.094)
Increase at a slower rate						0.721*** (0.128)
Stay about the same						Ref.
Fall						0.319 (0.355)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	130,070	130,070	130,070	305,498	130,070	305,498

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'no, definitely not', 2 'no, probably not', 3 'yes, maybe' 4, 'Yes, definitely' to the question "Do you intend to make major purchases in the next 12 months?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

Table 6: Marginal Effects of Inflation Expectations on Consumption - Planned Car Purchase

	(1)	(2)	(3)	(4)	(5)	(6)
<u>π^e Quantitative</u>						
All	0.007 (0.008)					
Less than 10%		0.053** (0.021)				
By intervals:						
[10%; + ∞ [0.322* (0.189)			
[5%; 10%[			0.293* (0.162)			
[3%; 5[			0.616*** (0.170)			
]0%; 3%[			0.351** (0.152)			
0%			Ref.			
< 0%			0.829* (0.477)			
<u>π^e Qualitative</u>						
Stable				-0.086 (0.060)		
Stable (π_{quanti}^e non-missing)					-0.396*** (0.107)	
By intervals:						
Increase more rapidly						-0.029 (0.101)
Increase at the same rate						0.108 (0.066)
Increase at a slower rate						0.291*** (0.086)
Stay about the same						Ref.
Fall						0.214 (0.230)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	130,361	130,361	130,361	307,136	130,361	307,136

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'no, definitely not', 2 'no, probably not', 3 'yes, maybe' 4, 'Yes, definitely' to the question "Do you intend to buy a car in the next 12 months?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

Table 7: Marginal Effects of Inflation Expectations on Consumption - HH Heterogeneity

		Own Purchase Past 12 months		Right Time to Purchase	
		(Quanti)	(Quali)	(Quanti)	(Quali)
Gender	Female	0.345*** (0.099)	-0.999*** (0.318)	0.090 (0.058)	-0.708*** (0.181)
	Male	0.101 (0.073)	-0.653*** (0.245)	0.011 (0.045)	0.017 (0.145)
Age	16-29	-0.194 (0.245)	-0.599 (0.954)	-0.142 (0.134)	0.602 (0.519)
	30-49	0.192** (0.095)	-0.746** (0.370)	0.039 (0.048)	-0.152 (0.178)
	50-64	0.257** (0.104)	-1.440*** (0.366)	-0.010 (0.065)	-0.042 (0.213)
	65+	0.144 (0.118)	-0.197 (0.301)	0.197** (0.087)	-0.610*** (0.213)
Education	Primary	0.052 (0.138)	0.244 (0.368)	0.063 (0.093)	-0.259 (0.213)
	Secondary	0.322*** (0.104)	-0.949*** (0.355)	0.106 (0.065)	-0.214 (0.226)
	Further	0.162** (0.082)	-1.100*** (0.293)	0.017 (0.048)	-0.285* (0.227)
Income	< 1Q	0.180 (0.112)	-0.460 (0.340)	0.022 (0.073)	-0.279 (0.213)
	]Q1 – Q2]	0.141 (0.115)	-0.456 (0.379)	0.070 (0.072)	-0.307 (0.226)
	]Q2 – Q3]	0.211* (0.113)	-1.340*** (0.409)	0.059 (0.067)	-0.303 (0.227)
	> Q3	0.209* (0.122)	-0.811* (0.424)	0.027 (0.074)	-0.062 (0.247)

Note: In the two first columns, we report marginal effects from Probit models where the endogenous variable is a dummy variable equal to 1 if the household answers Yes to the question "Did you make major purchases over the last 12 months?", each cell corresponds to the result of model where the sample is restricted to a given category. "(Quanti.)" we include quantitative answer to the question on inflation expectations whereas "(Quali.)" we use a dummy variable equal to 1 if the HH answer "stable prices" to the qualitative question on inflation expectations. In the last two columns, we report from (Ordered) Probit regressions where the endogenous variable is a variable taking 3 different values 1 if the household answers 'no', 2 'neither good nor bad', 3 'yes' to the question "Do you think it is right time for people to make large purchases?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) education, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

Table 8: Marginal Effects of Inflation Expectations on Consumption - Past Purchases - HH Hetero

	Rounders	No Rounders	Attentive infla	Inatt infla
π^e Quantitative	0.151** (0.065)	0.218* (0.119)	0.254*** (0.094)	0.103 (0.067)
π^e Quanti. by intervals:				
[10%; +∞[	0.067 (0.568)	-0.001 (0.176)	0.618 (1.060)	0.023 (0.633)
[5%; 10%[	1.250** (0.546)	1.610* (0.924)	1.780*** (0.646)	1.260* (0.672)
[3%; 5[	0.896 (0.717)	1.490** (0.627)	1.190** (0.536)	1.580 (1.010)
]0%; 3%[	-0.229 (0.813)	1.770*** (0.519)	1.190** (0.464)	1.830 (1.390)
0%	Ref.			
< 0%	0.420 (1.980)	-0.776 (1.760)	-0.418 (1.590)	-0.121 (2.360)
π^e Quali. - Stable	-0.698* (0.374)	-1.220*** (0.342)	-0.995*** (0.308)	-0.985** (0.441)
π^e Quali - by intervals:				
Increase more rapidly	0.623 (0.609)	2.280*** (0.594)	2.240*** (0.530)	0.944 (0.711)
Increase at the same rate	0.544 (0.404)	1.110*** (0.388)	0.947*** (0.345)	0.684 (0.477)
Increase at a slower rate	1.320*** (0.484)	1.320*** (0.494)	1.060** (0.435)	1.860*** (0.567)
Stay About the Same	Ref.			
Fall	-0.790 (1.480)	1.410 (1.260)	0.837 (1.180)	0.123 (1.660)
Controls	Yes	Yes	Yes	
Obs	64,837	65,233	87,682	42,388
Obs	90,179	97,402	122,708	64,873

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'no, definitely not', 2 'no, probably not', 3 'yes, maybe' 4, 'Yes, definitely' to the question "Do you intend to make major purchases in the next 12 months?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

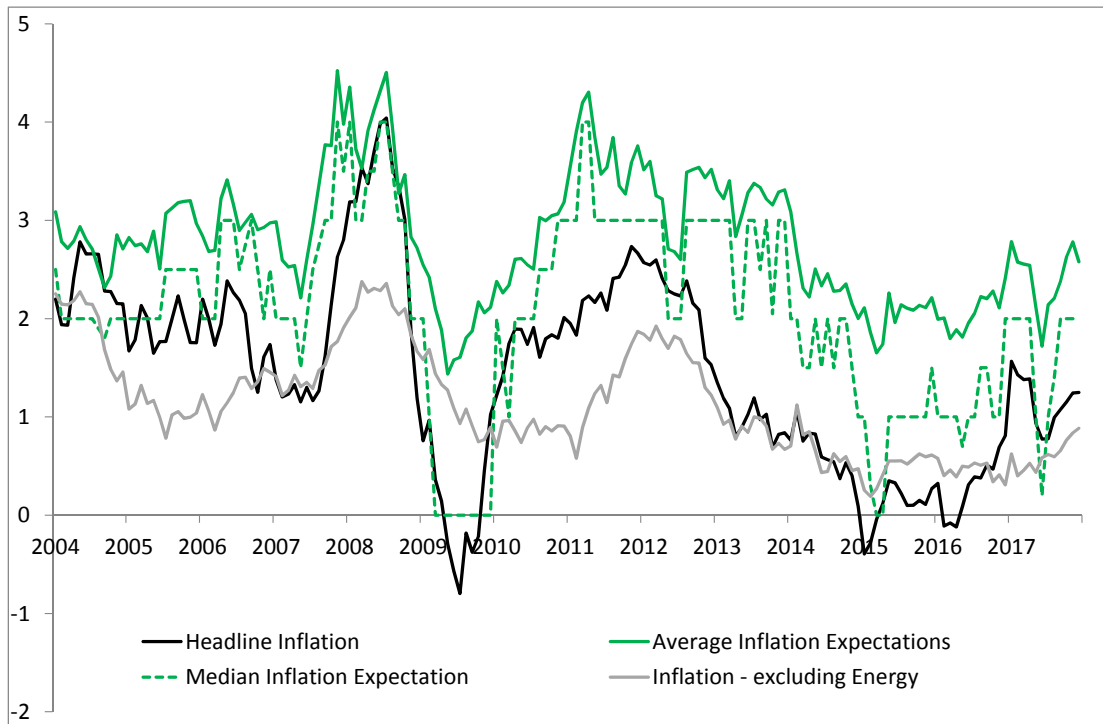
Table 9: Marginal Effects of Inflation Expectations on Consumption - Right Time to Purchase - HH Hetero

