What Matters in Households' Inflation Expectations?*

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Abstract

We provide new survey evidence on the role of French households' inflation expectations for durable spending over the period 2004 - 2018. A large share of households expects prices to remain stable instead of increasing. This share accounts for 75% of fluctuations in the average inflation expectation. Individuals who perceive that the prices of specific spending categories, including non-durable ones, remained recently stable are more likely to expect future stable prices. Households expecting stable prices have a lower propensity to buy durable goods than those expecting positive inflation. In contrast, differences across households expecting positive inflation are associated with insignificant differences in durable consumption decisions.

JEL codes: D12, D83, E21, E31, E52

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1   Introduction

Households' inflation expectations are a central transmission channel in New Keynesian (NK) models and key for monetary and fiscal policies that are advocated to bypass the effective lower bound (ELB) on the nominal interest rate.[1] This setup postulates that agents have full information and rational expectations, and that their inflation expectations affect their consumption through their impact on the real interest rate and intertemporal choices.

Such a theoretical channel contrasts with what is observed in households' surveys. There is clear evidence that their inflation expectations do not satisfy the assumption of full information and rational expectation (Coibion and Gorodnichenko, 2012, 2015a). Moreover, while the theory predicts that higher inflation expectations increase current consumption because of the induced lower real interest rate, in the data the effect is often found to be either small or non-significant (see Bachmann et al., 2015, among others). Recent theoretical contributions resort to various cognitive and financial constraints to rationalize these properties. They emphasize that such frictions mitigate the inflation expectation channel and therefore the efficacy of policies dealing with the ELB constraint.[2] D'Acunto et al. (2019c) provide evidence that indeed inflation expectations do not matter for consumption choices of individuals with relatively stronger cognitive constraints.

In this paper, we highlight a novel behavioral distortion that sheds new light on how the household inflation expectation channel is at play. We show that differences in individual expected inflation matter for durable consumption choices when households have different views about the broad *qualitative* inflation regime that they expect—what we call the *extensive margin* of household inflation expectations—rather than about precise future *quantitative* inflation rates—that we call the *intensive margin* of household inflation expectations. In our data, the main dimension along which inflation expectations have an impact on their durable consumption decisions is whether they expect that prices will remain stable or will increase: The latter have a higher propensity to buy durable goods than the formers. By contrast, households with different positive quantitative in-

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[1]See Eggertsson and Woodford (2003); Adam and Billi (2006); Werning (2012) among many others. The inflation expectation channel is for instance crucial for the efficacy of the average inflation targeting strategy recently adopted by the Fed.

[2]See, among others, Angeletos and Lian (2018); Andrade et al. (2019); Farhi and Werning (2019); Garcia-Schmidt and Woodford (2019); Gabaix (2020); McKay et al. (2016); Wiederholt (2015); Woodford (2019).

flation expectations make similar durable consumption choices. This explains why the link between quantitative measures of expected inflation and households' expenditure is often found to be weak. We also document substantial heterogeneity on how households' inflation expectations impact their durable consumption, with the distortion that we highlight prevailing among households who are less prone to cognitive limits or to financial constraints.

Our baseline results are obtained on a survey of French households, which covers about 2,000 individuals every month between January 2004 and December 2018. That being said, the importance of the extensive margin is also obtained in comparable surveys of US and German households which have been used in the previous studies of respectively Bachmann et al. (2015) and D'Acunto et al. (2016). These datasets combine detailed individual information on qualitative and quantitative inflation expectations as well as on durable consumption decisions on a relatively long sample period which are needed to establish our main result. Our focus on the survey of French households is motivated by the fact that, for these households, we had access to additional ad-hoc surveys that can be used to provide micro-evidence on what drives the individual beliefs about the future inflation regime. Moreover, another advantage of the survey of French households is that it provides information on both individual own durable consumption decisions and individual views on durable consumption in general. In contrast, the surveys of US and German households, only give information on that latter 'readiness to spend on durable' variable that has been used in several previous studies. Having access to the two measures allow us to check that our results are robust to this difference in measurement.

We start by documenting new facts on household inflation expectations underlining the importance of the extensive margin. Looking at the qualitative assessment of future inflation reveals that a large share of households expect prices to 'stay about the same' over the next year. On average, they make for almost one third of the total sample. This share fluctuates over time and declines when realized inflation increases. Additional ad-hoc survey waves reveal that individuals form their qualitative inflation expectations based on their own experience with non-durable goods they frequently buy like gasoline and food. This is consistent with recent evidence that personal shopping experience and salient prices shape individual inflation expectations (Coibion and Gorodnichenko, 2015b; Cavallo et al., 2017; D'Acunto et al., 2019d). Relative to these works, our contribution

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is to show that individuals' perceived evolution of micro prices also affect the qualitative inflation regime that they expect. In addition, we document that the share of individuals expecting that prices will 'stay about the same' varies with individual socio-demographics such as age, gender, education, income. But there is a sizeable share of individuals who answer so in each of these groups. One also finds that the majority of households answering that prices will stay about the same think that inflation will be close to zero over the next year. Finally, we show that the extensive margin accounts for the bulk of fluctuations in household inflation expectations: The share of households expecting stable prices instead of positive inflation accounts for up to 75% of the fluctuations in inflation expectations averaged across households.

We then highlight the role of the extensive margin of households' inflation expectations on their durable consumption decisions. We find that households expecting that prices will increase over the next year have a higher probability to buy new durable goods in the current year than households expecting that prices will remain stable over the same period. By contrast, households with different positive inflation expectations have a similar propensity to buy durable goods over the current year. These findings hold true for the individual 'own' durable consumption choices but also for the individual 'readiness to spend' on durables in general, a measure that has been widely used in previous works.[3]

Our baseline results are obtained in regressions using a repeated cross-section of households together with a rich set of individual characteristics and beliefs. In particular, the survey informs us about individual perceived current inflation. This information helps us to control for potential reverse causality, whereby the shopping experience resulting from past durable spendings would lead individuals to more likely infer that prices are increasing rather than stable. The survey design also allows us to address some endogeneity concerns stemming from omitted variables that could vary with inflation expectations and also affect consumption choices. To be more specific, we can control for individual expected own financial and consumption expectations as well as aggregate macroeconomic perspectives. This mitigates the concern that households' durable consumption reacts to a shock that raises inflation but can also have an impact on their expected real income.

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[3]As for many surveys, we only have information on durable spending. Nevertheless, it is the most important margin of adjustment in total private consumption fluctuations over the business cycle and the component that is the most interest-rate sensitive. So the intertemporal substitution of private consumption induced by variations in expected inflation—hence in the real interest rate—should predominantly go through changes in durable consumption plans (see e.g Berger and Vavra, 2015).

Finally, we can control for households' perceptions of whether the current period is a good time to save, which relates to their nominal interest rate perceptions. This limits the endogeneity stemming from the households who understand that the central bank reacts to higher expected inflation by tightening interest rates, which would then lower private spending.

We conduct several robustness checks. We confirm our main findings using the panel dimension of the French survey, showing that our baseline results hold when controlling for unobserved fixed individual characteristics.[4] We also provide evidence that households with extreme views on future inflation are not driving our results. Moreover, they still hold when using an alternative imputation of quantitative inflation expectations of households answering 'stable prices'.

We also assess how our results vary across households. Consistent with previous studies, we find that households that are richer, older, with higher education degree, or who make more precise inflation forecasts tend to factor in their inflation expectation when making durable spending choices. However, even for these households, inflation expectations matters only through the extensive margin. In other words, our aggregate findings are not driven by individuals with relatively lower cognitive capacity or higher financial constraints.

Finally, we show that our results can be reconciled with recent related studies by highlighting the importance of controls about future income to obtain a positive connection between inflation and durable consumption. We also illustrate that our main result holds in surveys of German and US households that have been previously studied in the literature.

We conclude by discussing the implications of our findings for the household inflation expectation channel in macroeconomics and some related policy implications.[5]

Literature.   Our paper is related to the literature studying the formation of macroeconomic expectations. Recent contributions highlight deviations from the usual assumption of full information and rational expectation either in surveys of households, firms, or professional forecasters (Carroll, 2003; Mankiw et al., 2003; Coibion and Gorodnichenko,

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[4]As documented by Vellekoop and Wiederholt (2019), individual fixed effects tend to capture a large part of the variation in inflation expectations across individuals.

[5]We introduce a simple New Keynesian model featuring households who form their inflation expectations in a way consistent with our results is introduced and discussed in Appendix A.

2012; Andrade and Le Bihan, 2013; Coibion and Gorodnichenko, 2015a; Andrade et al., 2016; Malmendier and Nagel, 2016; Coibion et al., 2018; Broer and Kohlhas, 2019; Bordalo et al., 2020; Fuhrer, 2018; D'Acunto et al., 2019a; Lewis et al., 2019; Angeletos et al., 2020; Kohlhas and Walther, 2020) or in controlled experiments (Cavallo et al., 2017; Fuster et al., 2018b; Coibion et al., 2019b, 2020; Afrouzi et al., 2020). These papers analyze the properties of agents' quantitative macroeconomic expectations. We emphasize that changes in the broad qualitative inflation regime households expect is an important margin to focus on to understand the formation of inflation expectations.

We also contribute to the literature using surveys to assess how households' macroeconomic expectations affect their decisions. Numerous references study whether policies aiming at increasing expected inflation are expansionary or not (see Armantier et al., 2015; Bachmann et al., 2015; Binder, 2017; Burke and Ozdagli, 2013; Coibion et al., 2019a; Crump et al., 2018; D'Acunto et al., 2016; Dräger and Nghiem, 2020; D'Acunto et al., 2019b,c; Ichiue and Nishiguchi, 2015; Duca-Radu et al., 2020; Michelacci and Paciello, 2019a; Vellekoop and Wiederholt, 2019).

These works reach different conclusions depending on the country and sample studied, the identification method, or whether the effect on durable, non-durable, and total consumption level or growth is studied. We confirm the recent findings that increasing inflation expectations can be expansionary.[6] But we add an important qualifier to this mechanism: It goes through the extensive margin of inflation expectations. As we illustrate in Appendix A, this has some important consequences for how inflation expectations affect macroeconomic outcomes. The key role of the extensive margin also provides an explanation for why previous related studies reached different conclusions regarding the effect of inflation expectations on households' spending: Focusing on the effect of differences in the quantitative measure of expected inflation blurs the relation between expected inflation and consumption and masks the role of the extensive margin.[7]

Our work is also connected to the theoretical works rationalizing why the inflation expectation channel is much less potent in the data than what models with sticky prices,

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[6]Our regression analysis controls for the expected future individual durable consumption. Our results are thus consistent with Crump et al. (2018) who obtain that individuals expect a lower *growth rate* of consumption when their inflation expectation increases in the New-York Fed survey of US households.

[7]Some related studies investigate the role of expected house prices (Chahrour and Gaballo, 2021), wages (Nunes and Park, 2020), unemployment (Roth and Wohlfart, 2020), or gains or losses (Fuster et al., 2018a) on households expenditure. In contrast, we limit our analysis to the effect of expected aggregate inflation and test whether it is consistent with an intertemporal substitution channel.

complete markets, and rational expectations with perfect information predict (see e.g. Del Negro et al., 2015). This includes models with information frictions and cognitive limits (Angeletos and Lian, 2018; Melosi, 2017; Nakamura and Steinsson, 2018; Andrade et al., 2019; Garcia-Schmidt and Woodford, 2019; Gabaix, 2020; Woodford, 2019), limited intertemporal substitution due to non-diversifiable idiosyncratic risk and credit constraints (see e.g. McKay et al., 2016; Kaplan et al., 2018), a combination of the two (Farhi and Werning, 2019; Auclert et al., 2020; Carroll et al., 2020; McKay and Wieland, 2020), or decisions under Knightian uncertainty (Michelacci and Paciello, 2019b). Our empirical results underline a new cognitive distortion that limits the inflation expectation channel.

More generally, our findings speak to the literature emphasizing the role of inattention in macroeconomics (see Mankiw and Reis, 2002; Sims, 2003; Woodford, 2003; Mackowiak and Wiederholt, 2009; Alvarez et al., 2012; Mackowiak et al., 2018; Gabaix, 2019). More specifically, that households adjust their durable consumption to a limited number of inflation regimes while inflation is a continuous variable is reminiscent of the literature on discretization and consideration sets (see Caplin et al., 2018; Jung et al., 2019, among others) and of models in which individuals make consumption plans by solving simplified optimization problems (see Reis, 2006; Gabaix, 2014; Ilut and Valchev, 2020).

2 Data

In this section, we describe the main data source that we use – the French survey of households.[8] We start by describing the sample and the design of the questionnaire. We then focus on the questions on inflation expectations and durable consumption decisions. Finally, we provide some descriptive statistics on these two variables.

2.1 Sample and questionnaire

We consider the individual answers to the monthly consumer confidence survey conducted by INSEE (Institut National de la Statistique et des Etudes Economiques, the French public statistical agency) over a January 2004 – December 2018 period. Before 2008, the survey was not conducted in August. Every month, about 2,000 interviews are carried

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[8]We provide a description of the German and US surveys of households that we also use in this paper in the Appendix H and I.

out by phone. The sample size is larger than the one of comparable surveys used in the literature – the Michigan Survey of Consumers conducts around 500 interviews each month and the New York Fed Survey of Consumer Expectations is based on a rotating panel of 1,300 household heads. The sample is designed to be representative of the overall French adult population (sampling weights are calculated by city size, age, household composition, job occupation, socio-professional category, diploma). Every household is surveyed over three consecutive months, so our data set contains a panel dimension for households answering to several interviews: a total of about 160,000 households are surveyed out of which 42% respond to three consecutive interviews, 25% to two, and 33% to only one.

The baseline questionnaire contains about 20 questions on households' perceptions on the macroeconomic outlook (general economic situation, quality of life, unemployment, prices), as well as on their own economic prospects and decisions (financial situation, savings, durable consumption decisions). In addition, surveyed households provide socio-demographic information like age, gender, diploma, income, employment status, household's composition.[9]

INSEE also occasionally runs surveys with one-off modules of additional questions. In particular, in April 2007 and February 2009, households in the survey were asked about their inflation perceptions for some specific items and, in September 2007, households expecting prices to remain the same were asked about what they mean by prices remaining the same. We use these specific survey waves to provide further insights on how households form their inflation expectations.[10]

2.2 Expected inflation

The survey asks individuals about both their *qualitative* and *quantitative* perceptions of the evolution of prices over the next 12 months. While most of the literature focuses on the latter, we take advantage of having access to the two types of inflation expectation to emphasize the importance of the former in how the inflation expectation channel operates.

More specifically, individuals are first asked to provide a *qualitative* assessment on

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[9]See Appendix B for the full questionnaire. The harmonized European household confidence indicators released by the European Commission for all countries in the European Union use a subset of this questionnaire.

[10]See the Appendix F for details on the one-off modules of additional questions.

future prices:

Question 1. *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,* **6.** *Don't Know.*

Note that the set of possible qualitative answers is more detailed than the Michigan Survey of Consumers – this latter survey only distinguishes between three categories "declining prices", "stable prices", and "increasing prices". In what follows, we will refer to the answer "stay about the same" as the expectation of stable prices.

Households are then asked to give their *quantitative* estimation (in percentage) of expected inflation:

Question 2. *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%*

Importantly, this second question is not asked to individuals who answered "stay about the same" to the previous qualitative question. Following the usual practice with this survey, we impute a 0% inflation rate for these households to the quantitative question.[11]

This imputation oversamples households answering 0% to the quantitative question on expected inflation. Indeed, while there is a significant proportion of non-responses to that quantitative question, there is none for households answering "stay about the same" since they are all assumed to answer 0%. To correct for this oversampling, we estimate a model of the determinants of the non-response using information on the characteristics of households who do not respond to the quantitative question but who have responded that prices are going to increase.[12] Using these estimates, we compute for each household answering "stay about the same" the estimated probability of non-response to the quantitative question on expected inflation conditional on its observed characteristics. We

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[11]See EC (2019), footnote 17: "The two questions are not asked if the response to the qualitative questions is 'don't know' or that prices will 'stay about the same', as in this latter case it is assumed that the respondent perceives or expects no change in 'consumer prices'. When the respondent says that prices will 'stay about the same', the interviewer is instructed to automatically impute a zero inflation rate in response to the quantitative questions." See also Arioli et al. (2017), footnote 8.

[12]In Appendix D.1 we report more results on the response rate to the quantitative question on inflation expectations and perceptions. About 50% of households are not able to report a quantitative answer on inflation whereas this proportion is only 5% for the qualitative question. Households with a higher income, better education and younger are more likely to report a quantitative inflation expectation.

then impute a "missing value" instead of 0% for households with the highest estimated probability of having a missing observation so that the response rate is similar for the quantitative expected inflation associated with the answer "stay about the same" than the ones observed for other answers to the qualitative question.

In section 3.2 below, we use additional one-off modules of the survey to discuss what households mean when they answer that they expect prices to remain stable.

2.3 Consumption decisions

The survey asks households about both their *own* durable consumption decisions and about their *general* assessment on whether it is a good time to buy durable goods.

More precisely, the survey first asks whether a household bought durable goods or not:

Question 3. *Have you made any major purchase over the last 12 months? (washing machine, refrigerator, furniture, dishwasher, ...)*

1. Yes, 2. No, 3. Don't know.

The survey also asks a question on whether the surveyed individual thinks it is the right time for people in general to make major purchases of durable goods, which has been labeled the "readiness to spend on durables" in previous works (see e.g. Bachmann et al., 2015). The exact wording is the following:

Question 4. *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, 4. Don't know.

In what follows, we use both variables as proxies for individual durable consumption. We thus implicitly assume that individuals' views on whether it is a good time to buy durables in general is linked to their own decision to buy durables.