	Rounders	No Rounders	Attentive infla	Inatt infla
π^e Quantitative	0.106** (0.036)	0.158** (0.078)	0.159*** (0.060)	0.029 (0.036)
π^e Quanti. by intervals:				
[10%; + ∞ [-0.122 (0.303)	-0.127 (1.170)	0.073 (0.683)	-0.251 (0.322)
[5%; 10%[	0.712** (0.288)	0.421 (0.592)	1.050*** (0.406)	0.436 (0.338)
[3%; 5[	0.717* (0.384)	1.480*** (0.406)	1.330** (0.338)	0.437 (0.511)
]0%; 3%[	0.752* (0.427)	0.904*** (0.334)	0.710** (0.289)	2.490*** (0.739)
0%	Ref.			
< 0%	0.504 (1.170)	-0.286 (1.240)	-0.101 (1.060)	0.205 (1.400)
π^e Quali. - Stable	-0.377* (0.200)	-0.459** (0.222)	-0.534*** (0.195)	-0.220 (0.230)
π^e Quali - by intervals:				
Increase more rapidly	0.141 (0.339)	0.635 (0.394)	0.789** (0.346)	-0.178 (0.383)
Increase at the same rate	0.374* (0.215)	0.425* (0.247)	0.460** (0.215)	0.254 (0.247)
Increase at a slower rate	0.882*** (0.262)	1.010*** (0.325)	0.959** (0.280)	0.831*** (0.297)
Stay about the same	Ref.			
Fall	0.780 (0.901)	0.531 (0.905)	0.472 (0.815)	0.812 (1.010)
Controls	Yes	Yes	Yes	
Obs	64,837	65,233	87,682	42,388
Obs	90,179	97,402	122,708	64,873

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'no, definitely not', 2 'no, probably not', 3 'yes, maybe' 4, 'Yes, definitely' to the question "Do you intend to make major purchases in the next 12 months?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

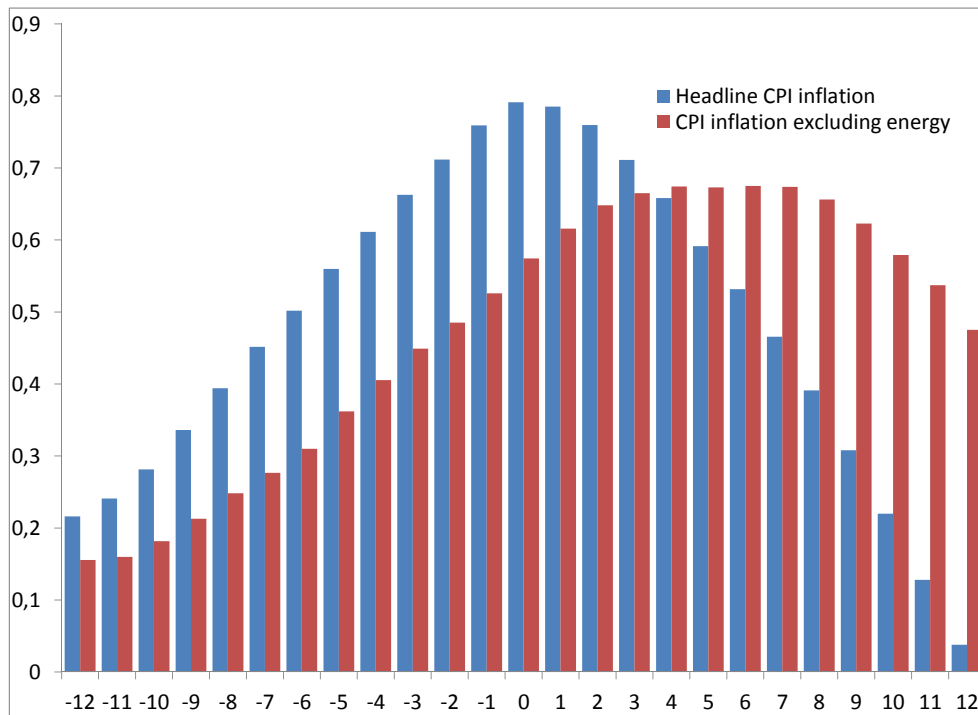
Figures

Figure 1: Expected Inflation and Headline HICP inflation)



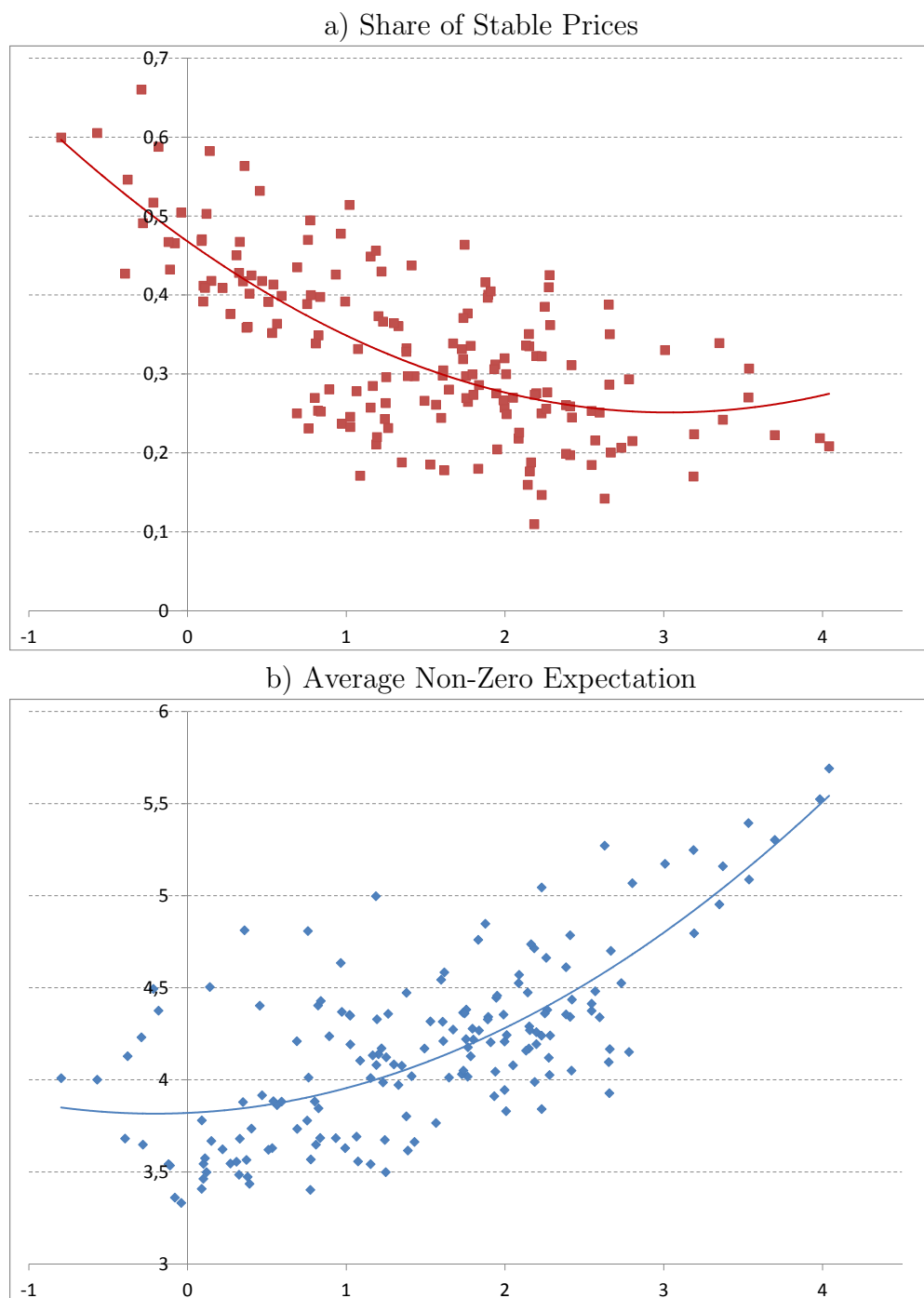
Note: using answers to the quantitative questions on inflation expectations (we have dropped quantitative inflation perceptions larger than 20%), we have computed the simple average/median of all answers date by date. Before 2008, the survey was not conducted in August, in that case, we have replaced aggregate statistics by a simple interpolation between July and September. We have also plotted as benchmarks headline HICP inflation (source Insee) and HICP inflation excluding energy (source Insee).