Several recent works assessing the impact of households' inflation expectations on their consumption decisions only provide information on households' readiness to spend on durables (see Bachmann et al., 2015; Duca-Radu et al., 2020; D'Acunto et al., 2016,

2019a) or on households' own durable consumption (see Dräger and Nghiem, 2020; Burke and Ozdagli, 2013) among others. Having access to both measures allows us to draw comparisons with these two sets of papers.

Another advantage of having access to the two questions is that they are complementary proxies for individual *own* and *current* durable consumption. Question 3 is a measure of individual *own* durable consumption but goes as far as 12 months back in time. While in the next section we report evidence that the question captures movements in relatively recent lags of realized durable consumption, it also includes some noise through spending decisions that are too distant in time to be related to current expected inflation. Question 4 is a measure of *current* desired durable consumption, so it can arguably be more directly connected to current inflation expectations, but is indirectly linked to individuals' own decisions.

The answers to both questions are qualitative. So we can only observe whether households have decided to adjust (or think it is a good time to adjust) their stock of durable goods (beyond depreciation) but not the amount of money they spend. Another restriction is that the survey focuses on durable goods and more specifically "major purchases" of furniture, washing machines, electronic or computer equipment. So we cannot observe households' non-durable consumption decisions. However, there is evidence that variations in the share of households who decide to buy durable goods is the margin that matters the most for the fluctuations of aggregate consumption, as emphasized by Berger and Vavra (2015) among others. Moreover, recent studies by Burke and Ozdagli (2013); Coibion et al. (2019a) that have information on both durable and non-durable consumption show that the effect of inflation expectation on consumption predominantly goes through durables and, within that category, through the extensive margin of durable consumption.

2.4   Summary statistics

We provide summary statistics on inflation expectations and durable good consumption decisions as well as comparisons with external information on realized inflation and durable consumption.

Inflation expectations. Figure 1 plots the average and the median of inflation expectations (calculated date by date over all households) and the actual headline inflation rate. This figure illustrates two well-known facts in the literature: inflation expectations overestimate the actual inflation rate but at the same time are strongly positively correlated with it. Table 1 confirms these findings. There, we report the average of inflation expectations – whose value is 2.8% – while the average of this inflation rate over the sample period is about 1.5%. The overestimation is much smaller when we consider the median expected inflation instead of the mean, suggesting that few but very large - non-plausible - inflation expectations contribute a lot to this overestimation when we use the mean expected inflation rate. We also report in this Table that the correlation between the average expected inflation rates and the actual headline inflation rate is about 0.8.[13]

Durable consumption decisions. Table 1 also provides summary statistics on the survey measures of durable consumption. Only a minority of households made major purchases over the past 12 months (about 31%). Similarly, only 15% of households think that it is the right time to make major purchases. Finally, both variables are positively correlated with the annual growth of consumption.[14]

The correlation of the question on individual own past durable consumption with current realized consumption is relatively large at .45. Again, 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 e.g. Berger and Vavra (2015). Moreover, the correlation with current durable decisions is also large, at .41, which shows that, despite the question is about major consumption expenditures over the past 12 months, it is linked with the actual recent decisions.[15]

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[13]The correlation with core inflation is smaller, at nearly .5, but significant. Appendix D.3 shows that the dynamic correlation with realized core inflation peaks at the horizon of 8 months.

[14]See Appendix E for the connection between durable consumption and total consumption. Table E.1 in Appendix E also reports some simple statistics on households' actual spending in durable goods (including home appliances, TV, computers, phones, furniture but excluding cars) in France for the years 2005 and 2011 (based on household consumption survey). Among households reporting durable spending, 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).

[15]One may question whether going as far as one year back in time does not introduce too much noise to capture the potential effect of current inflation expectations on current consumption. However, because individual durable consumption is an infrequent decision, it also makes sense to survey individuals about their durable consumption over a sufficiently long period of time rather than at a precise date. For instance, Coibion et al. (2019a) consider individual durable consumption reported over the last three months. Consistent with this, Appendix D.3 shows that the dynamic correlation of the question on past own durable consumption is stronger for more recent realizations of durable consumption with a peak at

3   The extensive margin of inflation expectations

In this section, we establish a set of new stylized facts characterizing households' inflation expectations. We start by underlining that a large share of households expect prices to "stay about the same" and that this share is strongly correlated with realized inflation: When inflation is higher, a smaller share of households expect prices to remain stable. We then provide micro evidence on what underlies such a belief: What expecting that prices will "stay about the same" means, who answers so, and how this belief on aggregate inflation is connected to individual experience on more specific items. In particular, we show that individuals who perceive that prices of frequently-bought items have been stable have a higher probability to think that aggregate prices will stay about the same. Finally, we show that variations in the share of households expecting "increasing prices" as opposed to "prices will stay about the same" – i.e. the *extensive margin* of inflation expectations – account for the bulk of the variations in the average inflation expectation. In comparison, the *intensive margin* of inflation expectations – i.e. variations in the average inflation expectations of households expecting "increasing prices" – contributes much less.

3.1   A large share of households expect prices to "stay about the same"

Figure 2 displays the cross-section distribution of individual inflation expectations. As it is well known, this exhibits a huge degree of heterogeneity across individuals: While actual inflation realizations are in between -1% and $+4\%$ over the sample period, 40 percent of individual inflation expectations are outside this range over the same period.

However, despite this heterogeneity, there is a clear mode: About one third of households reports to expect prices "to stay about the same" which the survey interprets as a zero expected inflation.The share of households expecting that prices will remain constant over the next 12 months is not constant over time. As Table 1 illustrates, it is strongly negatively correlated with inflation realizations at the date of the survey. With an absolute value of $+.7$, the correlation of the associated extensive margin of inflation

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a 3-month lag. Later in the paper, we further address this potential issue by estimating the impact of changes in individual inflation expectations on changes individual durable consumption decisions using panel regressions.

expectation is larger in absolute terms than the correlation between realized inflation and the average of positive inflation expectations (the intensive margin) which equals +.6.

Figure 3 illustrates that the relation is non-linear and that the proportion of households answering that prices will "stay about the same" decreases more rapidly for realized inflation rates below 2% than above. By contrast, 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%. So, the lower the inflation rate, the more the share of households expecting prices to remain stable fluctuates with realized inflation.

Fact 1. *Inflation expectations are heterogeneous but a large fraction of households expect stable prices. This fraction is negatively correlated with realized inflation, and more so for low inflation realizations.*

3.2   Micro evidence on what underlies the belief that prices will "stay about the same"

We use ad-hoc modules to the French survey of households to address the following three questions. What do individuals have in mind when they answer that prices will "stay about the same"? Who does answer so? And how does such a belief on aggregate inflation connect to individual perceptions on their actual shopping experience?

What does "stay about the same" mean?   As we detailed above, in the French survey, households answering that they expect prices to "stay about the same" are not asked about their quantitative inflation expectation and the common practice is to impute a zero to these unobserved responses. However it might well be that these individuals have a different interpretation of what "stable prices" means when answering so. An additional survey module that was conducted in September 2007 can be used to shed some light on this issue.

More precisely, households who answered that prices will "stay about the same" to the question on inflation expectations over the next 12 months were asked if they meant that "prices will increase at the same rate as today" or if "prices will remain the same over the next 12 months". In addition, individuals answering that they meant that prices will increase at the same rate as today were asked about their quantitative inflation expectations. The others were imputed a zero to this question.

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Among the 1,847 households that were surveyed in September 2007, 16% answered that prices will remain about the same over the next 12 months. Among these households, about 60% declared that they meant that "prices will remain the same over the next 12 months".[16] So the majority of households actually think that aggregate inflation will not differ from zero and the average expected inflation for individuals answering that they expect stable prices is 1.35%, well below the average obtained for individuals expecting a positive inflation rate.

Who answers that "prices stay about the same"? In Table 2, we report evidence on the different margins of inflation expectations and their connection with realized inflation for different groups of households. More precisely, we report the average inflation expectation, the share of households expecting stable prices, the level of non-zero inflation expectation and the coefficient of a bivariate regression linking these different variables with realized inflation.

For all the groups, we find that a substantial share of households expect stable prices—roughly one third —and that non-zero expectations are around 4% and that average inflation expectation. So every type of households can expect that prices will remain "stable". Another striking fact is that the extensive margin co-moves with realized inflation, with the share of households expecting "stable" prices decreasing when inflation rises.

That being said, there are also notable differences across different types of households: Women and older individuals tend to answer more frequently that they expect "stable" prices than the average. By contrast, more educated and richer households tend to answer relatively less than they expect "stable" prices. At the same time, women have higher expected inflation when they report that prices will increase. In contrast, older, richer and more educated individuals report lower (and less upward biased) inflation expectations when answering prices will increase.

How does the belief that aggregate "prices stay about the same" connect to the perceived evolution of prices of specific items? Two additional survey modules conducted in April 2007 and February 2009 provide information on individuals' qualitative perception of how the price of 9 specific items evolved recently. These items cover basics

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[16]The full distribution of quantitative inflation expectations in this additional module is reported in Table F.2 of the Appendix.

non-durable, durables and services expenditures: bread, beef, food oil, electricity, car repair, gasoline, phone/internet, washing machine and TV set.

Table 3 reports the results. On average over the 9 items, 30% of households perceive that prices remained stable. These shares are smaller for items that change prices more frequently, as, for example, gasoline (10% of stable prices), and larger for those whose prices are arguably more sticky such as services and durable goods (more than 50% for phones and washing machines).[17]

We then investigate whether these perceptions on micro price influence individuals' aggregate inflation expectations. As Table 4 illustrates, we obtain that when an individual perceives that the prices of these specific items are broadly stable, he has a higher probability to expect that aggregate prices will remain stable over the next year. This relationship is stronger for the items that are bought more frequently like food (beef, food oil) and gasoline.

These results – combined with the results in Table 2 that the share of individuals expecting that prices will stay the same declines when inflation increases – suggest that households form their aggregate inflation expectations based on their shopping experience and salient prices. A higher inflation rate increases the probability that an individual notices that some specific prices have increased and thus lowers the probability that this individual expects prices to remain stable in the future. This is consistent with recent evidence by Coibion and Gorodnichenko (2015b); Cavallo et al. (2017); D'Acunto et al. (2019d). A novelty of our results is to show that one's individual broad perception of how some micro prices evolve affects the broad regime of aggregate inflation she/he expects.[18]

Overall, the following Fact summarizes the findings of this subsection:

Fact 2. *While there are variations across different types of households, all types may expect prices to stay about the same. When having such an expectation, a majority of households actually expect that prices will remain stable rather than inflation will remain*

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[17]Table F.1 illustrates how the fraction of individuals perceiving that the price of specific items remained 'stable' varies across households' characteristics.

[18]A related contribution is Montag (2019) who also uses the French survey of households to show that individuals tend to overweight goods that they purchase frequently, typically bread, when forming their views on *current* inflation. He then analyzes the welfare consequences of such a bias in a partial-equilibrium model where households save in a single nominal bond subject to inflation risk. In comparison, we emphasize the effect of individual perceptions on the evolution of specific goods and services on the inflation regime that households expect and analyze the consequence of these expectations on their durable spending.

stable. That belief is also positively correlated with the perception that prices of frequently-bought non-durable items stayed about the same.

3.3 Fluctuations in the extensive margin explain a lot of the fluctuations in the average expectation

We now investigate how fluctuations in the share of households expecting prices "stay about the same" – that we call the *extensive margin* of inflation expectations – contribute to the overall evolution of the average inflation expectation. We compare this with the contribution of fluctuations of the average expectation of households reporting non-stable prices – the *intensive margin* of inflation expectations.

To decompose the variations of average inflation expectations into their extensive and intensive margins, we follow the approach by Klenow and Kryvtsov (2008) in the case of micro-price data. More precisely, let $\pi^e_{i,t|t+1}$ denote individual i's inflation expectation at date t for date $t+1$, and let I_{it} be an indicator variable verifying $I_{it} = 1$ if $\pi^e_{i,t|t+1} > 0$ and $I_{it} = 0$ otherwise. The average of individual expectations, $\pi^e_{t|t+1} = \frac{1}{n_t} \sum_{i=1}^{n_t} \pi^e_{i,t|t+1}$ can be decomposed into two components:

$$\pi^e_{t|t+1} = fr_t \times dp^e_{t|t+1}$$

with $fr_t = \left(\frac{1}{n_t} \sum_{i=1}^{n_t} I_{it} \right)$ the fraction of households with positive inflation expectations and with $dp^e_{t|t+1} = \left(\sum_{i=1}^{n_t} I_{it} \right)^{-1} \left(\sum_{i=1}^{n_t} \pi^e_{i,t|t+1} \right)$ the average among households having non-zero inflation expectations.

Using a first-order approximation around the average inflation, we can decompose fluctuations in the average inflation expectation of households into an extensive margin and an intensive margin:

$$\pi^e_{t|t+1} - \overline{\pi}^e = \underbrace{\left(fr_t - \overline{fr} \right) \overline{dp}^e}_{extensive} + \underbrace{\left(dp^e_{t|t+1} - \overline{dp}^e \right) \overline{fr}}_{intensive} + O(t).$$

Figure 4 plots the result of the decomposition between these two margins: 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.

From this expression, we can write the contribution to the variance of aggregate

expected inflation $\pi^e_{t|t+1}$ of the intensive and the extensive margins as well as the co-movement between the two:

$$V\left(\pi^e_{t|t+1}\right) = \underbrace{V\left(dp^e_{t|t+1}\right)\overline{fr}^2}_{intensive} + \underbrace{V\left(fr_t\right)\overline{dp^e}^2 + 2cov\left(fr_t, dp^e_{t|t+1}\right)\overline{dp^e fr}}_{extensive}$$

Table 5 reports our results for this decomposition. In a first approach, we follow the survey's practice by assuming that households answering prices "to stay about the same" expect zero inflation over next year. In this case, the extensive margin accounts for about 75% of the total variance of the average inflation expectation, with 50% coming from the mere variance of the share of households answering stable prices in the survey.[19]

Table 5 also reports these decompositions when using other imputed values for households answering that prices "will stay about the same". While the average inflation expectation increases with the imputed value, the variance and the contribution of the extensive margin decreases. However, the extensive margin still accounts for about 60% of the fluctuations of average inflation expectations when imputing an inflation rate in between 1% and 1.5%, a range consistent with the average inflation expectation observed among households expecting that prices "will stay about the same" in the additional survey of September 2007 discussed above.

Table 5 further illustrates that the extensive margin matters more in a low-inflation environment. It reports the contribution of the extensive and the intensive margins to the variations in the average inflation expectation in low- and high-inflation regimes, that is when inflation is respectively below and above median inflation over our sample. The contribution of the extensive margin to the variance of inflation is about 90% in a low-inflation environment and about 60% in a higher inflation environment. Overall, the contribution of the extensive margin cannot be neglected to assess the variations of the average inflation expectation.

Fact 3. *A large share of the adjustment in the average inflation expectation comes from changes 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.*

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[19]The extensive margin captures the contribution of the variations of the frequency including the covariance term. If the frequency was constant, the covariance term would be equal to 0 and would not contribute to the variance of aggregate expected inflation.

4 The extensive margin of inflation expectations and consumption decisions

In this section, we investigate how households relate their consume durable consumption decisions to their inflation expectations. Our main finding is that the propensity to buy durables is significantly and positively affected by changes in the inflation regime households expect, but not by changes in the exact inflation number they expect. This finding is robust to using either individuals' own decisions to buy durables or their readiness to spend on durables. Importantly, while the baseline identification exploits cross-sectional variations in expected inflation, our results are preserved when using the short panel dimension of the survey to control for unobserved individual characteristics. Moreover, these findings are also robust to alternative methods of imputation for inflation expectations of households expecting prices to stay about the same. Finally, the results are not driven by households with extreme inflation expectations.

4.1 A discrete choice model of durable consumption

Specification We consider that the decision to buy durable goods between $t-1$ and t, $b_{i,t}$ is a binary process that follows:

$$b_{i,t} = \begin{cases} 1 & \text{if } z_{i,t}^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

where $z_{i,t}^*$ is a latent variable which evolves according to:[20]

$$z_{i,t}^* = \alpha + \beta \pi_{i,t|t+1}^e + \gamma X_{i,t} + \lambda_t + \mu z_i + \epsilon_{i,t} \tag{2}$$

with $\pi_{i,t|t+1}^e$ the inflation expectation formed by household i at date t for the next year (between t and $t+1$), X_{it} a set of individual specific controls which includes perceived inflation (see questionnaire in Appendix, question Q6), intention to buy durables in the next 12 months (question Q14), assessment about own financial situation (questions Q19

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[20] $z_{i,t}^*$ can be interpreted as the difference between the desired stock and the current stock of durable goods. The fact that durable consumption is a discrete choice is consistent with the view that it is subject to fixed costs. It is also consistent with our data, as only one-third of the respondents declare they bought durables over the last year.

to Q21), whether it is the right time to save (question Q11), assessment about aggregate economic situation (questions Q1 to Q5), λ_t fixed-time effects controlling for all aggregate variations, and z_i a set of household fixed characteristics such as age, composition of the household, occupation, income, working regime, education, gender, region, city size.[21]

Our dataset provides two measures for $b_{i,t}$ that were used separately in previous studies. First, individuals' *own* decision to make major purchases given in answer to Question 3. This gives us information on whether household i bought some durable goods over the past year (between $t-1$ and t). Second, as an alternative measure, individual beliefs on whether the current time is a right time to consume durables or not reported in response to Question 4. We also have access to two different measures for the inflation an individual expects for the next year. The *qualitative* assessment given in answer to Question 1 and the *quantitative* estimates provided in response to Question 2.