Figure 2: Dynamic Correlation Between Inflation and Average Inflation Expectation



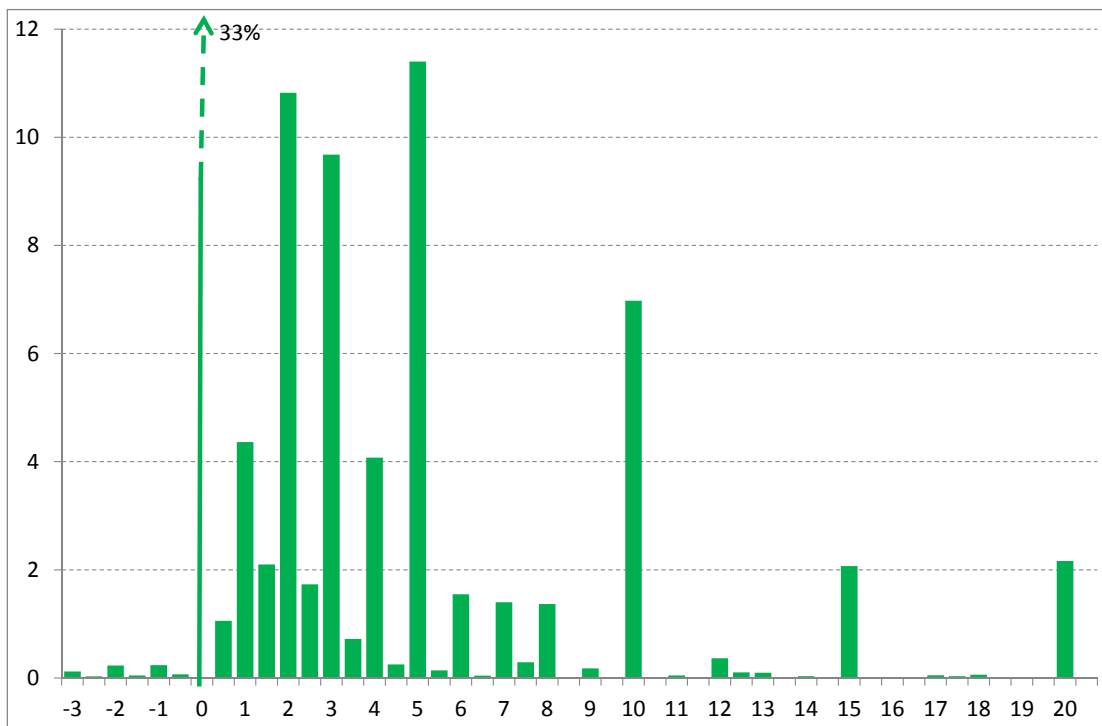
Note: We have first computed date by date the simple average answer to the quantitative questions on inflation expectations. This figure plots the dynamic correlation between the average expected rate of inflation and actual headline CPI inflation / CPI inflation excluding energy. Dynamic correlations are calculated using lagged and forward values of actual inflation (between t-12 months until t+12 months).

Figure 3: Share of Stable Prices, Average Non-Zero Expected Inflation and Headline CPI Inflation



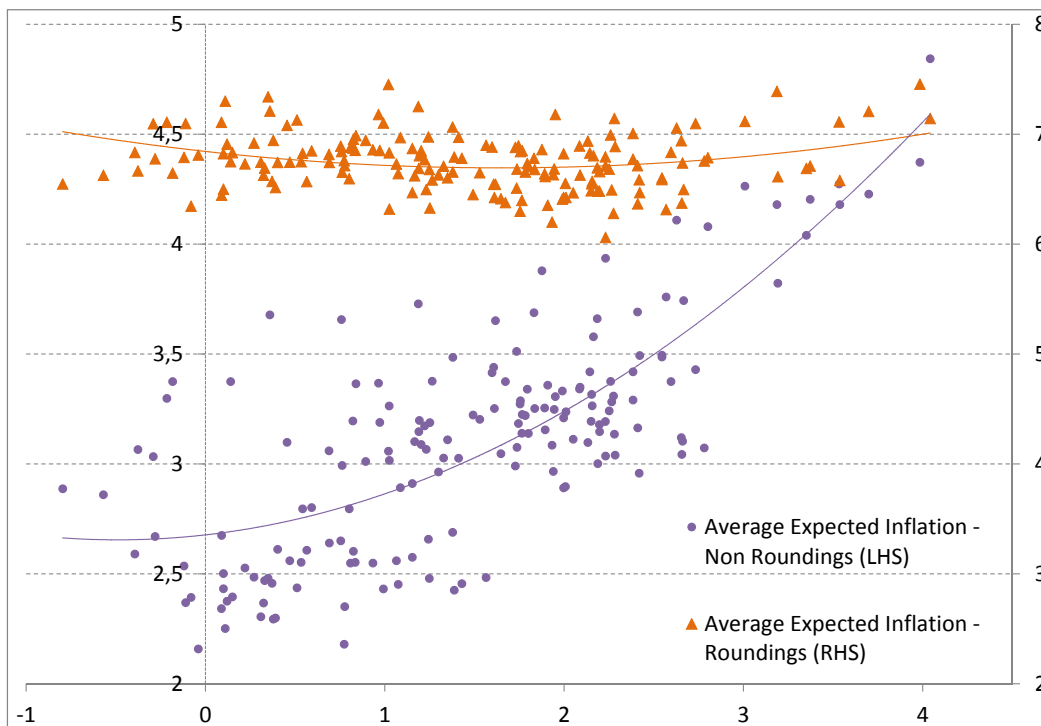
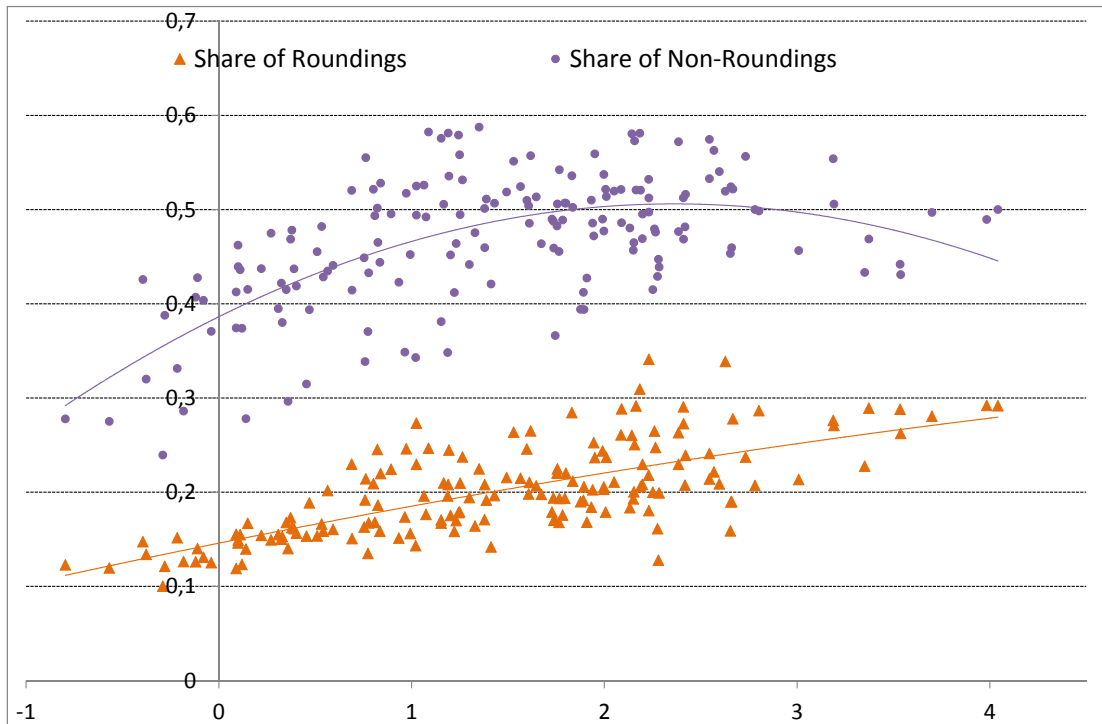
Note: on the top panel, we have first computed date by date the proportion of individuals reporting expected stable prices (i.e. 0% inflation). This figure is the scatter plot of this monthly proportion and headline CPI inflation. In red, each dot represents the share of individual answering expecting stable prices over the next 12 months for a given month (and so inflation rate). The red line is simple polynomial of degree 2 fitting the data. On the panel below, we have computed the average inflation expectation (when individuals do not answer stable prices) date by date. The figure is the scatter plot of this monthly average and headline CPI inflation.

Figure 4: Cross Distribution of Inflation Expectations



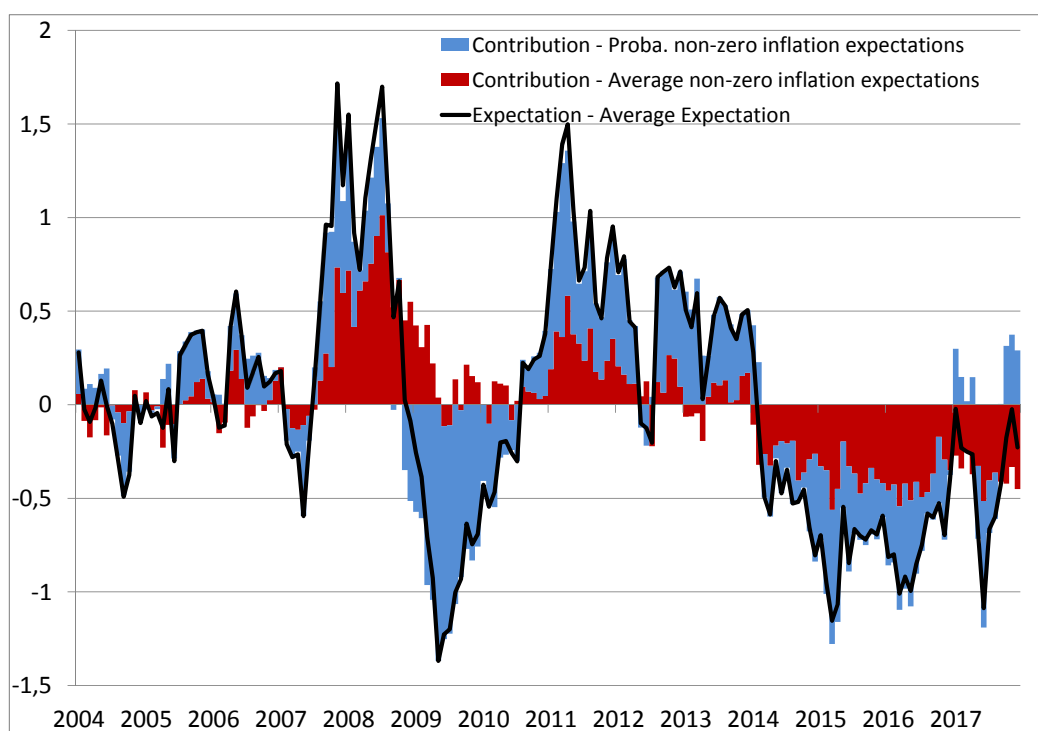
Note: we here represent the distribution of inflation expectations across households computed over the period Jan. 2004 - Dec. 2017. The proportion of answers above 20% is not reported. The distribution is unweighted.

Figure 5: Roundings and Headline Inflation



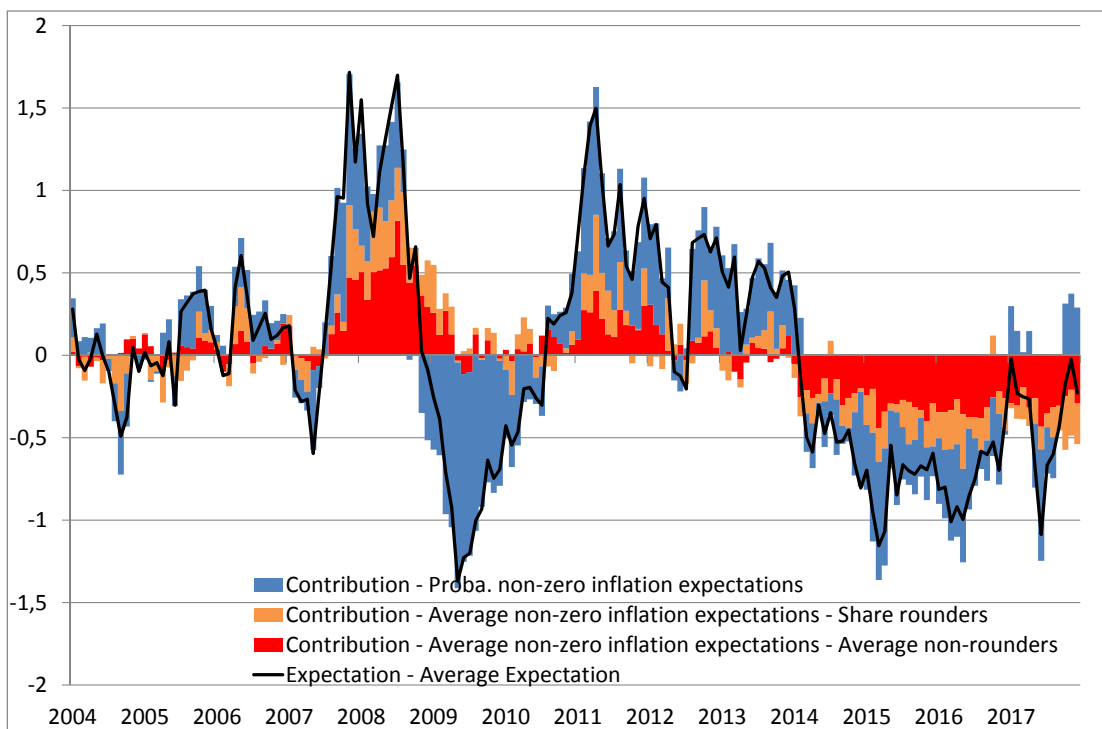
Note: on top panel, we plot the proportion of answers multiple of 5 / share of answers not multiple of 5 versus the headline CPI inflation whereas on the bottom panel we plot the average inflation expectation when households answer a multiple of 5 and the average inflation expectation when households answer something different than a multiple of 5 or a 0 versus headline CPI inflation. These aggregate moments are calculated date by date as simple average across all individuals responding to the question on inflation expectations in the Consumer Expectation Survey (source Insee).