Addressing potential endogeneity issues   Our baseline empirical model raises three potential identification issues.

First, the identification relies on cross-sectional variation in households' inflation expectations. However, as shown by Vellekoop and Wiederholt (2019), individual fixed effects are key to explain such individual disparities and this can bias our estimates. To clarify why, consider two households. Household 1 typically thinks inflation is 2% but expects higher inflation say 3% and hence she/he thinks it's a good time to buy durable. Household 2 instead typically perceives inflation around 6% but now expects lower inflation, say 5%, going forward which refrains her/him to buy durables. Regressing their willingness to buy on their numerical inflation expectations would yield a negative coefficient, contrasting with the positive link assumed in the data generating process. This issue is mitigated by the fact that we control for a large set of household characteristics z_i that captures most of household-specific effect. Moreover, the information in the survey allows us to control for the current inflation rate perceived by an individual which in the example above captures individual specific bias in inflation perception. Finally, as a robustness check, we use the short panel dimension of the data to verify that our results are preserved when controlling for unobserved household heterogeneity (Section 4.3).

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[21]Expectations about durable good prices might also matter for durable good decisions. However, this question is not asked in the survey so we cannot investigate this effect. As in the literature starting with Bachmann et al. (2015), we focus on the relation between durable good consumption and aggregate inflation expectations.

Second, our specification may also suffer from reverse causality: Households who purchased durables may tend to perceive that prices increased and so to expect a positive inflation rate rather than stable prices. Additionally, households who decide to consume durables may think other households also do and so expect higher current and future prices inflation from excess demand. In both cases, the reverse causality goes through individual perceived current inflation, which we control using the available variable in the survey (see Questionnaire in Appendix question Q6).

Third, our estimates might also suffer from an endogeneity bias resulting from omitted time-varying variables. Higher inflation expectations could be associated with persistent shocks that coincidentally affect households' expected future income, and expected future durable consumption, and hence could be correlated with past durable consumption decisions. To address this potential issue, we control for future consumption plans, expected own financial situation, as well as expected future macroeconomic conditions. Another concern is that higher expected inflation could lead to a tightening of monetary policy, and so a higher the real interest rate which would lower durable consumption choices. We address this concern by controlling for the household's subjective view on whether the time is a right time to save, which is related to the nominal interest rate.[22] In addition to this proxy for the interest rate perceived by individuals, we also estimate the link between consumption and inflation expectation over the ELB period assuming households did not expect any central bank reaction to inflation at that time (Appendix G.5).

Note that endogeneity issues could be responsible for finding a spurious relation between individual inflation expectations and consumption decisions. But it is harder to rationalize why they would explain the difference between the effect of the extensive and the intensive margins of inflation expectations on durable consumption that we emphasize.

4.2 What matters for durables consumption?

The extensive margin matters. Column 1 in the left panel of Table 6 shows the impact of the quantitative measure of inflation expectation on individual own durable consumption decisions when including all individuals in the survey. Column 2 presents the

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[22]The link between interest rates and the average beliefs of whether the time is "a right time to save" is illustrated in Figure E.2 in the Appendix.

results obtained when restricting the sample to households expecting a positive inflation rate. This way, it identifies the effect of the intensive margin of inflation expectations. Finally, column 3 shows the effect of expecting a positive inflation rate instead of prices that will remain stable. This way, it identifies the effect of the extensive margin of inflation expectations.

As column 1 illustrates, the link between inflation expectations and durable consumption is positive but non significant when considering all cross-sectional difference in expected inflation. Columns 2 and 3 of Table 6 reveal that this actually mixes up two very different effects of the intensive and the extensive margin of inflation expectations. While the effect of the intensive margin is negative and non significant (col. 2), the effect of the extensive margin is positive and significant (col. 3): When households expect prices to increase rather than stay the same, the probability that they have made a durable purchase increases by about 1 percentage point.

As the right panel of Table 6 shows, these results stay the same when looking at the impact on individual expectations on the perception that the time is a good time to buy durable goods. In particular, the probability that they consider that, in general, it is a good time to buy durable increases by roughly .63 percentage point as reported in the third column of the right panel of Table 6.

Overall, quantitative variations of expected inflation have no significant impact on durable decisions. This is reminiscent of the results obtained by Bachmann et al. (2015) on a survey of US households. Our additional evidence shows that this conceals the positive impact of the extensive margin of inflation expectations.

Do other expected inflation regimes matter? The previous results could mask an heterogeneous reaction of durable consumption to different subsets of positive inflation expectations. To investigate such a possibility, we run the same regression as above but splitting inflation expectations into different brackets, namely below 0%, 0%, between 0 and 3%, between 3 and 5%, between 5 and 10% and higher than 10%. The results are displayed in the fourth column of the two panels of Table 6. When households report a positive inflation expectation – whatever the value between 0 and 10%, their probability of making large purchases is higher by about 1 percentage point than when they expect prices to remain stable. The only difference is when inflation is expected to

be larger than 10% in which case the effect on durable consumption is the same than when answering stable prices.[23] As Figure 5 illustrates, this result also holds when considering finer expected inflation brackets of 1 percentage point. This also shows that the absence of effects along the intensive margin is not driven by any particular value of inflation expectations.

Let us also mention that Table 6 and Figure 5 also clarify where the positive impact of the extensive margin is coming from: this positive impact is driven by households expecting between 0% and 10% of inflation. In contrast, households expecting higher-than-10% inflation levels are playing no role for the extensive margin as consumption patterns are not different from households expecting stable prices.[24]

We also investigate if other differences in qualitative inflation regimes that households expect matter for durable consumption. Table 7 shows the results obtained when using the qualitative measure of inflation expectations (Question 1) instead of the quantitative measures in the previous regression.[25] Considering qualitative inflation expectations more than double the sample size as a large number of households only reply to this question and not to the quantitative one. Column 1 confirms on this larger sample the previous result that when a household expects something different than "stay about the same", they are more likely to make major purchases, by .83 percentage point, compared to the case where the household answers "stay about the same". Column 2 shows that, when splitting the qualitative inflation expectations into the five different regimes available instead of the mere "stable prices" versus "positive inflation" distinction, the relation between expected inflation and durable consumption is not monotonic. However, these differences are of second order compared to the difference between expecting stable prices or positive inflation: The distinction that really matters when it comes to consumption decisions is between the "prices stay about the same" and the "positive inflation" regimes. Columns 3 and 4 confirm these results on the subsample of households that reply to both

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[23]This finding is consistent with a high-inflation expectation regime in which households consume less. This is consistent with our main result that inflation expectations affect durable consumption through the broad inflation regime and not the precise quantitative inflation that households expect.

[24]When we restrict our sample to households answering less than 10%, we find a stronger positive relationship between quantitative inflation expectations and durable consumption decisions but this relationship is fully driven by the extensive margin effect (see Table G.2 in the appendix). In other words, the extensive margin effect is not driven by households expecting very high inflation levels.

[25]Table D.3 in the Appendix reports the connections between the qualitative and quantitative questions (see also Stanislawska et al., 2019, for further facts on these connections). Here we focus on Question 3 on household purchases of durable goods over the last 12 months. The previous results hold when we extend the sample to households reporting only a qualitative answer to the inflation expectation questions.

the qualitative and quantitative questions on inflation expectation.

Main fact. Overall, there exists a positive link between inflation expectations and durable consumption, but mostly through inflation expectations shifting from stable prices to positive inflation. The decision to consume durable goods is uniform across households expecting positive inflation as this appears in Figure 5, with the exception of households expecting very large inflation rates. In other words, households do not seem to act on the exact level of inflation expectation that they report, but to the broad qualitative inflation regime they expect. Our findings are summarized in the following fact:

Fact 4. *Households' durable consumption is positively related to the extensive margin of households' inflation expectations. In contrast, durable consumption does not significantly vary with the intensive margin of inflation expectations.*

4.3 Robustness

Panel regressions. Although the dataset is not a panel, some individuals are surveyed several times. We use this panel dimension of our dataset to check that our results are not driven by unobserved household's characteristics. Reconstructing a panel from the sequence of cross-section data present several challenges that we detail in Appendix G.3 and the panel dimension obtained remains short, which limits the possibility to obtain precise estimates. The first panel of Table 8 reports the estimation of panel Probit models with households random effect, still controlling for observed households heterogeneity. The overall picture does not substantially differ with the one from our baseline regression.[26]

Imputation. In our benchmark regression, we impute a 0% inflation expectation to households expecting prices to "stay about the same". We provide additional evidence that our main result is not an artefact of this specific imputation. Namely we run the same regression but impute to households expecting prices to "stay about the same" values of inflation expectations that are randomly drawn from the distribution of inflation

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[26]We also report in Appendix G.3 the results of Logit models with fixed household effects using the qualitative answers to expected inflation to keep the sample sufficiently large. The results are very similar with our benchmark specification: Households are more likely to consume when they expect prices to increase instead of remaining stable.

expectations observed in the ad-hoc additional survey of September 2007. The results obtained are reported in the second panel of Table 8. We confirm that the extensive margin of inflation expectation has a significantly positive impact on durable consumption (See Figure G.2 in the Appendix). The intensive margin has the same negative impact than in the baseline although the effect becomes significant. As discussed previously, this negative effect is driven by individuals with high inflation expectations, which can be considered as a third broad inflation regime that households have in mind.

Outliers. As Figure 2 illustrates, a significant share of households have inflation expectations that are well above the typical inflation realization over the sample period studied. Bachmann et al. (2015) emphasize that these outliers can affect estimates of the link between expected inflation and households' durable consumption decisions. In the third panel of Table 8 we report the estimation results obtained when dropping 'extreme' expected inflation, more specifically households expecting that inflation will be larger than 10% over the following year. The results illustrate that dropping these outliers lead to find a positive overall effect of expected inflation on durable spending.

5 Heterogeneity across households

In this section, we investigate how our baseline results vary across households. The bottom-line is that there is substantial heterogeneity in how expected inflation impacts durable spending. In particular, households households that tend to face relatively stronger cognitive or financial constraints also tend not to react to expected inflation when making their durable consumption choices. However, our baseline results are not driven by these households.

High-income, and older households are driving the aggregate effect of the extensive margin. Table 9 shows regression results obtained for different categories of households. We find a stronger effect of inflation expectations for high-income and middle-age households. There is no statistically significant difference between men and women. In contrast, for young and low-income—in the bottom quartile of the income distribution—households inflation expectations do not necessarily have a statistically significant effect on durable consumption. As younger and lower-income households are more

subject to financial constraints, these results are consistent with the fact that financially-constrained households do not link expected inflation and durable consumption decisions. Overall, even though every type of households tends to adjust its inflation expectations depending on the inflation regime that they perceive (see Table 2 above), their inflation expectations do not systematically affect their propensity to buy durable goods.

High-educated, and households with more precise expectations are driving the aggregate effect of the extensive margin. The results in Table 9 also show that our findings in Section 4 are not driven by individuals with low-education or with low precision of inflation forecasts, two variables which correlate with individuals' cognitive limits. Indeed, D'Acunto et al. (2019a,b,c) show that these proxies are related, although imperfectly, to IQ which is a more objective and exogenous measure of individuals' cognitive constraints. Households with lower education level and with less precise inflation forecast have durable consumption decisions that are not related to their inflation expectation, consistently with the findings of D'Acunto et al. (2019c). In contrast, households with high education levels and more precise forecasts do, but only via the extensive margin.[27]

This leads to our fifth fact:

Fact 5. *When individuals are more prone to financial constraints or have stronger cognitive limits, their propensity to buy durable goods react less to expected inflation. When households' inflation expectation matters this is predominantly through the extensive margin rather than the intensive margin of inflation expectation.*

6   Further results and relation with previous studies

As discussed in the introduction, the literature studying how individual inflation expectations affect households' consumption has reached different conclusions. We find a positive impact, consistent with D'Acunto et al. (2016) or Coibion et al. (2019a), but we highlight that this positive link comes from the extensive margin of inflation expectations. In this

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[27]One concern may be that households who bought durable goods are more aware of prices and hence have more precise views on inflation. In Appendix G.1 we provide evidence that the forecast errors on inflation between households who consume and those who do not consume durables do not differ statistically significantly.

section, we document how to reconcile our findings with the studies that found a negative effect of inflation expectations on consumption expenditure as e.g. Bachmann et al. (2015).

6.1 The role of controls

The first panel of Table 10 illustrates how our results vary when progressively including controls about perceived and expected own and macroeconomic variables. The first column reports how durable consumption decisions vary with individual inflation expectation when one looks at their overall cross-section variations: The effect is significantly negative when one does not control for expected future macroeconomic outcomes and personal situation and then becomes non-significant when these controls are added. The second column looks at the impact of cross-section variations of inflation expectations along the intensive margin: Again, the effect is significantly negative when one does not control for expected future macroeconomic conditions and personal situation and then becomes non-significant when these controls are added. This is consistent with the results of Candia et al. (2020) and the stagflation view of inflation whereby higher future inflation is associated with worse perceived economic conditions and prospects. Finally, the third column reports the impact of cross-section variations of inflation expectations along the extensive margin: These have a non-significant impact on durable consumption decisions when one does not control for expected future macroeconomic outcomes and personal situation. However, this impact becomes positive and significant when these controls are added. Overall, controlling for expected future income is important to exhibit the positive link between expected inflation and durable consumption. Crucially, that link goes through differences along the extensive margin. Looking at the intensive margin or the overall variations does not allow to identify this positive link.

These results shed some light on one reason why the recent empirical literature assessing the link between inflation expectations and consumption decisions is rather inconclusive. When controlling for a large set of individual perceptions, in particular expected income, our estimates of the link between inflation expectations and consumption decisions shift from being negative to non-significantly positive.

By contrast, as Table 6 above illustrates, looking at individual perceptions about aggregate consumption or at individual consumption choices does not matter much to

identify the effect of inflation expectations on durable consumption.

6.2 Additional country evidence

We also investigate how the extensive margin of inflation expectations matters for durable consumption in two other surveys that have been used in the literature: The German survey of households and the US Michigan survey of consumers. A limit compared with the French data is that these surveys only have information on individuals' readiness to spend on durables no information on households' own durable consumption. However, the set of controls is similar. As for the French survey, we had access to a 2004-2018 sample period for the German data. We had access to a longer sample covering the 1984-2020 period for the US survey.[28]

We report the results of the baseline regression obtained on these additional data in the bottom panel of Table 10. Like French households, US and German households expecting that prices will increase are more likely to report that the time is a good time to buy durable compared to households expecting stable prices. A difference with the French survey is that the effect of the intensive margin is significantly negative leading to an overall effect that is also significantly negative. However, further investigation shows that this effect is mainly driven by households expecting a relatively high inflation rate, more specifically greater than 5%, who have a lower readiness to spend than the average.[29] These households behave like the households expecting that inflation will be greater than 10% in the French survey. Understanding these country differences is left as an open question.

Overall, our main results remain valid on these alternative samples: Differences in the qualitative inflation regime that households expect lead to differences in durable consumption. And households expecting a moderate positive inflation regime have a higher readiness to spend compared with the households expecting prices to remain stable. These results also stress that the regression specification typically used in the literature tend to conceal the positive effect of the extensive margin of inflation expectations on households' durable spending.

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[28]Differences in survey design as well as lack of information prevent us from implementing an analysis as rich as the one we can conduct with the survey of French households. Appendix H for Germany and Appendix I for the US give a detailed description of the surveys and further replication of the results that we obtain on France.

[29]See Figures H.1 and I.1 in the appendix for details.

7 Conclusion

In this paper, we provide new evidence on how households form their inflation expectations and how they matter for their consumption decisions. Our findings point out at the importance of the subjective and broad inflation regime that households expect. In particular, in the case of the French survey, we identify that the most important component in expectations is the share of households that expect prices to "stay about the same".

Our results have important implications for how expected inflation can affect aggregate demand.[30] First, although significant, the link between inflation expectations and aggregate demand that we obtain is lower than the ones that could be obtained from typical New Keynesian models. According to our results, changes in the average inflation expectation have no effect on durable consumption if they are not associated with a change in the share of household expecting 'stable' prices. The behavioral friction that we uncover thus limits the inflation expectation channel compared to the standard full information and rational expectation setup.

Second, and more specific to such a friction, monetary policy can run out of ammunitions, at least for the specific set of regimes French households have in mind. The simple reason is that the share of households expecting prices to "stay about the same" is naturally bounded and it cannot decrease below 0. Once everybody is in the positive expected inflation regime, increasing expected inflation further does not increase durable consumption. There is thus "limited ammunition" for policies aiming at increasing aggregate demand through inflation expectations–such as forward guidance or average inflation targeting—corresponding to this share of households expecting that prices will stay about the same.

This limited ammunition implication of our results holds "locally", as the inflation regimes that we identify are specific to the low inflation environment that characterizes the sample period considered. Policies and inflation realizations could also modify the inflation regimes households have in mind so that the expectation channel could still be at play. But the modification of households' decision rules would probably require stronger and more persistent policy moves than those usually considered (see Carvalho et al., 2020, for an analysis of such non-linearities in expected inflation).

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[30]We develop these points more formally in the Appendix A that introduces an inflation expectation channel working though the extensive margin in an otherwise standard New Keynesian model.