Figure 6: Aggregate Inflation Expectations Decomposition - Extensive vs Intensive Margins



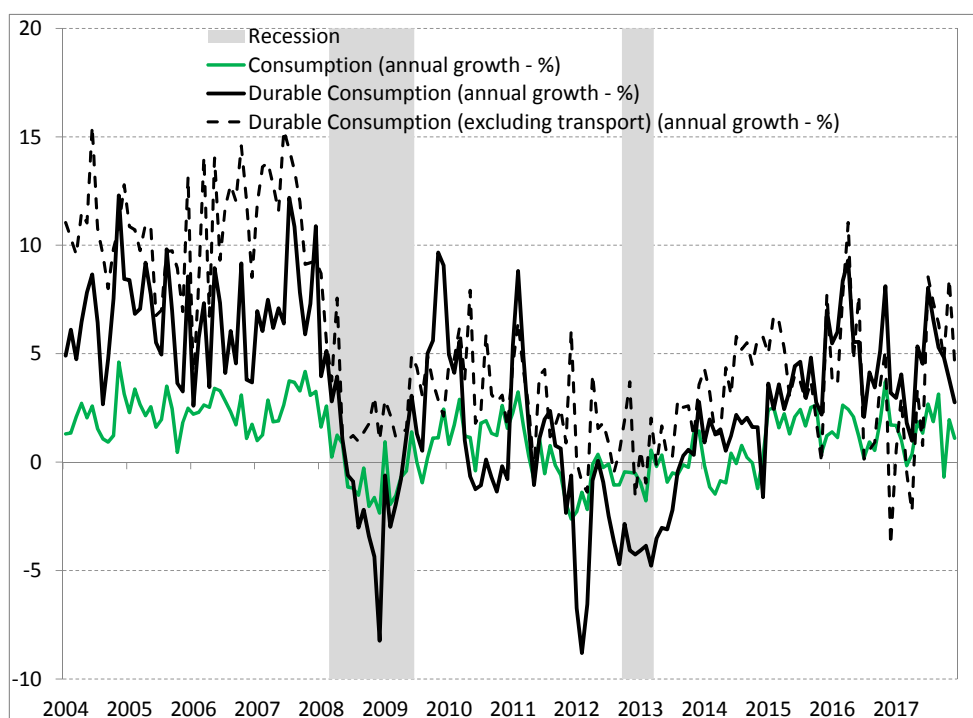
Note: Contributions to aggregate inflation expectations. Black line: aggregate average expected inflation - mean aggregate average expected inflation; blue histogram: contribution of time variations of the probability of non-zero answers (extensive margin); red histogram: contributions of time variations in the average expected inflation (intensive margin).

Figure 7: Aggregate Inflation Expectations Decomposition - Contribution of Implausible Values



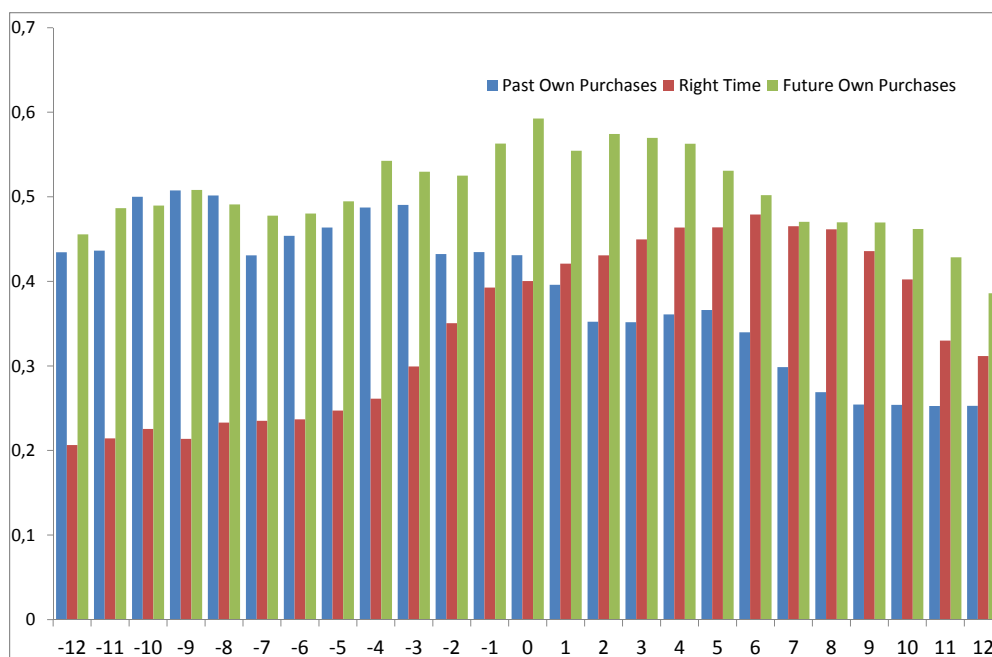
Note: Contributions to aggregate inflation expectations. Black line: aggregate average expected inflation - mean aggregate average expected inflation; blue histogram: contribution of time variations of the probability of non-zero answers; light orange histogram: contributions of time variations of the probability of answers multiple of 5; dark orange histogram: contribution of time variations in the average expected inflation for answers not multiple of 5. The contributions of the share of non-multiple of 5 or the average size of answers multiple of 5 are very small and not reported on this graph.

Figure 8: Aggregate Consumption Growth in France - Total and Durables



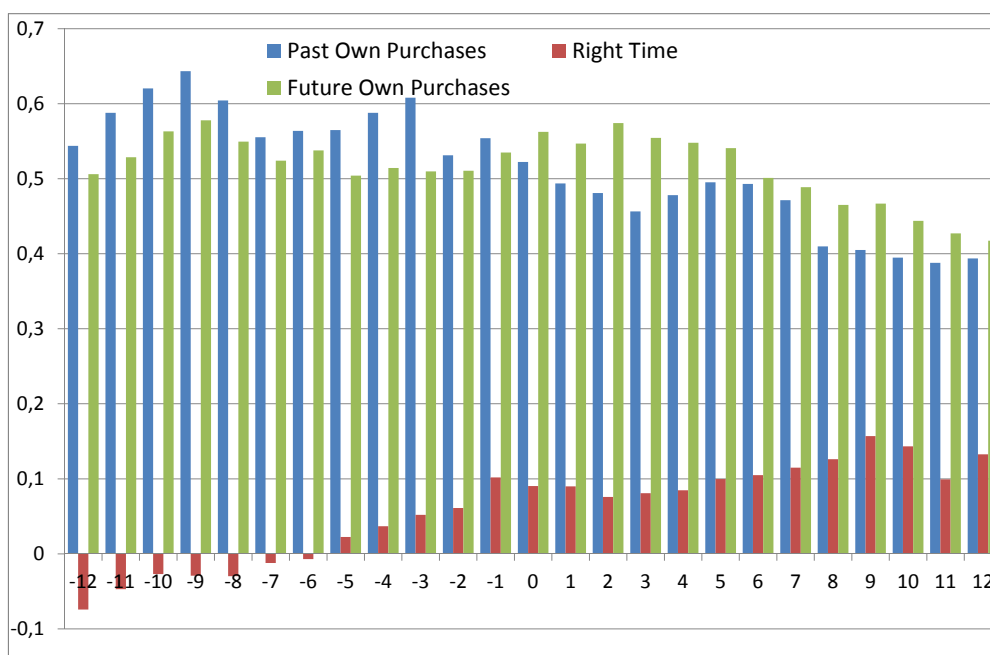
Note: Annual growth rate of household consumption of goods (including, food, manufactured goods and energy), durables (including transport equipment, housing equipment and other durables), durables excluding transport equipment (source Insee)

Figure 9: Dynamic Correlation Between Aggregate Actual Durable Expenditures and Aggregate Answers on Durable Expenditure in the Survey



Note: We have first calculated date by date the proportion of individuals answering: Yes to the question "Over the last 12 months, have you made durable expenditures?", Certainly Yes to the question, "Over the next 12 months, will you make durable expenditures?" and Yes to the question, "Is it the right time to make large expenditures?". Then, we have calculated the correlation between these time-series of share of individuals answering Yes to questions on durable consumption and the annual growth rate of monthly durable expenditures (source Insee). Dynamic correlations are calculated using lagged and forwarded values of the actual growth rate of durable consumption between $t-12$ months and $t+12$ months.