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Tables

Table 1: Inflation expectations and durable consumption – Some descriptive statistics

Inflation expectations	Average	Correlation with	
		π, Headline	π, excl. Energy
Whole sample	2.82	0.79	0.48
	(0.64)		
% of Stable Prices	0.33	-0.68	-0.26
	(0.11)		
HHs answering non-stable	4.15	0.63	0.63
	(0.46)		

Durable consumption	Frequency	Corr. with consumption	
		Overall	Durables
Own Major Purchases Over the Past 12 Months			
Yes	0.31	0.45	0.41
No	0.69	-0.45	-0.41
Right Time to Purchase ('Readiness to Spend on Durables')			
Yes	0.15	0.38	0.44
Neutral	0.51	0.68	0.64
No	0.34	-0.66	-0.67

Note: This table reports simple statistics calculated using individual answers to the quantitative question on inflation expectations and the answers to the 2 questions on durable consumption ("Have you made major purchases during the last 12 months?" and "Do you think it is the right for people to make large purchases?"). The first panel looks at 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 HICP inflation (source Eurostat) and HICP inflation excluding energy and unprocessed food (source Eurostat). "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. The second panel looks at durable consumption. We first compute the average proportion of answers for 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 (source Insee).

Table 2: Heterogeneity of inflation expectations across time and individuals

| | | Avg of π_{it}^e | | | Regress π_{it}^e on π_t | | |
		All	Share of "Stable"	Among $\pi^e > 0$	All	Extensive	Intensive
Whole sample		2.97	32.0	4.48	0.388***	3.05***	0.405***
Periods	High infl.	3.44	26.6	4.79	0.406***	0.71***	0.537***
	Low infl.	2.56	36.9	4.16	0.519***	6.16***	0.485***
Gender	Female	3.03	35.4	4.87	0.353***	2.63***	0.377***
	Male	2.97	30.2	4.34	0.456***	3.26***	0.420***
Age	16-29	3.23	29.9	4.75	0.222***	2.54***	0.202***
	30-49	3.29	27.9	4.69	0.409***	2.80***	0.417***
	50-64	3.15	28.6	4.51	0.458***	2.99***	0.474***
	65+	2.40	40.6	4.11	0.314***	2.81***	0.337***
Education	Primary	2.66	40.2	4.63	0.275***	2.73***	0.263***
	Secondary	3.03	32.8	4.65	0.420***	2.55***	0.470***
	Further	3.04	29.1	4.37	0.402***	3.51***	0.395***
Income	$< Q1$	2.94	36.6	4.84	0.318***	2.53***	0.335***
	$]Q1 - Q2]$	3.01	34.0	4.70	0.366***	2.77***	0.385***
	$]Q2 - Q3]$	3.12	30.4	4.58	0.407***	3.13***	0.417***
	$> Q3$	2.88	28.2	4.06	0.437***	3.70***	0.445***

Note: The three first columns report average statistics on expected inflation by categories of households. "All" refers the average calculated using all values of expected inflation collected by the survey including 0s. "Share of Stable" refers the proportion of households reporting "stable prices" or 0 expected inflation. "Among $\pi^e > 0$" is the average of expected inflation calculated only on non-zero values. The three last columns report results of simple regressions where the endogenous variable corresponds to: i) all expected inflation values (OLS model), ii) a dummy variable equal to 1 if a given household expects a non-zero inflation (Extensive margin, Probit model) iii) non-zero inflation expectations marginal effect (Intensive margin, OLS model). In all equations, we have reported the coefficient or marginal effect associated with the exogenous variable HICP inflation. Each cell corresponds to the result of a model where the sample is restricted to a given household category. 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...), answers to the question about future plans for major purchases and a dummy variable for 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 3: Perceived price evolutions of specific goods and services

	Share of Households (in %)				
	Decrease	Stable	Increase	Large increase	It depends
Bread	0.2	19.2	58.1	17.2	5.3
Beef	0.7	23.9	59.9	10.0	5.5
Food oil	0.8	43.3	45.9	3.9	6.0
Electricity	1.1	24.7	60.9	12.1	1.2
Car repair	0.0	16.1	55.9	19.6	8.4
Gasoline	16.5	10.2	30.4	41.2	1.7
Phone/internet	5.0	58.2	27.7	4.1	5.1
Washing machine	11.5	52.8	21.5	0.7	13.5
TV set	35.8	25.0	14.9	2.5	21.9

Note: This table reports the proportions of households answering to product-specific questions on perceived price changes in the one-off modules incorporated in the regular survey of April 2007 and February 2009 (see Appendix F for details on the one-off modules of additional questions). For each product, columns sum to 100.

Table 4: Perceptions of specific prices and beliefs about future aggregate inflation

| | Perceived price impact on expectation of "positive inflation" | | | | | Nb obs |
	Decrease	Stable	Increase	Large increase	It depends	
Bread	-0.626	Ref.	7.626***	3.989***	6.213***	3,534
	(5.195)		(1.409)	(0.211)	(0.612)	
Beef	5.262	Ref.	10.988***	10.023***	5.609	3,177
	(14.082)		(6.733)	(1.963)	(4.657)	
Oil	3.968	Ref.	8.231***	7.929***	-2.540	2,786
	(14.097)		(0.125)	(2.936)	(3.994)	
Electricity	-6.198	Ref.	4.971***	0.804	0.535	3,342
	(9.836)		(1.262)	(2.488)	(10.015)	
Car repair	-	Ref.	5.481***	7.450*	3.721	2,547
			(1.720)	(4.107)	3.017)	
Gasoline	0.323	Ref.	7.656***	7.569***	1.988	3,416
	(0.800)		(2.005)	(0.369)	(5.846)	
Phone/internet	-2.941	Ref	3.609**	2.510***	11.039***	3,520
	(6.174)		(1.696)	(0.310)	(4.026)	
Washing machine	-2.951	Ref.	9.106***	7.535	3.106***	2,157
	(2.416)		(0.873)	(18.803)	(0.396)	
TV set	-6.901**	Ref.	6.275***	4.524**	2.425***	2,871
	(3.623)		(2.149)	(2.175)	(0.504)	

Note: This table reports marginal effects (in percentage points) from Probit regressions where the endogenous variable is a dummy variable taking the value 1 if an household answers that she expects prices to increase over the next 12 months. We keep only observations for which the quantitative answer on expected price inflation is available. Overall, the sample contains individual observations collected in April 2007 and February 2009 supplementary modules (see Appendix F for details on the one-off modules of additional questions). 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 5: Fluctuations in average inflation expectation: Extensive vs Intensive Margins

Imputed Value (in %)	Average Agg. Expect.	Var. of Agg. Expect.	Contrib. Extensive			% of Variance	
			Tot.	Freq.	Cov.	Ext.	Freq.
Baseline							
0 - All sample	2.82	0.41	0.30	0.20	0.10	73.2	49.4
0 - Low inflation	2.43	0.41	0.36	0.26	0.10	88.4	64.2
0 - High inflation	3.20	0.42	0.25	0.15	0.10	58.4	35.0
Robustness							
0.5	2.98	0.35	0.24	0.16	0.09	69.0	44.6
1	3.14	0.30	0.19	0.12	0.07	63.8	39.1
1.5	3.30	0.25	0.15	0.08	0.06	57.5	32.8
2	3.47	0.21	0.11	0.06	0.05	49.7	25.7
2.5	3.63	0.18	0.07	0.03	0.04	40.2	18.2

Note: This table reports simple statistics on the mean and variance of aggregate inflation expectations depending on the average value imputed to households answering prices will stay about the same (col. 1) and assuming no time variation in the average expectations of these households' answers. Assumption '0' is our baseline scenario. Col. 2 is the average aggregate expectation over time (over all types of answers to the quantitative question, imputed or not), Col. 3 reports the time variance of this average aggregate expectation. Col. 4-5-6 report the contribution of the extensive margin to the overall variance of inflation (Total and separately the relative contribution of the time variations of the share of answers 'stay about the same' and the covariance term). Col. 7 the relative contribution of extensive margin to the overall variance (the relative contributions of extensive and intensive margins sum to 100%). Col. 8 the relative contribution of the time variations of the share of answers 'stay about the same'. In Appendix F.3, we provide more details on how to obtain this table and other robustness checks.

Table 6: Effects of Inflation Expectations on Durable Consumption – Baseline

	Own Major Purchases Over the Last 12 Months				Right Time to Purchase			
	All	Intensive (Excl. 0)	Extensive	All Quali.	All	Intensive (Excl. 0)	Extensive	All Quali.
π^e	0.005	-0.045	1.021***		0.006	-0.021	0.632***	
	(0.027)	(0.037)	(0.337)		(0.015)	(0.019)	(0.185)	
π^e by intervals:								
[10%;+∞[				0.043				-0.096
				(0.574)				(0.296)
[5%;10%[				1.491***				0.790***
				(0.462)				(0.280)
[3%;5%[				1.257***				1.176***
				(0.492)				(0.300)
]0%;3%[				1.240***				0.848***
				(0.417)				(0.251)
0%				Ref.				Ref.
< 0%				-0.258				-0.070
				(1.332)				(0.821)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	136,574	92,002	136,574	136,574	134,117	90,566	134,117	134,117

Note: This table reports marginal effects (in percentage points) from resp. Probit and and Ordered Probit regressions where the endogenous variable is coded from the answers to the questions "Have you made major purchases during the last 12 months?" and "Do you think now is the right time for people to make major purchases". For question "Have you made major purchases during the last 12 months?", the endogenous variable is a dummy variable equal to 1 if the household answers 'YES' to the questions "Have you made major purchases during the last 12 months?". The endogenous variable is a variable taking 3 different values 0 if the household answers 'No, it is the wrong time', 1 'It is neither the right time nor the wrong time', 2 'Yes, now is the right time' to the question "Do you think now is the right time for people to make major purchases". Marginal effects are calculated for the value 'Yes'. 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, right time to save and perceived inflation. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.

Table 7: Effects of Inflation Expectations on Durable Consumption – Qualitative Answers

| | Own Major Purchases Over the Last 12 Months | | | | Right time to purchase | | | |
| | All Answers | | Non-Missing Quantitative Answers | | All Answers | | Non-Missing Quantitative Answers | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\pi^e \neq 0$	0.835***	-	1.021***	-	0.267**	-	0.646***	-
	(0.213)		(0.337)		(0.134)		(0.180)	
Increase more rapidly		1.721***		1.442***		0.0553		0.443
		(0.333)		(0.522)		(0.224)		(0.292)
Increase at the same rate		0.727***		0.924***		0.323**		0.758***
		(0.231)		(0.361)		(0.142)		(0.197)
Increase at a slower rate		1.277***		1.339***		0.839***		1.080***
		(0.284)		(0.464)		(0.159)		(0.238)
Stay about the same		Ref.		Ref.		Ref.		Ref.
Fall		0.821		-0.243		0.270		0.513
		(0.763)		(1.333)		(0.513)		(0.779)
DK		-0.677		-		0.256		-
		(0.447)		-		(0.269)		-
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	312,921	312,921	136,574	136,574	302,330	302,330	138,571	138,571

Note: This table reports marginal effects (in percentage points) from Probit regressions where the endogenous 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?". The first two columns report results for all answers to the qualitative question on expectations. The last two columns report results excluding households with missing observations on the quantitative question on both inflation expectations and perceptions. 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, right time to save and perceived inflation. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.

Table 8: Effects of Inflation Expectations on Durable Consumption – Robustness

	All π^e	Intensive margin $(\pi^e > 0)$	Extensive margin $(\pi^e = 0 \text{ vs } \pi^e > 0)$
Baseline	0.005	-0.045	1.021***
	(0.027)	(0.037)	(0.337)
Panel regression	0.002	-0.027	0.636**
	(0.023)	(0.033)	(0.285)
Alternative imputation	-0.009	-0.041***	0.779***
	(0.065)	(0.010)	(0.268)
Excluding outliers	0.226***	0.003	1.452***
	(0.074)	(0.109)	(0.343)

Note: This table reports marginal effects (in percentage points) from Probit regressions, where the endogenous 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?". Each cell of the table corresponds to a robustness regression. In columns, we report results for three different variable for expected inflation: all answers, only positive answers ("intensive margin"), a dummy equal to 1 for positive answers ("extensive margin"). Each row corresponds to a different robustness analysis. "Panel regression" reports results from a panel regression with random individual household effects. "Alternative imputation" reports regressions that are run on 50 different samples in which we have imputed the answers on quantitative inflation expectations for households answering prices will remain the same. For that, we have reproduced the distribution observed in September 2007 in the complementary module. The 50 different samples correspond to different seeds for the DGP of the imputation. We have reported average marginal effects over the 50 regressions and the standard deviation of the distribution of the marginal effects. "Excluding outliers" reports results when we exclude households expecting inflation rates above 10%.

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, right time to save and perceived inflation. *p<0.1; **p<0.05; ***p<0.01.

Table 9: Effects of Inflation Expectations on Durable Consumption – Heterogeneity

		All HHs (Excluding $\pi^e = 0$)	Intensive margin ($\pi^e = 0$ vs $\pi^e > 0$)	Extensive margin
Gender	Female	-0.005	-0.013	1.317**
		(0.034)	(0.51)	(0.550)
	Male	0.012	-0.081	0.725**
		(0.40)	(0.049)	(0.368)
Age	16-29	0.117	0.187	-0.719
		(0.086)	(0.125)	(1.190)
	30-49	0.009	-0.045	0.512
		(0.40)	(0.52)	(0.539)
	50-64	0.012	-0.069	1.831***
		(0.047)	(0.075)	(0.518)
	65+	-0.036	-0.091	0.944*
		(0.056)	(0.80)	(0.543)
Education	Primary	-0.087	-0.073	0.200
		(0.057)	(0.48)	(0.702)
	Secondary	0.097**	0.023	1.689***
		(0.041)	(0.058)	(0.527)
	Further	-0.034	-0.073	0.832*
		(0.037)	(0.048)	(0.443)
Income	$< Q1$	-0.037	-0.104*	0.508
		(0.040)	(0.054)	(0.556)
	$]Q1 - Q2]$	0.013	-0.097	1.039*
		(0.46)	(0.063)	(0.622)
	$]Q2 - Q3]$	0.020	0.188	0.029
		(0.046)	(0.067)	(0.624)
	$> Q3$	0.033	0.011	1.154**
		(0.067)	(0.094)	(0.584)
Forecast Error	<median	-0.066**	-0.097	1.660***
		(0.028)	(0.105)	(0.381)
	> median	-0.069**	-0.069**	0.631
		(0.030)	(0.031)	(1.130)

Note: We report marginal effects (in percentage points) 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 household category. Col. 1 "All HHs" we include quantitative answer to the question on inflation expectations, col. 2 we consider only non zero answers to the question on inflation expectations, col. 3 we use a dummy variable equal to 1 if the HH answers 0 to the quantitative question on inflation expectations. 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. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.

Table 10: Effects of Inflation Expectations on Durable Consumption – Role of controls and additional country evidence

	All HHs	Intensive margin (Excluding $\pi^e = 0$)	Extensive margin ($\pi^e = 0$ vs $\pi^e > 0$)
A - Role of controls- Own Major Purchases			
No Perceived / Expected Variables	-0.210***	-0.255***	-0.000
	(0.019)	(0.022)	(0.297)
+ Perceived Inflation	-0.096***	-0.152***	0.057
	(0.027)	(0.036)	(0.338)
+ Expected Own Durable Consumption	-0.065**	-0.113***	0.197
	(0.027)	(0.036)	(0.335)
+ Expected Own Financial Situation	-0.031	-0.080**	0.636*
	(0.027)	(0.036)	(0.337)
+ Past and Current Own Financial Situation	-0.022	-0.072**	0.732**
	(0.027)	(0.036)	(0.332)
+ Expected Business Cycle & Unemployment	0.000	-0.051	1.016***
	(0.027)	(0.036)	(0.330)
+ Good Time to Save (Baseline)	0.005	-0.045	1.021***
	(0.027)	(0.037)	(0.337)
B- Additional country evidence - "Right Time to Purchase"			
French households (baseline)	0.006	-0.021	0.632***
	(0.015)	(0.019)	(0.185)
German households	-0.073***	-0.118***	0.832***
	(0.019)	(0.018)	(0.277)
US households	-0.134***	-0.276***	0.743**
	(0.026)	(0.030)	(0.297)

Note: Panel A of this table reports marginal effects (in percentage points) from Probit regressions where the endogenous 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?". In all regressions, we keep basic control variables such as year and month dummies, household characteristics (age, location (city, region) diploma, job, income, survey wave (1, 2 or 3). Other control variables include answers to other question on French economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases, right time to save and perceived inflation. In the first regression we remove all the other control variables whereas in other regressions, we add control variables one by one. Panel B reports additional country evidence using answers to the question "Do you think now is the right time for people to make major purchases" in France, Germany and in the US. 'French households' reports our baseline marginal effects estimated on the French data. (in percentage points) from Ordered Probit regressions where the endogenous variable is a variable taking 3 different values 0 if the household answers 'No, it is the wrong time', 1 'It is neither the right time nor the wrong time', 2 'Yes, now is the right time' to the question "Do you think now is the right time for people to make major purchases". Marginal effects are calculated for the value "Yes". We control for all observable households characteristics and other answers to the survey. 'German households' reports marginal effects obtained from the equivalent regression using German data (GfK survey on German households, see Appendix H for more details). 'US households' reports marginal effects (in percentage points) from Ordered Probit regressions where the endogenous variable is a variable taking 3 different values 0 if the household answers 'Bad', 1 'Pro-Con', 2 'Good' to the question "Generally speaking, do you think now is a good or a bad time for people to buy major household items?". Marginal effects are calculated for the value 'Good'. We use individual data from the Michigan Survey. We control for all observable households characteristics and other answers to the survey. Extensive margin (US): the dummy variable is equal to 1 if inflation is strictly positive, 0 otherwise. In Appendix, Table I.1 and Figure I.1, we report more detailed results for the US. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.
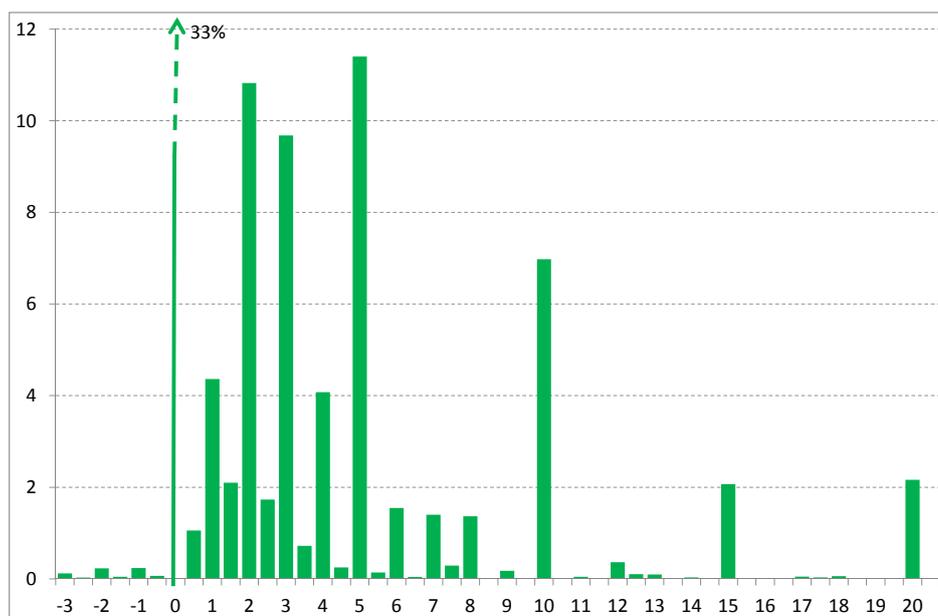
Figures

### Figure 1: Expected Inflation and Headline HICP inflation
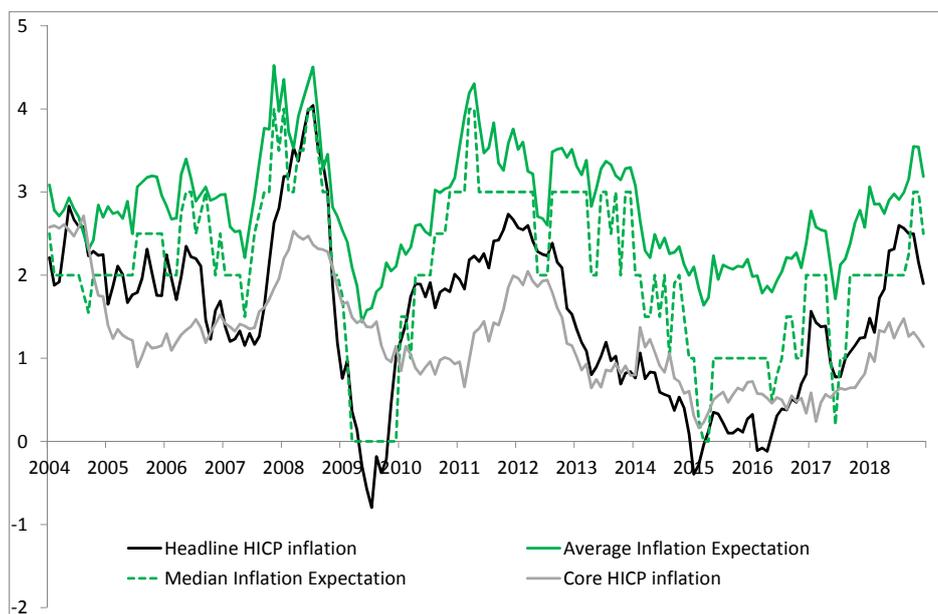
Note: using answers to the quantitative questions on inflation expectations (we have dropped quantitative inflation perceptions larger than 20%), we have computed the simple average/median of all answers date by date. Before 2008, the survey was not conducted in August, in that case, we have replaced aggregate statistics by a simple interpolation between July and September. We have also plotted as benchmarks headline HICP inflation (source Eurostat) and HICP inflation excluding energy (source Eurostat).

Figure 2: Cross Distribution of Inflation Expectations


Note: we here represent the distribution of inflation expectations across households computed over the period Jan. 2004 - Dec. 2018. The proportion of answers above 20% is not reported. The distribution is unweighted.

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

a) Average Expectation

b) Share of Stable Prices

c) Average Non-Zero Expectation
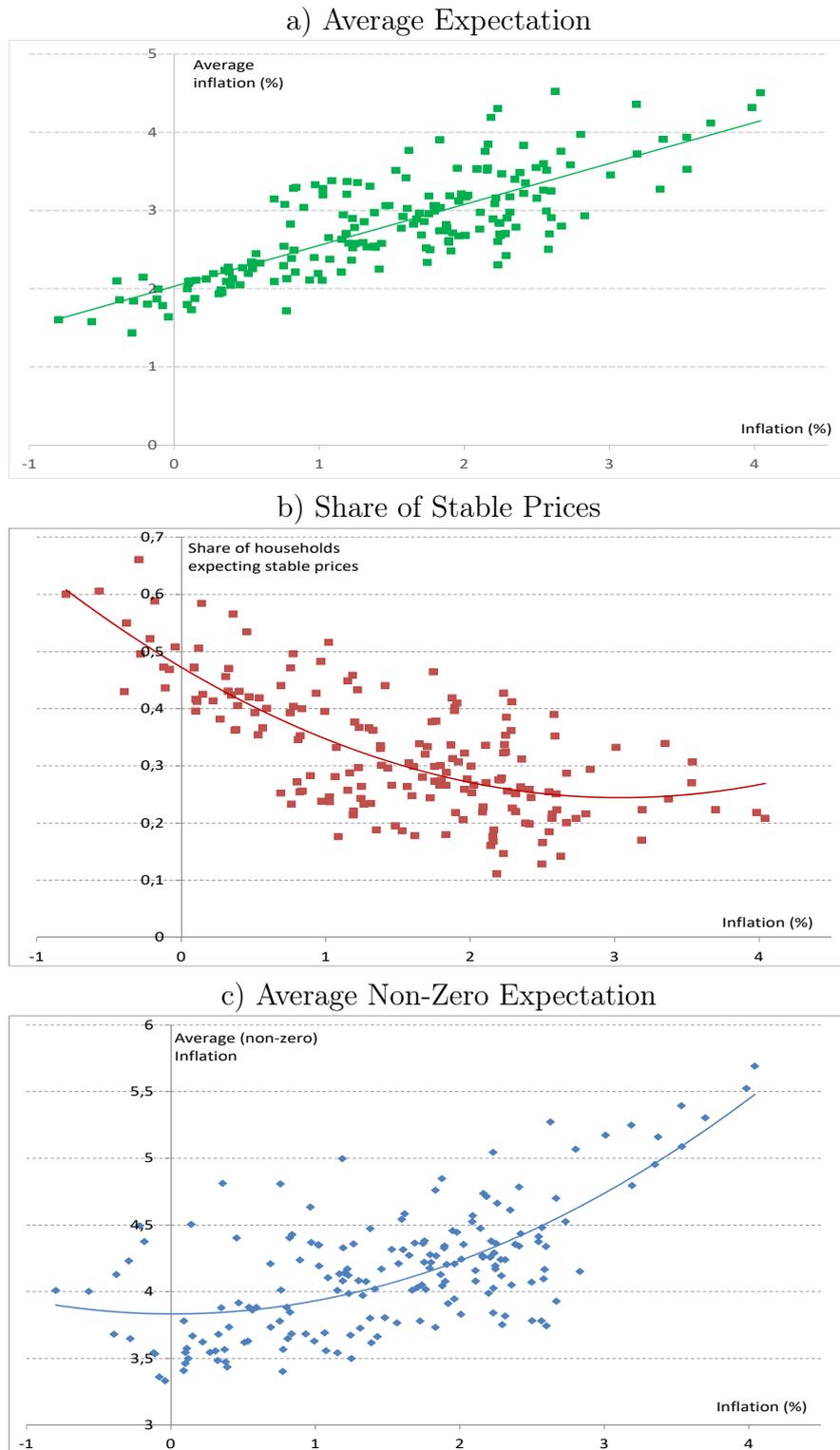
Note: Panel (a) is the scatter plot of average expectation and headline CPI inflation (monthly data). The green line is simple polynomial of degree 2 fitting the data. Panel (b): we have first computed date by date the proportion of individuals reporting expected stable prices (i.e. 0% inflation) and (b) 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. Panel (c): 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. The blue line is simple polynomial of degree 2 fitting the data.

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Figure 4: Aggregate Inflation Expectations Decomposition - Extensive vs Intensive Margins
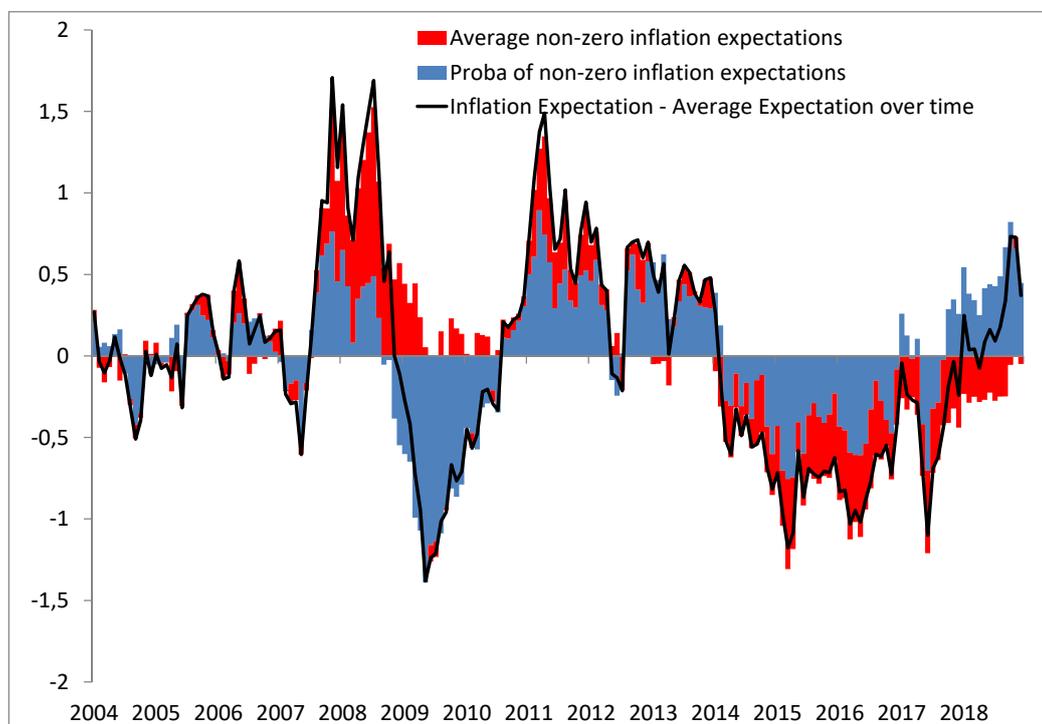
Note: we plot contributions to aggregate inflation expectations. Black line: aggregate average expected inflation - mean aggregate average expected inflation; blue histogram: contribution of time variations of the probability of non-zero answers (extensive margin); red histogram: contributions of time variations in the average expected inflation (intensive margin).

Figure 5: Marginal Effect of Inflation Expectations on Decision to Buy

a) Own Durable Consumption

b) Right Time to Buy

Note: These two figures plot our estimates of marginal effects of inflation expectations on decision to buy durables (Panel (a) 'own consumption'; Panel (b) 'Right Time to consume'). The orange line reports results where we have grouped answers by 'smaller' brackets. The reference is 0% (negative answers were grouped in a single bracket but not reported on the graph). Marginal effects are reported in percentage points. Dashed orange lines correspond to the 95% confidence interval. The dashed dark line corresponds to our baseline estimates with 'large' brackets (as reported in Table 6) and the grey shaded area corresponds to the 95% confidence interval associated with these estimates.

Appendix

A A New Keynesian model with an extensive margin of households' inflation expectations

We illustrate the importance of the extensive margin of inflation expectations in a stylized NK model that features (1) households who have heterogeneous views about inflation and (2) households whose consumption decisions react only to shifts between 0- and strictly positive inflation expectations. The importance of the extensive margin for consumption decisions has implications for the transmission of shocks and for policies relying on expectation such as forward guidance.

Model. We illustrate our discussion with simulations of a simple three-equation NK model featuring a ZLB constraint and households that are heterogeneous because of their inflation expectations as in Andrade et al. (2019).

$$c_{it} = E_{it}c_{it+1} - \sigma\left(r_t - mE_{it}\pi_{t+1}\right) + \delta_t,$$

with c_{it} is log-consumption of individual i at time t, $E_{it}(\cdot)$ is the expectation conditional on individual i's information at date t, σ is the elasticity of intertemporal substitution, r_t the nominal interest rate, m is an operator mapping expectations into decisions that we specify below, π_t is aggregate inflation between t and $t-1$, and δ_t is a common preference shock. Every variable is expressed in deviation from its steady state.

In addition to this heterogeneity across households we assume that, consistent with our results, individuals map their inflation expectations into their consumption decisions according the following function:

$$mE_{it}\pi_{t+1} = \begin{cases} c^+/\sigma & \text{if } E_{it}\pi_{t+1} > \epsilon_i \\ 0 & \text{if } E_{it}\pi_{t+1} \leq \epsilon_i \end{cases}$$

with ϵ_i a positive constant. This captures the fact that individuals' consumption adjustment to expected inflation is a discontinuous function, and that two inflation regimes matter: c_{it} is equal to a positive constant if individual i at date t thinks inflation is going to be positive over the next period, and $c_{it} = 0$ if individual i at date t thinks prices will remain broadly stable. The threshold ϵ_i between the two regimes is individual specific as individuals can differ on how define that prices will "remain broadly stable".

Integrating across households, one gets an aggregate Euler equation of the following kind:

$$c_t = \int c_{it}di = \overline{E}_t c_{t+1} - \sigma(r_t - s_t c^+/\sigma) + \delta_t$$

where $\overline{E}_t c_{t+1} = \int E_{it}c_{it+1}di$ and with s_t the share of households expecting a positive inflation rate at date t.

Note that the usual Euler equation holds as a subcase when one assumes that every household has access to complete information, so that beliefs about future inflation and consumption are homogenous $E_{it}c_{t+1} = E_t c_{t+1}$ and $E_{it}\pi_{t+1} = E_t\pi_{t+1}$ $\forall i$, and a simple identity mapping between inflation expectations and individual consumption decisions, $m = 1$. One then gets

$$c_t = E_t c_{t+1} - \sigma(r_t - E_t\pi_{t+1}) + \delta_t.$$

For simplicity of exposure, we assume that firms behave as in the standard NK setup, so that the usual Phillips curve holds

$$\pi_t = \beta E_t \pi_{t+1} + \kappa c_t.$$

We also postulate that the monetary policy authority keeps the interest rate (in deviation from its steady-state value) constant at $-r$ over a given number of periods T before switching to an inflation targeting rule (for instance because of a ZLB constraint or as a result of a strategy making-up for past inflation realizations below target)

$$r_t = \begin{cases} -r, & t = 1, \ldots, T, \\ \phi \pi_t, & t > T. \end{cases}$$

A back-of-the-enveloppe quantification of the impact of inflation expectations on aggregate consumption. We first illustrate that the inflation expectation channel is less effective than in the standard NK model. A simple back-of-the-envelope computation of what our estimates mean for aggregate consumption shows that these are also economically significant. The average share of households purchasing durables is 31%. Our estimation gives us ΔShare(Dur=1) $= \beta \times \Delta$Share(Inf>0). Given that the average monthly change in the share of households shifting their expectations from "stay about the same" to "increase" is about 10 percentage points in absolute terms, and that our baseline estimate of the marginal effect β is 1 percentage point, this share of households reporting that they made major purchases will change by $.01 \times .1 = 0.1\%$. Assuming that durable consumption is given by this share of households multiplied by a typical durable expenditure that does not vary across individuals and over time, the variation of total durable consumption in reaction to a typical shift of households' inflation expectation from prices will "stay about the same" to will "increase" is ΔShare(Dur=1)/Share(Dur=1) $= .001/.31 = .3\%$. Since durable consumption accounts for $1/4$ of total consumption, this would lead to a $.075\%$ increase in monthly aggregate consumption. This is small but significant in comparison to the standard deviation of monthly goods consumption growth which equals $.9\%$ over our sample.

However that contribution is limited compared to what the inflation expectation channel would imply in a standard NK model. Given that the average expected inflation of households expecting that prices will increase equals 4.15%, this 10 percentage points increase in the share of individuals thinking that inflation will be positive amounts to a change in the average expected inflation of .415% over a month. With log-utility preference, this shock would imply an increase in consumption on impact of the same magnitude, so much larger than what one obtains with the extensive margin. The reaction would still be much larger for an elasticity of intertemporal substitution of .5 that Crump et al. (2018) obtain on household surveys and that is typically used in medium-scale NK models. The behavioral distortion we highlight thus strongly limits the inflation expectation channel compared to standard calibrations of the NK model. As a comparison, with an elasticity of intertemporal substitution of .5, one would need an average annual discounting parameter of $(.075/.5 \times .415) \simeq .36$ in the discounted Euler equation implied by, among others, McKay et al. (2017).

Calibration. In what follows, we calibrate the model using standard values as in e.g. Galí (2015) for the parameters σ, β, κ, and ϕ. We calibrate c^+ using the effect of a one-standard deviation shock in the extensive margin of inflation expectation on aggregate monthly consumption that can be derived from our results as detailed in the above paragraph.

We compute the equilibrium path for inflation and output under the following scenario. We consider that a sequence of deterministic preference shocks puts the economy at the ZLB for T_{ZLB} periods and lowers the fraction of households thinking that inflation is positive to s^-.