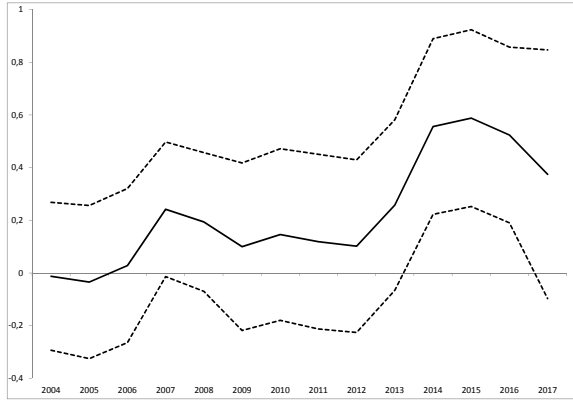
Figure 10: Dynamic Correlation Between Aggregate Actual Durable Consumption (excluding Cars) and Aggregate Answers on Durable Expenditure in the Survey



Note: We have first calculated date by date the proportion of individuals answering: Yes to the question "Over the last 12 months, have you made durable expenditures?", Certainly Yes to the question, "Over the next 12 months, will you make durable expenditures?" and Yes to the question, "Is it the right time to make large expenditures?". Then, we have calculated the correlation between these time-series of share of individuals answering Yes to questions on durable consumption and the annual growth rate of monthly durable expenditures (source Insee). Dynamic correlations are calculated using lagged and forwarded values of the actual growth rate of durable consumption between $t-12$ months and $t+12$ months.

Figure 11: Marginal Effects of Inflation Expectations Over Time

*) Quantitative Expectations

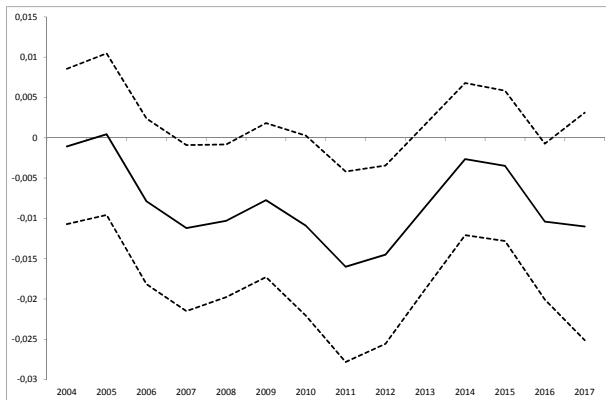


(a) Own Past Purchases



(b) Right Time

***) Stable Prices



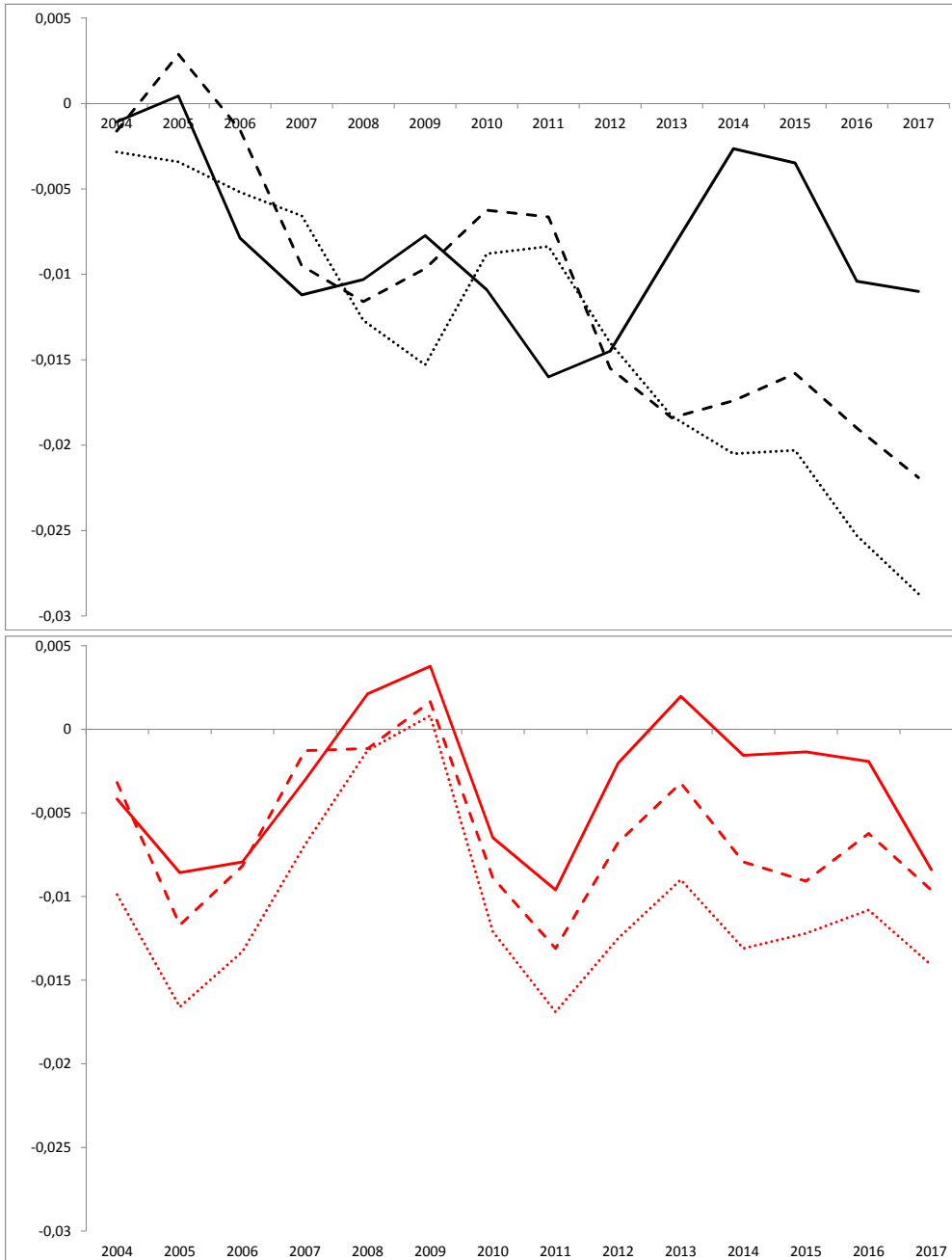
(c) Own Past Purchases



(d) Right Time

Note: In black lines, we report marginal effects from Probit models estimated year by year where the endogenous variable is a dummy variable equal to 1 if the household answers Yes to the question "Did you make major purchases over the last 12 months?"; "Quantitative Expectation" we include quantitative answer to the question on inflation expectations whereas "Stable Prices" we use a dummy variable equal to 1 if the HH answer "stable prices" to the qualitative question on inflation expectations. In red lines, we report from (Ordered) Probit regressions where the endogenous variable is a variable taking 3 different values 1 if the household answers 'no', 2 'neither good nor bad', 3 'yes' to the question "Do you think it is right time for people to make large purchases?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) education, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. Dashed lines corresponds to the 95% confidence intervals.

Figure 12: Robustness Quali over years



Note: In black lines, we report marginal effects from Probit models estimated year by year where the endogenous variable is a dummy variable equal to 1 if the household answers Yes to the question "Did you make major purchases over the last 12 months?"; we use a dummy variable equal to 1 if the HH answer "stable prices" to the qualitative question on inflation expectations. The solid line corresponds to the model where we use all observations; the dashed line only observations for which the quantitative expectation is non-missing; the dotted line only observations for which the quantitative expectation is non-missing and not an outlier. In red lines, we report from (Ordered) Probit regressions where the endogenous variable is a variable taking 3 different values 1 if the household answers 'no', 2 'neither good nor bad', 3 'yes' to the question "Do you think it is right time for people to make large purchases?". Marginal effects are calculated for the value "Yes, definitely".

APPENDIX - Not intended to be published

A Questionnaire

We here provide a translation of the full questionnaire of the survey. all socio demographic questions are only asked during the first interview and are pretty standard (age, occupation, diploma, income, number of members in the HH, marital status, region, city size...), the wording is not reported here. Since the wording of the questionnaire is harmonized across European Union countries, for the questions which are common to all countries, we use the wording of the UK survey (see https://ec.europa.eu/info/sites/info/files/questionnaires_uk_cons_en.pdf), the French version is highly similar. We have grouped questions by general topics (general eco. situation, prices, consumption/saving and own financial situation) and this order does not follow the actual order in which questions are asked to households.