σ	.5
β	.99
κ	.1
ϕ	1.5
c^+	$3 \times .00075$

Absent any policy intervention, that fraction goes back to its steady state at the end of the trap. Alternatively, we consider that the central bank gives forward guidance that it will keep its interest rate at zero for T_{MP} additional period of accommodation and convince a fraction s^+ of households that inflation will be positive at the end of the trap.

In these exercises, we calibrate the preference shock to $\delta_t = -1\%$ for the periods where the ZLB is binding and to zero otherwise. We assume that the preference shocks last for 12 quarters. We choose $c^+ = .215\%$ consistent with our estimation results on monthly durable goods. We also assume that the intensive margin of durable consumption does not change over time and that non-durable goods do not react to changes in the real interest rate. Finally we assume that the trap has a one standard deviation negative impact on the share of households believing that prices will increase next period $s_t = -.1$, $t = 1, \dots, T_{ZLB}$. Symmetrically, we assume that the central bank has the ability to steer households' expectations and that forward guidance increases the share of households expecting a positive inflation at the end of the trap by one standard deviation $s_t = .1$, $t = 1, \dots, (T_{ZLB} + T_{MP})$ and leaves this share at its steady state value before.

The mitigation of the expectation channel: Missing deflation and forward guidance. Figures A.1a and A.1b illustrate the reaction to the above sequence of shocks obtained under a standard 3 equation NK model, and compare it to the reaction obtained when one introduces the behavioral distortion described above. As is well known, in the standard NK model, this shock is extremely detrimental. The ZLB constraint induces a deflationary spiral which makes the output contraction and the initial deflation quite dramatic with a quarterly output loss of more than 10% and a quarterly deflation of about 7% at impact. This reaction seems to be extreme compared to what happened during the Great Recession.

By contrast, the presence of households with discrete views makes this deflationary spiral much less potent so that the recession to the same shock while significant is more than two times lower at impact both for inflation and output. From this point of view, the importance of extensive margin limits the extend to which expected inflation becomes negative in a trap. This is consistent with the fact that individuals' inflation expectations helped to stabilize the economy during the Great Recession as emphasized in e.g. Coibion and Gorodnichenko (2015a).[31]

As figures A.1a and A.1b also highlight, forward guidance on interest rates is much less potent in the model with heterogeneous and discrete beliefs than in the standard NK model. A central bank committing to keep interest rates at zero for 4 extra periods at the end of the trap has an extremely expansionary impact on the economy. This is the well-known FG puzzle underlined in e.g. Del Negro et al. (2015). By contrast, the expectation channel hence forward guidance are much less potent with discrete beliefs. Note that to be effective, forward guidance policies need to convince a substantial share households expecting prices to remain stable to switch to a positive inflation regime. The conditions under which such policies will achieve this remain to be explored.

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[31]Note that this mitigation of the inflation could be reinforced if one assumed that firms have the same behavior than households, as assumed in e.g. Coibion and Gorodnichenko (2015a), so that their discrete view on aggregate inflation expectation imperfectly transmits to pricing decisions in ones of firms.

Figure A.1: ZLB and FG with discrete beliefs

(a) Output gap

(b) Inflation
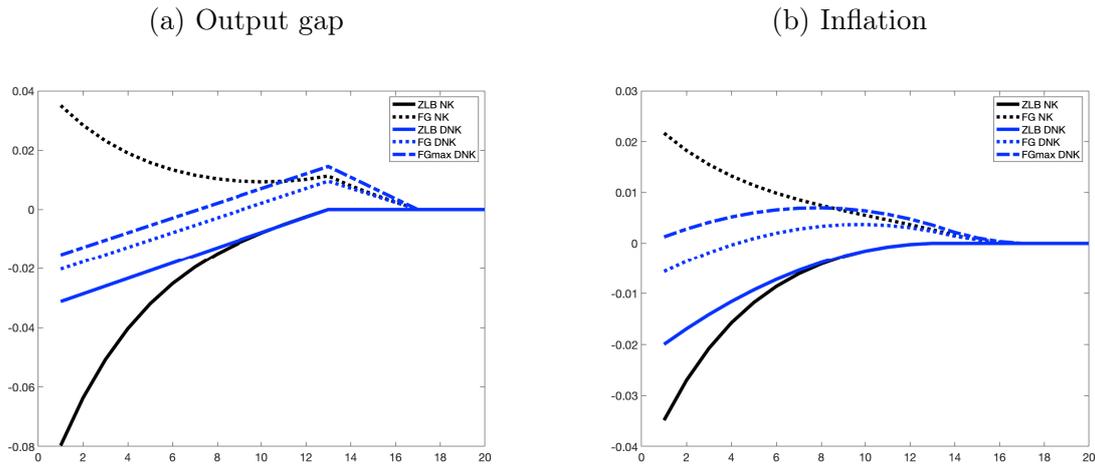
Note: The plain black line (ZLB NK) corresponds to the reaction of the standard NK model to a shock pushing the economy to the ZLB and the dotted black line (FG NK) to a forward guidance shock. The plain blue line (ZLB DNK) corresponds to the reaction of the Discrete New Keynesian (DNK) model with discrete adjustment of consumption to inflation expectations to a shock pushing the economy to the ZLB and the dotted blue line (FG DNK) to a forward guidance shock. Finally the dashed blue line (FG max DNK) corresponds to a case where 100% of households expect positive inflation after the shock.

Limited ammunition. An important consequence of discrete inflation expectations is that when households already expect positive inflation, a further increase in their expectations would not translate into more households purchasing durable goods. This finding thus suggests that forward guidance can be effective when it has an impact on the households expecting prices to remain stable. Once all households are out of this regime, there is no possibility to raise consumption by increasing inflation expectations further. More generally, the expectation channel of policies is limited and less powerful: once it has been used, it cannot be further used. This finding is illustrated in A.1a and A.1b under the FG max DNK scenario which assumes that 100% of households expect a positive inflation regime at the end of the trap. This limit in the impact of FG is consistent with McKay and Wieland (2020) who obtained it in a model with sticky prices and adjustment costs on durable consumption.

B 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. Finally, in parenthesis, we add the way we refer to the questions in the main text.

General Economic Situation

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

1. (past macroeconomic conditions) Got a lot better, **2.** Got a little better, **3.** Stayed the same, **4.** Got a little worse, **5.** Got a lot worse, **6.** Don't Know.

Q2. (expected future macroeconomic conditions) How do you expect the general economic situation in France to develop over the next 12 months? It will...

1. Get a lot better, **2.** Get a little better, **3.** Stay the same, **4.** Get a little worse, **5.** Get a lot worse, **6.** Don't Know.

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

1. Got a lot better, **2.** Got a little better, **3.** Stayed the same, **4.** Got a little worse, **5.** Got a lot worse, **6.** Don't Know.

Q4. (expected future macroeconomic conditions) How do you expect the quality of life in France to develop over the next 12 months? It will...

1. Get a lot better, **2.** Get a little better, **3.** Stay the same, **4.** Get a little worse, **5.** Get a lot worse, **6.** Don't Know.

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

1. Increase sharply, **2.** Increase slightly, **3.** Remain the same, **4.** Fall slightly, **5.** Fall sharply, **6.** Don't Know.

Prices

Q6. (perceived current inflation – qualitative) How do you think consumer prices have developed over the last 12 months? They have...

1. Risen a lot, **2.** Risen moderately, **3.** Risen slightly, **4.** Stayed about the same, **5.** Fallen, **6.** Don't Know.

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

Q7. (perceived current inflation – quantitative) 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. (expected future inflation – qualitative) 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, **6.** Don't Know.

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

Q9. (expected future inflation – quantitative) 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. (right time to consume) 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, **4.** Don't Know.

Q11. (right time to save) In view of the general economic situation, do you think that now is?

1. A very good time to save, **2.** A fairly good time to save, **3.** Not a good time to save, **4.** A very bad time to save, **5.** Don't know.

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

1. Very likely, **2.** Fairly likely, **3.** Not likely, **4.** Not at all likely, **5.** Don't know.

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

1. Yes, **2.** No, **3.** Don't know.

Q14. (future consumption plan) 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, **5.** Don't know.

Q15. 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, **5.** Don't 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.)?

1. Very likely, **2.** Fairly likely, **3.** Not likely, **4.** Not at all likely, **5.** Don't know.

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

1. Very likely, **2.** Fairly likely, **3.** Not likely, **4.** Not at all likely, **5.** Don't know.

Own Financial Situation

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

1. We are saving a lot, **2.** We are saving a little, **3.** We are just managing to make ends meet on our income, **4.** We are having to draw on our savings, **5.** We are running into debt, **6.** Don't know.

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

1. Got a lot better, **2.** Got a little better, **3.** Stayed the same, **4.** Got a little worse, **5.** Got a lot worse, **6.** Don't Know.

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

1. Get a lot better, **2.** Get a little better, **3.** Stay the same, **4.** Get a little worse, **5.** Get a lot worse, **6.** Don't Know.

C   Further comments on robustness checks.

Panel regressions.   Our benchmark regressions rely on the cross-section of households to identify the effects of inflation expectations on households' decisions to buy durables. More precisely, we rely on a rich set of controls pertaining to individuals' fixed characteristics and to their perceptions of current and future micro and macroeconomic conditions to construct two counterfactual types of households that are identical except for their inflation expectations, and move randomly between two groups of inflation expectations: positive inflation and stable prices. We find that when an individual moves from the positive inflation expectation group into the stable price expectation group, this household will be less likely to make a durable purchase.

We provide further evidence for this result, controlling more generally for any unobserved household's characteristics using the panel dimension of our dataset. As households are interviewed at most over three consecutive months, another interest of panel regressions is that we capture the effect of changes in expected inflation over the next 12 months observed over the last three months on a change in past durable consumption decisions over the last three months. This reduces the noise potentially induced by the fact that the survey question on individual 'own' durable consumption decisions pertains to purchases realized over the last 12 months.

There are several challenges when using this panel dimension. First, the dataset does not always report household identifiers. But we can use several characteristics of households which are arguably fixed over time (geographical location, year of birth (head of household and partner), occupation (household head and partner), household composition, education) to identify households and reconstruct the panel dimension. Second, households are interviewed only three times over three consecutive months, and over our sample only 40% of households answer three times to the questionnaire. So the panel dimension is short, which limits the possibility to obtain precise estimates.

Imputation.   In our benchmark regression, we impute a 0% inflation expectation to households expecting prices to "stay about the same". We provide additional evidence that our main result is not an artifact of this specific imputation.

First, let us recall that, as discussed above and as Table 7 illustrates, the extensive margin of inflation expectation remains significantly positive when using the different qualitative measures of expected inflation. When splitting households according to their different *qualitative* rather than *quantitative* inflation expectations observed in the survey, without assigning any numerical values to these qualitative expectations, one also obtains that households expecting stable prices have a lower propensity to buy durable goods than households expecting prices to increase and that households expecting prices to increase a little, moderately or a lot have broadly the same (higher) propensity to consume durables. In other words, the extensive margin of inflation expectation matters for explaining individual differences in the propensity to buy durables, whatever households mean when they answer stable prices.

Second, some households who answer that they expect prices to remain 'stable' could in fact think that inflation is positive and low. So they could be wrongly imputed a 'stable' price expectation instead of a positive one. We thus conducted another robustness check by imputing randomly to households expecting prices to "stay about the same" values of inflation expectations that reproduce the distribution of inflation expectations observed in the complementary survey of September 2007. The regression results with that sample are reported in the second panel of Table 8. We confirm that the extensive margin of inflation expectation has a significantly positive impact on durable consumption (See Figure G.2 in the Appendix). The intensive margin has the same impact than in the baseline although the impact becomes significant. As discussed previously, this negative effect is driven by individuals with high inflation expectations, which can be considered as a third broad inflation regime that households have in mind.

Outliers. As Figure 2 illustrates, a significant share of households have inflation expectations that are well above the typical inflation realization over the sample period studied. Bachmann et al. (2015) emphasize that these outliers can affect estimates of the link between expected inflation and households' durable consumption decisions. In the third panel of Table 8 we report the estimation results obtained when dropping 'extreme' expected inflation, more specifically households expecting that inflation will be larger than 10% over the following year. The results illustrate that dropping these outliers lead to find a positive overall effect of expected inflation on durable spending. Interestingly, decomposing this overall effect into the intensive and extensive margin of inflation expectation show that this positive overall effect is driven only by the extensive margin, again at odds with standard specification of the relation between households spending and their expected inflation.

D Further descriptive statistics of the survey

D.1 Statistics on response rates

As illustrated by Table D.1, non-response rates are very low for the questions regarding one's household own consumption (less than 1% in general). There is less frequent answers to the questions on the right time to make purchases of durable goods in general (the non-response rate is about 5%).

Table D.2 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 whereas older people and women are less likely to respond.

Table D.1: 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	-	-

Note: this table reports 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 D.2: Determinants of Non-Response / Outliers to Quantitative Price Questions -
Marginal Effects

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

Note: this table reports marginal effects (in percentage points) from Probit regressions where the
endogenous 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). *$p<0.1$; **$p<0.05$; ***$p<0.01$.

D.2 Descriptive statistics on qualitative and quantitative inflation expectations

Table D.3: 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: this table reports the main statistics on quantitative inflation expectations according to the answer given to the qualitative question on inflation expectation (we here use the whole cross-section of the data set). 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.

D.3 Dynamic correlations

Inflation expectations Figure D.1 shows the dynamic correlations between 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 - $t+1$. 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). In terms of dynamic correlations, the largest correlation is obtained for dates between $t+3$ and $t+6$.

Figure D.1: Dynamic Correlation Between Inflation and Average Inflation Expectation
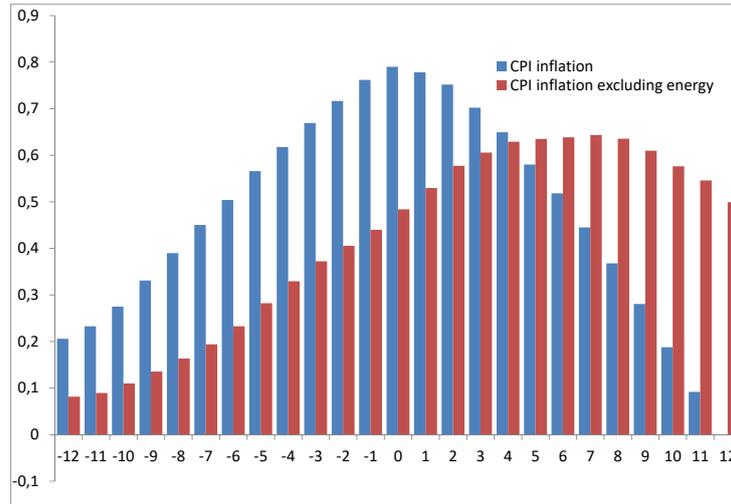
Note: we have first computed date by date the simple average answer to the quantitative questions on inflation expectations. This figure plots the dynamic correlation between the average expected rate of inflation and actual headline CPI inflation / CPI inflation excluding energy. Dynamic correlations are calculated using lagged and forwarded values of actual inflation (between t-12 months until t+12 months).

Durable consumption Figures D.2 and D.3 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.

Figure D.2: Dynamic Correlation Between Aggregate Actual Durable Expenditures and Aggregate Answers on Durable Expenditure in the Survey
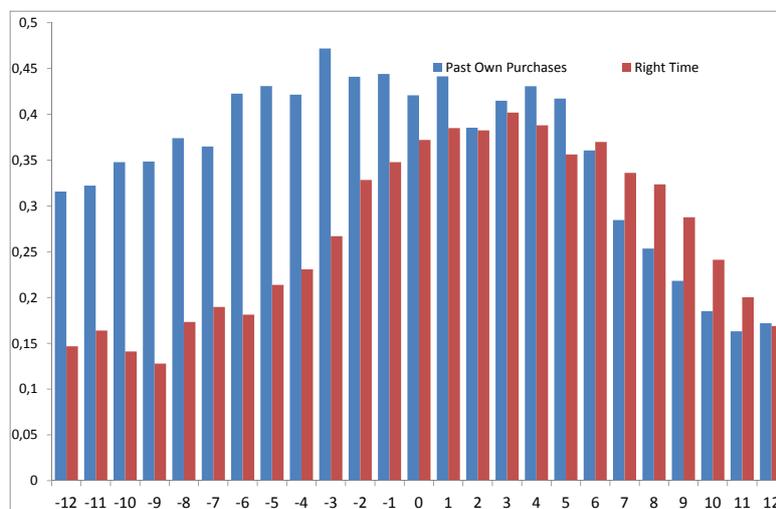
Note: we have first calculated date by date the proportion of individuals answering: Yes to the question "Over the last 12 months, have you made durable expenditures?", and Yes to the question, "Is it the right time to make large purchases?". Then, we have calculated the correlation between these time-series 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 D.3: Dynamic Correlation Between Aggregate Actual Durable Consumption (excluding Cars) and Aggregate Answers on Durable Expenditure in the Survey
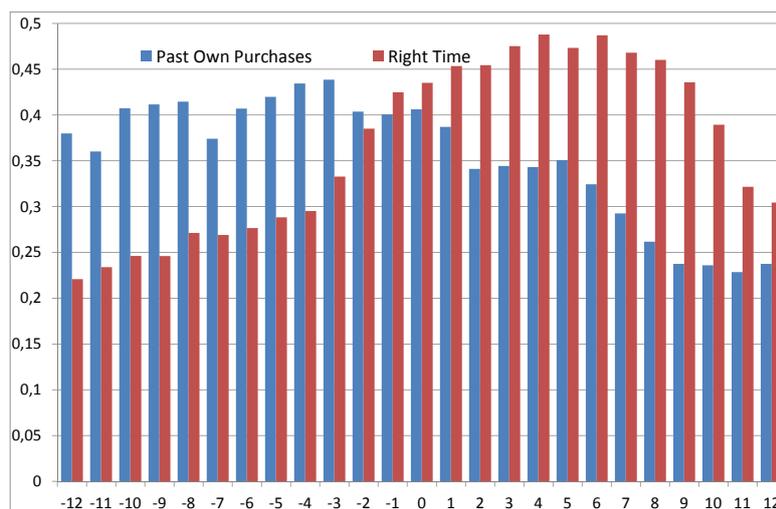
Note: we have first calculated date by date the proportion of individuals answering: Yes to the question "Over the last 12 months, have you made durable expenditures?", and Yes to the question, "Is it the right time to make large expenditures?". Then, we have calculated the correlation between these 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.
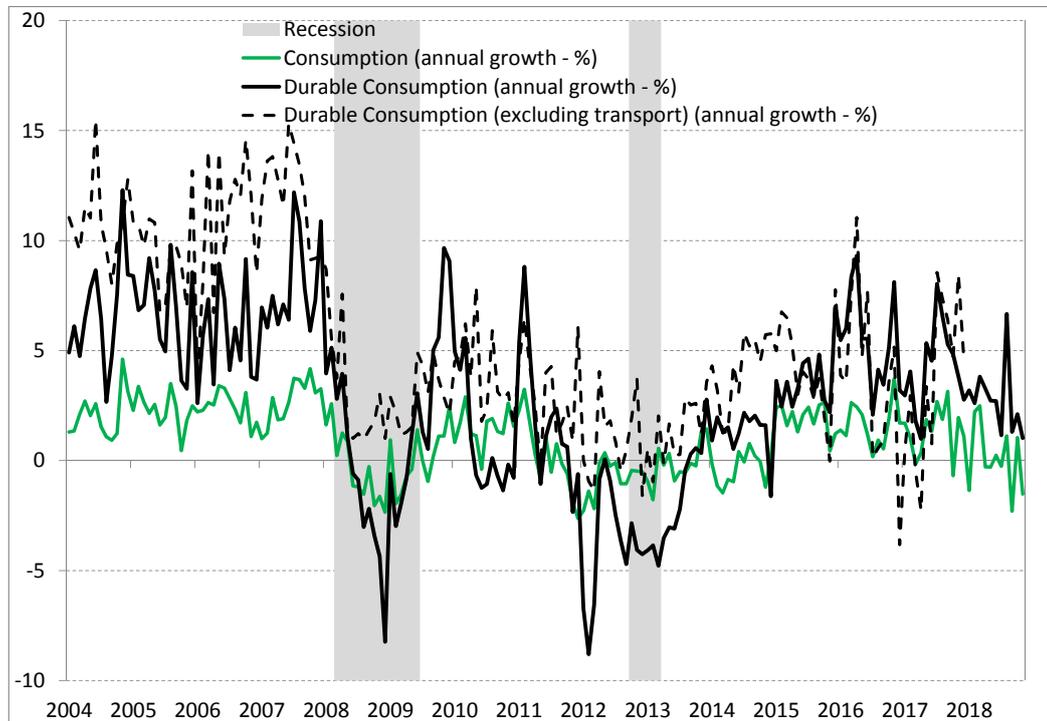
E Statistics on durable consumption

Figure E.1: 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)

Table E.1: Distribution of Durable Consumption (Household Budget Surveys 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: this table reports 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.

Figure E.2: Right Time to Save and the Deposit Interest Rate
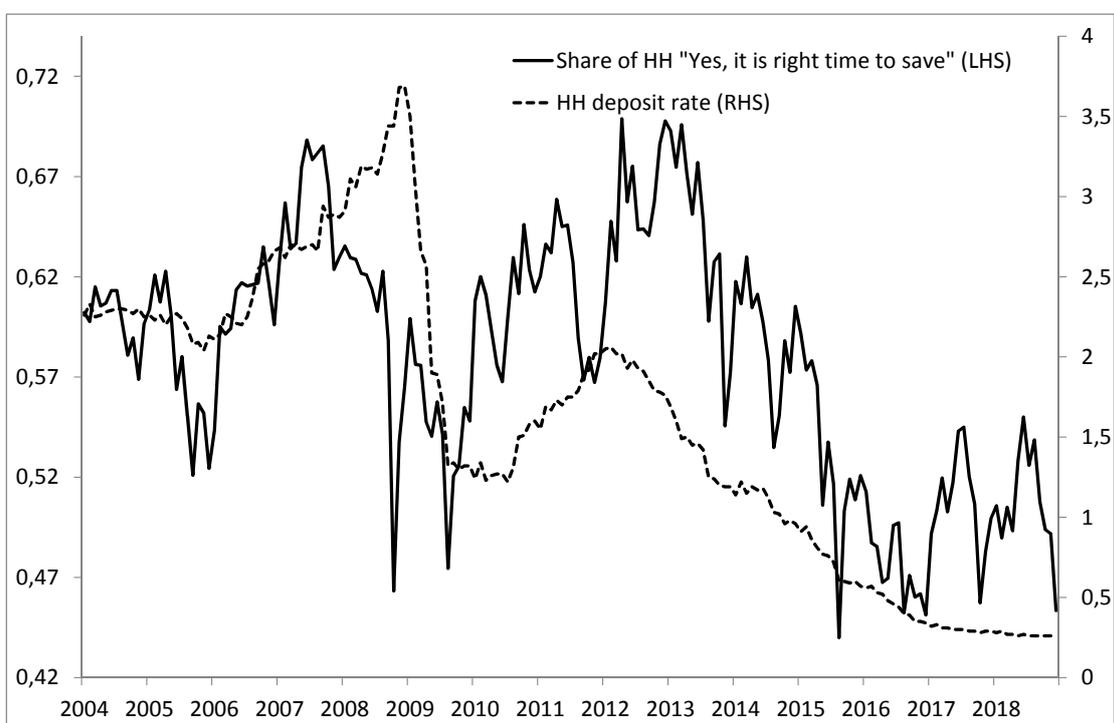
Note: we have calculated date by date the share of households answering "'Yes, this is the right time for people to save'" using individual answers of survey and we plot the monthly nominal interest on households' short-term deposits over the same period (source: Banque de France)

F   Additional survey modules

F.1   Determinants of Answers Prices Expected to Stay about the Same

In this Appendix, we document how we can relate expectations of prices to stay about the same and the perceptions about prices of specific goods. For that, we use the supplementary modules of the survey conducted in April 2007 and February 2009 where questions on perceived inflation are asked for 9 different goods/services: bread, beef, food oil, electricity, car repair, gasoline, phone/internet, washing machine and TV set. For each of the good/service, the question is the following:

Question 5. *In your opinion and in general, the price of the good/service i...*

1. *Has increased more than other prices*

2. *Has increased like other goods*

3. *Has stayed about the same*

4. *Has fallen*

5. *It depends (on characteristics of the good, on outlet type...)*

6. *Don't know*

F.2   What stable prices means?

We use the complementary quarterly module of the monthly survey conducted in September 2007. This module contains specific questions asked to all households of the monthly sample. Most of the time, this quarterly module is a one-shot module with specific questions about very different topics: IT equipment, environmental concerns, consumption habits, financial difficulties, housing issues... These modules contain several questions. In September 2007, households were asked to answer questions about what they mean by saying that prices will stay about the same to the question on inflation expectations over the next 12 months and on perceived inflation over the last 12 months.

Question 6. *About the evolution of prices over the next 12 months, you said that prices would remain about the same. Do you mean that:* **1.** *Prices will increase at the same rate as today* **2.** *Prices will remain the same over the next 12 months*

Question 7. *If answer 1., by how much prices will increase over the next 12 months? XX.X%*

In September 2007, 1847 households were surveyed, 292 households (i.e. 16%) answer that prices will remain about the same over the next 12 months. About 60% of households answering that prices will remain about the same do mean that prices will remain about the same over the next 12 months.

Table F.1: Proportion of Households Perceiving Stable Prices for Specific Goods

		Bread	Beef	Oil	Electricity	Car repair	Gasoline	Phone/ internet	Washing machine	TV set
Gender										
	Male	19.9	25.6	44.0	26.4	15.7	10.8	58.9	55.2	25.0
	Female	17.7	20.7	42.2	21.5	17.1	9.1	57.0	48.0	24.9
Age										
	16-29	12.1	26.5	52.8	28.9	30.7	5.4	61.8	61.5	26.3
	30-49	17.1	24.2	42.8	23.8	18.9	9.4	60.4	48.2	21.2
	50-64	19.2	23.8	41.4	25.9	13.9	12.0	57.9	56.3	25.9
	65+	22.2	23.4	44.4	23.8	12.4	10.1	55.8	53.1	28.3
Education										
	Primary	19.4	22.6	42.3	21.7	11.5	9.6	53.9	53.4	31.9
	Secondary	17.9	20.4	41.8	23.2	13.4	8.4	58.7	51.2	26.3
	Further	19.7	26.6	44.7	27.0	19.5	11.5	60.1	53.3	21.3
Income										
	$< Q1$	19.6	19.6	41.3	21.5	12.4	7.3	50.8	51.6	28.6
	$]Q1 - Q2]$	17.0	23.0	42.0	22.5	15.5	10.4	57.1	52.8	29.1
	$]Q2 - Q3]$	19.2	25.6	44.6	24.0	16.9	10.0	63.3	54.4	25.3
	$> Q3$	20.9	27.6	45.7	30.9	18.9	12.8	61.6	51.9	18.1

Note: this table reports the proportions of households (by characteristics) answering price 'has stayed about the same' to product-specific questions on perceived price changes in the one-off modules incorporated in the regular survey of April 2007 and February 2009.

Table F.2: Simple Statistics on Inflation Expectations – September 2007

	Mean	Q1	Q2	Q3
Stay about the same	1.35	0	0	2
Fall	-9.33	-15	-10	-3
Increase at a slower rate	3.80	2	3	5
Increase at the same rate	6.31	3	5	7
Increase more rapidly	7.92	4	4.5	10

Note: the table reports descriptive statistics on quantitative answers to inflation expectations for each modality of the qualitative question in September 2007. For the modality "Stay about the same", we use answers from the complementary quarterly module of questions. Answers are in %. For comparison, Table D.3 in Appendix reports similar statistics for the full sample of households.

F.3   Aggregate Inflation Expectation: Variance Decomposition

Baseline variance decomposition   As described in Section 3, the average of individual expectations, $\pi^e_{t|t+1} = \frac{1}{n_t} \sum_{i=1}^{n_t} \pi^e_{i,t|t+1}$ can be decomposed into two components:

$$\pi^e_{t|t+1} = fr_t \times dp^e_{t|t+1}$$

with $fr_t = \left(\frac{1}{n_t} \sum_{i=1}^{n_t} I_{it}\right)$ the fraction of households with positive inflation expectations and with $dp^e_{t|t+1} = \left(\sum_{i=1}^{n_t} I_{it}\right)^{-1} \left(\sum_{i=1}^{n_t} \pi^e_{i,t|t+1}\right)$ the average among households having non-zero inflation expectations.

We can then decompose fluctuations in the average inflation expectations of households into changes in both the extensive and the intensive margins:

$$\pi^e_{t|t+1} - \overline{\pi}^e = \underbrace{\left(fr_t - \overline{fr}\right) \overline{dp}^e}_{extensive} + \underbrace{\left(dp^e_{t|t+1} - \overline{dp}^e\right) \overline{fr}}_{intensive} + O(t).$$

Following Klenow and Kryvtsov (2008), we can thus write the variance of $\pi^e_{t|t+1}$ as:

$$V\left(\pi^e_{t|t+1}\right) = \underbrace{V\left(dp^e_{t|t+1}\right) \overline{fr}^2}_{intensive} + \underbrace{V\left(fr_t\right) \overline{dp^e}^2 + 2cov\left(fr_t, dp^e_{t|t+1}\right) \overline{dp^e}\,\overline{fr}}_{extensive}$$

Alternative imputation assumptions   As discussed in subsection 3.3, the average inflation expectations and its variance, but also the contribution of the extensive margin to inflation variations depend on the value imputed to answers 'Prices will stay about the same'. If we assume that a non-zero inflation expectation for households answering 'Prices will stay about the same', the average of individual expectations, can be decomposed into two components:

$$\pi^e_{t|t+1} = (1 - fr_t) \times s^e_{t|t+1} + fr_t \times dp^e_{t|t+1}$$

with $fr_t = \left(\frac{1}{n_t} \sum_{i=1}^{n_t} I_{it}\right)$ the fraction of households with positive inflation expectations and with $dp^e_{t|t+1} = \left(\sum_{i=1}^{n_t} I_{it}\right)^{-1} \left(\sum_{i=1}^{n_t} I_{it} \pi^e_{i,t|t+1}\right)$ the average among households having non-zero inflation expectations, and $s^e_{t|t+1} = \left(\sum_{i=1}^{n_t} (1 - I_{it})\right)^{-1} \left(\sum_{i=1}^{n_t} (1 - I_{it}) \pi^e_{i,t|t+1}\right)$ the average among households expecting prices to 'stay about the same'.

We can then decompose fluctuations in the average inflation expectations of households into changes in both the extensive and the intensive margins:

$$\pi^e_{t|t+1} - \overline{\pi}^e = \underbrace{\left(fr_t - \overline{fr}\right) \left(\overline{dp}^e - \overline{s}^e\right)}_{extensive} + \underbrace{\left(dp^e_{t|t+1} - \overline{dp}^e\right) \overline{fr} + \left(s^e_{t|t+1} - \overline{s}^e\right) (1 - \overline{fr})}_{intensive} + O(t).$$

In a first approach, we consider no time-variation in the average expectation for households expecting prices to remain about the same (i.e. we assume a constant average answer equal to $\overline{s}^e$). In that case, the average inflation can be decomposed as the following:

$$\pi^e_{t|t+1} - \overline{\pi}^e = \underbrace{\left(fr_t - \overline{fr}\right) \left(\overline{dp}^e - \overline{s}^e\right)}_{extensive} + \underbrace{\left(dp^e_{t|t+1} - \overline{dp}^e\right) \overline{fr}}_{intensive} + O(t).$$

and the variance decomposition is the following:

$$V\left(\pi_{t|t+1}^{e}\right) = \underbrace{V\left(dp_{t|t+1}^{e}\right)\overline{fr}^{2}}_{intensive} + \underbrace{V\left(fr_{t}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)^{2} + 2cov\left(fr_{t}, dp_{t|t+1}^{e}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)\overline{fr}}_{extensive}$$

When we compare this expression with our baseline variance decomposition, the contribution of the intensive margin to overall variance does not depend on $\overline{s}^{e}$ and is the same ad the one in our baseline case. However the contribution of the extensive margin (and so, the overall variance) will decrease with $\overline{s}^{e}$ (in particular through the term $V\left(fr_{t}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)^{2}$).

If we relax the assumption of no time-variation in the average expectation for households expecting prices to remain about the same. For instance, we can assume that the time variance of the average expectation for households expecting prices to remain 'about the same' is the same as the one observed for households expecting prices to increase. In that case, one additional covariance term will add to the contribution of the extensive margin to the overall inflation variance (increasing both the contribution of the extensive margin and the overall variance of inflation):

$$V\left(fr_{t}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)^{2} + 2cov\left(fr_{t}, dp_{t|t+1}^{e}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)\overline{fr} + 2cov\left(fr_{t}, s_{t|t+1}^{e}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)\left(1 - \overline{fr}\right)$$

Similarly, two terms will add to the contribution of the intensive margin, one is the variance of the answers imputed to households expecting prices to remain the same (here, both are equal) and the other is a covariance term between the two average answers:

$$V\left(dp_{t|t+1}^{e}\right)\overline{fr}^{2} + V\left(s_{t|t+1}^{e}\right)\left(1 - \overline{fr}\right)^{2} + 2cov\left(dp_{t|t+1}^{e}, s_{t|t+1}^{e}\right)\left(\overline{fr}\right)\left(1 - \overline{fr}\right)$$

We report results associated to these variance decomposition exercises in Table 5 in the main text and Table F.3 in this Appendix. In the first one, we assume different average values for the answer imputed to households expecting prices to 'stay about the same' (but we assume no time variation in this average answer). In the second table, we relax the assumption of no time variations in the average answer and assume that the time variance of the average answer imputed to households expecting prices to 'stay about the same' is the same as the one observed for households expecting prices to 'increase'.

In our first exercise (Table 5 in the main text), when we increase the average answer imputed to households answering prices to stay about the same, as expected, it increases the average aggregate inflation expectation and reduces its variance over time because the contribution of the extensive margin decreases (in particular because of the term: $V\left(fr_{t}\right)\left(\overline{dp^{e}} - \overline{s}^{e}\right)^{2}$ whereas the intensive margin remains unchanged.

In our second exercise, assuming some time variation in the average imputed answer has a large positive effect on the overall variance of inflation (relative to the previous exercise): in our baseline scenario with 0% imputed answer the overall variance is now 0.56 compared to 0.41 in the case without time-variation. This additional variance comes mainly from the intensive margin (i.e. the term $V\left(s_{t|t+1}^{e}\right)\left(1 - \overline{fr}\right)^{2}$). This leads to a smaller contribution of the extensive margin (62% in the 0% scenario versus 76% in our baseline scenario). When we increase the average answer imputed to households answering prices to 'stay about the same', results are quite similar as the one described above, the overall variance decreases since the contribution of the extensive margin decreases.