General Economic Situation

Q1. How do you think the general economic situation in France has changed over the past 12 months? It has...

- Got a lot better
- Got a little better
- Stayed the same
- Got a little worse
- Got a lot worse
- Dont Know

Q2. How do you expect the general economic situation in France to develop over the next 12 months? It will...

- Get a lot better
- Get a little better
- Stay the same
- Get a little worse
- Get a lot worse
- Dont Know

Q3. How do you think the quality of life in France, as a whole has changed over the past 12 months? It has...

- Got a lot better
- Got a little better
- Stayed the same
- Got a little worse
- Got a lot worse
- Dont Know

Q4. How do you expect the quality of life in France to develop over the next 12 months? It will...

- Get a lot better
- Get a little better
- Stay the same
- Get a little worse

Get a lot worse

Dont Know

Q5. How do you expect the number of people unemployed in this country will change over the next 12 months? The number will...

Increase sharply

Increase slightly

Remain the same

Fall slightly

Fall sharply

Dont Know

Prices

Q6. How do you think consumer prices have developed over the last 12 months? They have...

Risen a lot

Risen moderately

Risen slightly

Stayed about the same

Fallen

Dont Know

(If answer different than "Stayed about the same" at Q6, ask:)

Q7. By how many percent do you think consumer prices have gone up/down over the past 12 months? Please give an estimate. Record up to one decimal place.

Consumer prices have increased/decreased by XX.X%

Q8. In comparison with the past 12 months, how do you expect consumer prices will develop in the next 12 months? They will...

- Increase more rapidly
- Increase at the same rate
- Increase at a slower rate
- Stay about the same
- Fall
- Dont Know

(If answer different than "Stayed about the same" at Q8, ask:)

Q9. By how many percent do you think consumer prices will go up/down over the next 12 months? Please give an estimate. Record up to one decimal place.

Consumer prices will increase/decrease by XX.X%

Consumption / Savings

Q10. In view of the current general economic situation, do you think now is the right time for people to make major purchases (such as furniture, washing machines, electronic or computer equipment ...)?

- Yes, now is the right time
- It is neither the right time nor the wrong time
- No, it is the wrong time

Dont Know

Q11. In view of the general economic situation, do you think that now is?

A very good time to save

A fairly good time to save

Not a good time to save

A very bad time to save

Dont know

Q12. Over the next 12 months, how likely will you be to save any money?

Very likely

Fairly likely

Not likely

Not at all likely

Don't know

Q13. Have you made any major purchases over the last 12 months? (washing machine, refrigerator, furniture, dishwasher, ...)

Yes

No

Don't know

Q14. How likely are you to make major purchases over the next 12 months?

Very likely

- Fairly likely
- Not likely
- Not at all likely
- Dont know

Q15. How likely are you to buy a car over the next 12 months?

- Very likely
- Fairly likely
- Not likely
- Not at all likely
- Dont know

Q16. 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.)?

- Very likely
- Fairly likely
- Not likely
- Not at all likely
- Dont know

Q17. How likely are you to spend any large sums of money on home improvements or renovations over the next 12 months?

- Very likely

- Fairly likely
- Not likely
- Not at all likely
- Dont know

Own Financial Situation

Q19. Which of these statements best describes the current financial situation of your household?

- We are saving a lot
- We are saving a little
- We are just managing to make ends meet on our income
- We are having to draw on our savings
- We are running into debt
- Dont know

Q20. How has the financial situation of your household changed over the last 12 months? It has...

- Got a lot better
- Got a little better
- Stayed the same
- Got a little worse
- Got a lot worse

Dont Know

Q21. How do you expect the financial position of your household to change over the next 12 months? It will...

Get a lot better

Get a little better

Stay the same

Get a little worse

Get a lot worse

Dont Know

Table A: Non-response Rates (in %) to Price and Consumption Questions

	Non-Response		
	Quali.	Quanti.	Outlier ($\geq 10\%$)
Perceived Inflation	0.96	52.21	29.60
Expected Inflation	5.22	59.83	21.88
Right Time to Purchase	4.05	-	-
Own Major Purchase			
Past 12 Months	0.07	-	-
Next 12 Months	0.75	-	-
Car - Next 12 Months	0.21	-	-

Note: We here report the percentage of non-response calculated as the ratio between the number of households who answer "do not know" to a question. We also report the percentage of outliers or implausible values for quantitative inflation expectations, we set a threshold at 10% of inflation and the percentage is calculated as the number of answers above or equal to 10% over the total number of answers (among households answering to the question).

Table B: Determinants of Non-Response / Outliers to Quantitative Price Questions - Marginal Effects

		Non-Response		Outlier (more than 10%)	
		Perception	Expectation	Perception	Expectation
HH Income (Ref: < Q1)	[Q1; Q2]	-1.460*** (0.214)	-0.786*** (0.210)	-5.242*** (0.424)	-5.452*** (0.488)
	[Q2; Q3]	-3.182*** (0.242)	-1.328*** (0.228)	-8.922*** (0.452)	-9.292*** (0.514)
	> Q3	-5.390*** (0.272)	-1.750*** (0.250)	-15.629*** (0.472)	-14.969*** (0.529)
Education (Ref: Primary)	Secondary	-5.255*** (0.224)	-2.230*** (0.228)	0.631 (0.428)	0.356 (0.486)
	Further	-6.833*** (0.226)	-2.904*** (0.228)	-3.158*** (0.420)	-3.171*** (0.474)
Age (Ref: 16-29)	30-49	1.162*** (0.373)	-0.015 (0.312)	-0.422 (0.594)	-1.908*** (0.646)
	50-64	2.579*** (0.377)	1.049*** (0.318)	-2.407*** (0.607)	-3.233*** (0.663)
	65+	8.782*** (0.447)	2.676*** (0.392)	-6.646*** (0.732)	-7.708*** (0.789)
Gender (Ref: Male)	Female	5.643*** (0.180)	1.750*** (0.165)	10.441*** (0.317)	8.988*** (0.350)
Occupation (Ref: Yes)	No, Unemployed	-1.726*** (0.610)	0.211 (0.568)	3.567*** (1.030)	2.963*** (1.094)
	No Retired	-0.367 (0.450)	0.076 (0.440)	-1.996** (0.790)	-0.862 (0.869)
	No Inactive	3.217*** (0.414)	0.908** (0.407)	3.249*** (0.732)	1.805** (0.782)
HH Size (Ref = 1)	2	-1.224*** (0.317)	-0.384 (0.292)	3.997*** (0.515)	3.774*** (0.533)
	3	-1.595*** (0.358)	0.050 (0.326)	6.459*** (0.584)	5.150*** (0.604)
	> 3	-1.499*** (0.376)	0.532 (0.343)	8.407*** (0.617)	7.585*** (0.645)
Survey Wave (Ref: 1)	2	0.196 (0.281)	-0.763*** (0.263)	-4.398*** (0.499)	-3.520*** (0.545)
	3	0.240 (0.342)	1.279*** (0.316)	-6.057*** (0.597)	-4.376*** (0.649)
Controls		Yes	Yes	Yes	Yes
Obs		262,113	211,674	126,378	211,674

Note: In this table, we report marginal effects from Probit regressions where the endogeneous variable is a dummy variable taking the value 1 in case on non-response to the quantitative price question. Control variables include date dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3)). *p<0.1; **p<0.05; ***p<0.01.

Table C: Inflation Expectations: Qualitative vs. Quantitative Answers

	%	Quantitative answers			
		Mean	Q1	Q2	Q3
Qualitative answers					
Increase more rapidly	9.1	4.93	3	4.5	7
Increase at the same rate	44.6	4.35	2	3.5	5
Increase at a slower rate	13.8	3.15	2	2.5	4.5
Stayed about the same	26.1	0	0	0	0
Fall	1.2	-3.59	-5	-2	-1
Don't know	5.2	-	-	-	-

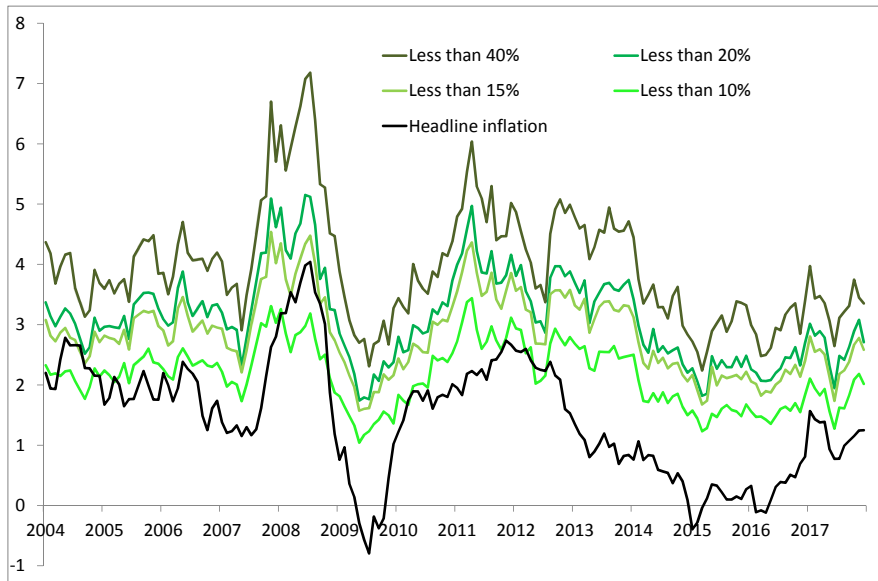
Note: We report in this table the main statistics on quantitative inflation expectations according to the answer given to the qualitative question on inflation expectation. The first column reports the share of households answering to the different qualitative categories. The second to fifth columns report the moments of the distribution of quantitative inflation expectations conditional on providing a given answer to the qualitative question.

Table D: Simple Statistics on Inflation Expectations - Implausible Values

	Aggregate Moments	Correlation with Headline π π excl. Energy	
Less than 40%	3.96 (0.97)	0.77	0.62
Less than 20%	3.12 (0.74)	0.79	0.59
Less than 15%	2.83 (0.65)	0.79	0.57
Less than 10%	2.15 (0.52)	0.77	0.54

Note: In this table, we report simple statistics calculated using individual answers to the quantitative question on inflation expectations. We first calculate statistics date by date and then compute the average of this time series. Each line corresponds to a specific restriction defining our sample used for the calculation. 'Less than 40%' means that we only consider inflation expectations less than 40%.

Figure A: Aggregate Inflation Expectation - Sensitivity to Outlier Definition



Note: using answers to the quantitative questions on inflation expectations, we have computed the simple average of all answers date by date. Each green line corresponds to a specific restriction defining our sample used for the calculation. 'Less than 40%' means that we only consider inflation expectations less than 40%.

Table E: Simple Statistics on Inflation Expectations - Multiple of 5

	Aggregate Moments	Correlation with Headline π π excl. Energy	
Average	2.81	0.79	0.57
% of Stable Prices	0.33	-0.66	-0.36
% of Multiple of 5	0.20	0.72	0.50
% of Other Answers	0.47	0.52	0.20
Average Size - Multiple of 5	6.75	-0.06	-0.06
Average Size - Other Answers	3.10	0.74	0.74

Note: In this table, we report simple statistics calculated with answers to the quantitative question on inflation expectations.

Table F: Distribution of Durable Consumption 2005-2011

	Year	Freq.	Moments - in euros			
			Q1	Q2	Q3	P90
Overall	2005	0.59	340	740	1559	2941
	2011	0.62	400	749	1450	2605
Home Appliances	2005	0.27	270	458	744	1213
	2011	0.30	280	422	700	1103
TV, computers, phones...	2005	0.35	200	416	990	1600
	2011	0.41	269	500	850	1370
Furniture	2005	0.30	240	531	1260	2846
	2011	0.28	270	549	1200	2570

Note: In this table, we report some moments of the distribution of durable spending over a year. Individual data comes from the survey "Enquete Budget des Familles", every 5 years Insee collects individual data on consumption for more than 10,000 households, HH report their durable spending over the last 12 months, product by product. We have dropped individual product spending less than 100 euros. We have calculated for every household in the survey the total durable spending. Freq. reports the share of households reporting durable spending over the last 12 months. The four last columns report moments of the distribution conditional of having reported a positive durable consumption.

Table G: Marginal Effects of Inflation Expectations on Consumption - Past Purchases - By Interview

	1	2	3
π^e Quantitative	0.153*	0.297***	0.098
	(0.084)	(0.105)	(0.132)
π^e Quanti. by intervals:			
[10%; + ∞ [0.411	0.846	-1.750
	(0.747)	(0.942)	(1.200)
[5%; 10%[	1.250*	2.310***	0.868
	(0.668)	(0.814)	(1.030)
[3%; 5[	1.250*	2.310***	-0.268
	(0.696)	(0.818)	(1.020)
]0%; 3%[	1.680**	1.37*	-0.077
	(0.659)	(0.741)	(0.912)
0%	Ref.		
< 0%	0.655	-0.597	-2.290
	(1.880)	(2.400)	(2.860)
π^e Quali. - Stable	-0.553*	-1.300***	-0.467
	(0.286)	(0.339)	(0.426)
π^e Quali - by intervals:			
Increase more rapidly	1.350***	2.260***	0.991
	(0.472)	(0.575)	(0.705)
Increase at the same rate	0.394	1.390***	0.175
	(0.314)	(0.373)	(0.468)
Increase at a slower rate	1.440***	1.210**	1.320**
	(0.398)	(0.471)	(0.599)
Stay about the same	Ref.		
Fall	0.773	1.050	0.469
	(1.050)	(1.330)	(1.660)
Controls	Yes	Yes	Yes
Obs.	146,959	97,676	60,862
Obs.	60,343	42,571	27,156

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'no, definitely not', 2 'no, probably not', 3 'yes, maybe' 4, 'Yes, definitely' to the question "Do you intend to make major purchases in the next 12 months?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.

Table H: Marginal Effects of Inflation Expectations on Consumption - Right Time to Purchase - By Interview

	1	2	3
π^e Quantitative	0.034 (0.052)	0.009 (0.064)	0.130* (0.078)
π^e Quanti. by intervals:			
[10%; + ∞ [0.462 (0.451)	-0.853 (0.553)	0.319 (0.704)
[5%; 10%[	0.676* (0.397)	0.918 (0.471)	1.74*** (0.588)
[3%; 5[	1.130*** (0.415)	0.381 (0.479)	1.990*** (0.592)
]0%; 3%[	1.010*** (0.391)	0.474 (0.434)	0.863* (0.511)
0%	Ref.		
< 0%	-0.107 (1.230)	-0.391 (1.560)	0.520 (1.710)
π^e Quali. - Stable	-0.339** (0.168)	-0.183 (0.198)	-0.167 (0.243)
π^e Quali - by intervals:			
Increase more rapidly	0.151 (0.285)	-0.295 (0.337)	0.267 (0.417)
Increase at the same rate	0.359** (0.183)	0.248 (0.215)	0.312 (0.265)
Increase at a slower rate	1.060*** (0.235)	0.706** (0.279)	0.399 (0.345)
Stay about the same	Ref.		
Fall	0.324 (0.687)	-0.006 (0.857)	1.130 (1.070)
Controls	Yes	Yes	Yes
Obs.	140,269	94,191	58,927
Obs.	58,984	41,828	26,729

Note: In this table, we report marginal effects from Ordered Probit regressions where the endogeneous variable is a variable taking 3 different values 1 if the household answers 'no, definitely not', 2 'no, probably not', 3 'yes, maybe' 4, 'Yes, definitely' to the question "Do you intend to make major purchases in the next 12 months?". Marginal effects are calculated for the value "Yes, definitely". Control variables include year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1,2 or 3), answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. *p<0.1; **p<0.05; ***p<0.01.