Table F.3: Variance Decomposition - imputation with time-variations

Imputed Value (in %)	Average Agg. Expect.	Var. of Agg. Expect.	Contrib. Extensive				% of Variance	
			Tot.	Freq.	Cov.1	Cov.2	Ext.	Freq.
0	2.80	0.56	0.35	0.20	0.10	0.05	62.0	36.3
0.5	2.96	0.50	0.29	0.16	0.09	0.04	57.1	31.6
1	3.12	0.44	0.23	0.12	0.07	0.04	51.5	26.7
1.5	3.29	0.39	0.17	0.08	0.06	0.03	45.0	21.4
2	3.45	0.34	0.12	0.05	0.05	0.02	37.7	16.0
2.5	3.61	0.30	0.09	0.03	0.04	0.02	29.5	10.6

Note: this table reports simple statistics on the mean and variance of aggregate inflation expectations depending on the average value imputed to households answering prices will stay about the same (col. 1) and assuming no time variation in the average expectations of these households' answers. Assumption '0' is our baseline scenario. Col. 2 is the average aggregate expectation over time (over all types of answers to the quantitative question, imputed or not), Col. 3 reports the time variance of this average aggregate expectation. Col. 4-5-6-7 report the contribution of the extensive margin to the overall variance of inflation (Total and separately the relative contribution of the time variations of the share of answers 'stay about the same' and the two covariance terms). Col. 8 the relative contribution of extensive margin to the overall variance (the relative contributions of extensive and intensive margins sum to 100%). Col 9 the relative contribution of the time variations of the share of answers 'stay about the same'.

G Additional regressions

G.1 Additional Regressions - Forecast Errors and Purchases

Figure G.1: Distribution of Forecast Errors by Answer to the Question on Own Durable Purchases
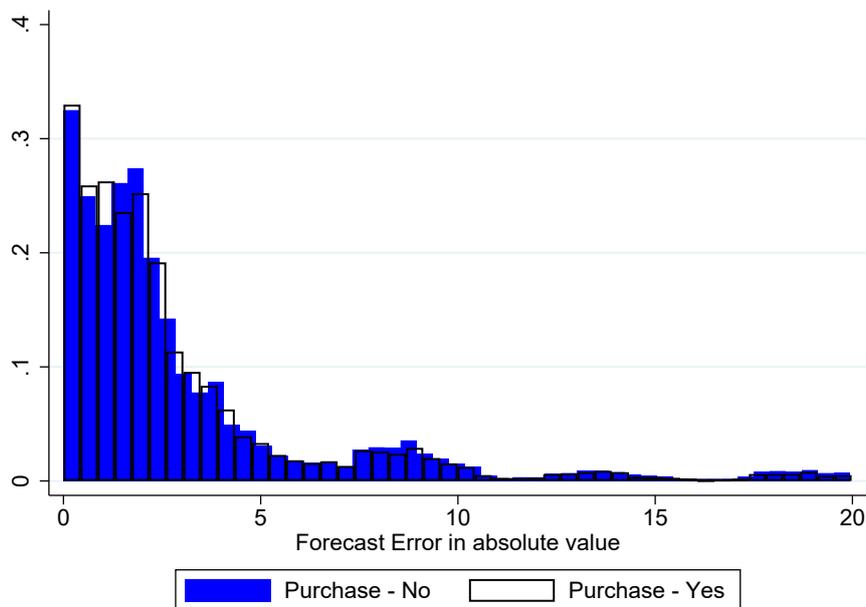
Note: we have calculated the difference in absolute value between the quantitative expectation of inflation (over the next 12 months) with the actual value of inflation 12 months after the date of the survey. This figure plots the distribution of this error forecast according to the answer to the question "Did you make major purchases over the last 12 months?" (Yes / No).

Table G.1: Effect of Durable Consumption Decisions on Forecast Errors

	All (1)	Less than p99 (2)	All (3)
Yes, Durable Purchase	0.013	0.014	0.018
	(0.012)	(0.012)	(0.012)
Perception error	-	-	0.320***
			(0.004)
Controls	Yes	Yes	Yes
Obs.	141,123	134,093	136,574

Note: this table reports fixed effect panel regressions where the endogenous variable is the log difference between household level inflation expectation at date t for the horizon t+12 and the actual inflation at date t+12; exogenous variables include a dummy variable equal to 1 if the household answers Yes to the question "Did you make major purchases over the last 12 months?" and the perception error which is the log difference between perceived inflation at date t and actual inflation at date t, we have included controls for date and household fixed effects. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.

G.2   Additional Regressions - Expectations Outliers

Table G.2: Marginal Effects of Inflation Expectations on Major Purchases: Inflation Expectation Outliers

	All	Intensive (Excl. 0)	Extensive
	(1)	(2)	(3)
Own major purchases over the last 12 months			
Baseline	0.005	-0.045	1.021***
	(0.027)	(0.037)	(0.337)
Obs.	136,574	92,002	136,574
Outliers - More than 10%	0.226***	0.003	1.452***
	(0.074)	(0.109)	(0.343)
Obs.	114,786	70,214	114,786
Outliers - More than 20%	0.055	-0.058	1.228***
	(0.047)	(0.072)	(0.340)
Obs.	128,435	83,867	128,435
Right time to purchase			
Baseline	0.006	-0.021	0.632***
	(0.015)	(0.019)	(0.185)
Obs.	134,117	90,566	134,117
Outliers - More than 10%	0.096***	-0.188**	1.181***
	(0.045)	(0.074)	(0.198)
Obs.	112,676	69,125	112,676
Outliers - More than 20%	-0.000	-0.198***	0.812***
	(0.027)	(0.035)	(0.191)
Obs.	126,097	82,546	126,097

Note: this table reports marginal effects (in percentage points) from resp. Probit and and Ordered Probit regressions where the endogenous variable is coded from the answers to the questions "Have you made major purchases during the last 12 months?" and "Do you think now is the right time for people to make major purchases". For question "Have you made major purchases during the last 12 months?", the endogenous variable is a dummy variable equal to 1 if the household 'YES' to the questions "Have you made major purchases during the last 12 months?". The endogenous variable is a variable taking 3 different values 0 if the household answers 'No, it is the wrong time', 1 'It is neither the right time nor the wrong time', 2 'Yes, now is the right time' to the question "Do you think now is the right time for people to make major purchases". Marginal effects are calculated for the value 'Yes'. 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, right time to save and perceived inflation. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.

G.3 Additional Regressions - Panel Dimension

Panel construction - Methodology Each household is surveyed at maximum during three consecutive months but the survey does not contain any household identifier provided by the statistical office before 2014 – after 2014, we use the variable NUMFA.

To construct the unique household identifier before 2014, we use all the variables describing the characteristics of the head of household (location (region, size of the city), gender, year of birth, education, but also the same characteristics for the partner and also variables describing the composition of the household. We consider that 3 observations are associated with the same household over time if all these variables characterizing the household are the same over the period.

This identification of household through time might quite conservative, in particular if over the 3-month period some characteristics changed. Overall, we find that our sample contains about 159,000 different households, 66,475 are surveyed three times, 39,492 twice and 52,771 only once.
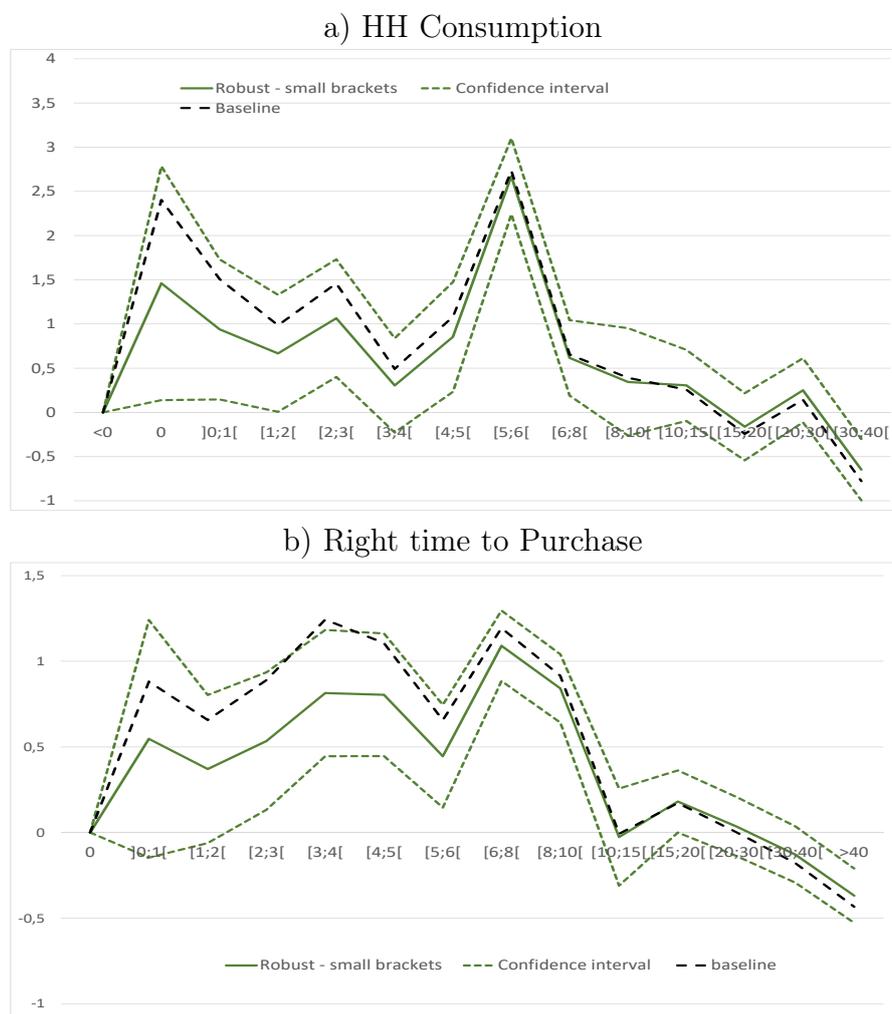
Table G.3: Marginal Effects of Inflation Expectations on Own Major Purchases Over the Last 12 Months: Qualitative Answer - Panel Regressions

	Fixed Effect Logit		Random Effect Probit	
	(1)	(2)	(3)	(4)
$\pi^e \neq 0$	0.551		0.584***	
	(0.383)		(0.179)	
Increase more rapidly		0.744		1.040***
		(0.648)		(0.294)
Increase at the same rate		0.556		0.531***
		(0.448)		(0.198
Increase at a slower rate		0.937*		0.951***
		(0.553)		(0.245)
Stay about the same		Ref.		Ref.
Fall		-0.033		0.578
		(1.430)		(0.670)
DK		-0.552		-0.775*
		(0.926)		(0.412)
Controls	Yes	Yes	Yes	Yes
Obs.	71,099	71,099	312,921	312,921

Note: this table reports marginal effects (in percentage points) from Panel Probit regressions with Random HH effects and Conditional logit where the endogenous 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, (when including random effects: household characteristics (age, location (city, region) diploma, job, income), but also 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, right time to save and perceived inflation. *p<0.1; **p<0.05; ***p<0.01.

G.4   Alternative imputation

Figure G.2: Small brackets - Imputation

a) HH Consumption

b) Right time to Purchase

Note: These two figures plot our estimates of marginal effects of inflation expectations on decision to buy durables (Panel (a) 'own consumption'; Panel (b) 'Right Time to consume'). The reference is 0% (negative answers were grouped in a single bracket but not reported on the graph). Marginal effects are reported in percentage points. Dashed black line correspond to the marginal effects obtained in our baseline regressions whereas the other lines correspond to the marginal effects obtained with our rule of imputation using the complementary module of the questionnaire conducted in Sep 2007. the solid line is the average marginal effect from regressions run on 50 different imputed samples whereas the dashed lines correspond to the 95% confidence interval.

G.5 The response to inflation expectations across years

In this subsection, we investigate whether the connection between inflation expectations and consumption decisions is stable across years. Our sample covers years both before and after the 2008 financial crisis, periods where effective lower bound arguably bind as well as periods where the European Central Bank made forward guidance announcements.

To this purpose, 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 period during which the ECB signaled it was at the ELB and gave explicit forward guidance on future rates. Figure G.3 reports the evolution of the coefficient in the regression for inflation expectations. As it can be observed, the patterns that we identified in Table 6 are relatively stable across our sample.

If anything, we find that the effect of quantitative inflation expectations on the decision to make large purchases has increased, especially since 2014, which corresponds to the ELB/FG period.
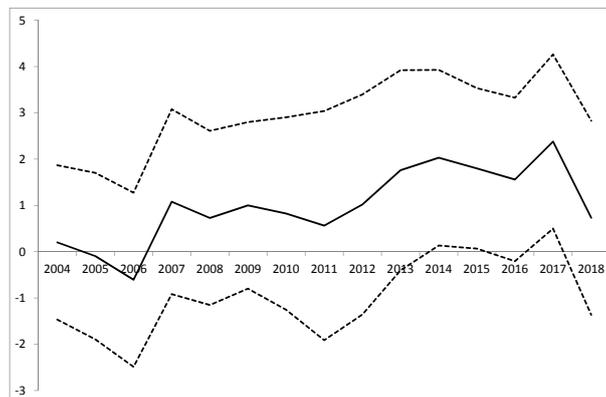
Figure G.3: Marginal Effects of Inflation Expectations Over Time
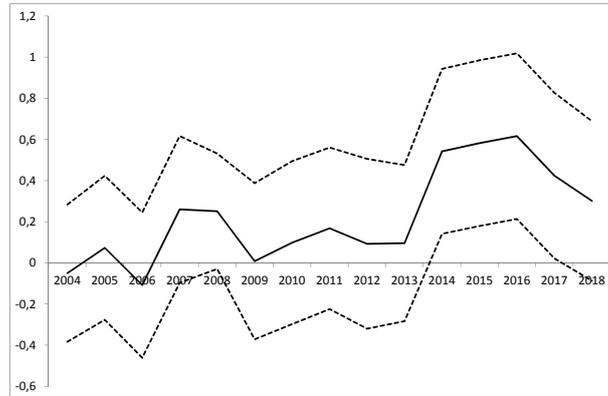
(a) All
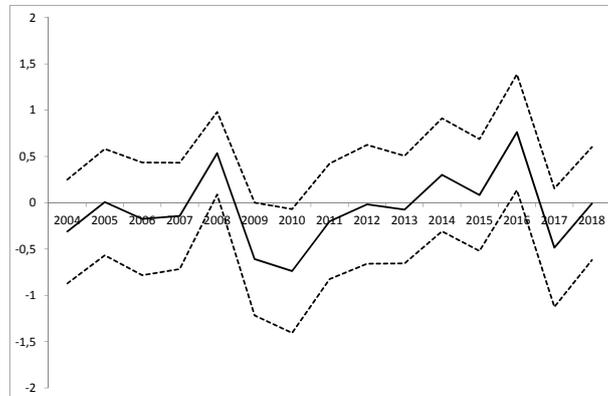
(b) Intensive margin

(c) Extensive margin

Note: black solid lines 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?"; "All" we include all quantitative answers to the question on inflation expectations; "Intensive margin" we only use non-zero answers; "Extensive margin" we use a dummy variable equal to 1 if the answer is different from 0, 0 otherwise. 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, right time to save, and perceived inflation. Regressions also include random household effects and standard errors are corrected for possible heteroscedasticity. Dashed black lines correspond to the 90% confidence intervals.

H   Germany

Data set.   We use the underlying individual data from the monthly consumer confidence survey conducted by GFK in Germany. This survey is part of the harmonized 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 2018.[32] Every month about 2,000 interviews are carried out via phone calls. The sample contains a little more than 360,000 individual observations over the 15-year period, i.e. about 2,000 observations per month on average. The questionnaire is very similar to the French questionnaire except that the German questionnaire does not include any question on the houshold's own consumption of durables.

Table H.1: Simple Statistics on Inflation Expectations

	Aggregate Moments	Correlation with	
		Headline π	π excl. Energy
Average Expectation	2.76	0.75	0.30
	(0.84)		
% of Stable Prices	0.31	-0.76	-0.31
	(0.10)		
Average of non-zero inflation	3.91	0.72	0.25
	(0.65)		

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 HICP inflation (source Eurostat) and HICP inflation excluding energy and unprocessed food (source Eurostat). "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.

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[32]Between Aug and Oct. 2007, quantitative answers to inflation are not available.

Table H.2: Marginal Effects of Inflation Expectations on Right Time to Purchase: Germany

	All	Intensive (Excl. 0)	Extensive	All Quali.	All Excl. outliers
π^e	-0.073***	-0.118***			0.144*
	(0.019)	(0.018)			(0.074)
$\pi^e \neq 0$			0.832***		
			(0.277)		
π^e by intervals:					
$[10\%; +\infty[$				0.128	
				(0.474)	
$[5\%; 10\%[$				1.134***	
				(0.402)	
$[3\%; 5\%[$				1.710***	
				(0.251)	
$]0\%; 3\%[$				2.364***	
				(0.380)	
0%				Ref.	
$< 0\%$				2.620**	
				(1.144)	
Controls	Yes	Yes	Yes	Yes	Yes
Obs.	256,540	182,714	256,540	256,540	217,308

Note: In this table, we report marginal effects (in percentage points) from Ordered Probit regressions where the endogenous variable is a variable taking 3 different values 0 if the household answers 'No, it is the wrong time', 1 'It is neither the right time nor the wrong time', 2 'Yes, now is the right time' to the question "do you think now is the right time for people to make major purchases". Marginal effects are calculated for the value "Yes". 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 German economic conditions (standard living, unemployment...), answer to the question about future plans for major purchases, right time to save and perceived inflation. Standard errors are clustered at the date level. *p<0.1; **p<0.05; ***p<0.01.

Figure H.1: Marginal Effect of Inflation Expectations on "Right Time to Buy"
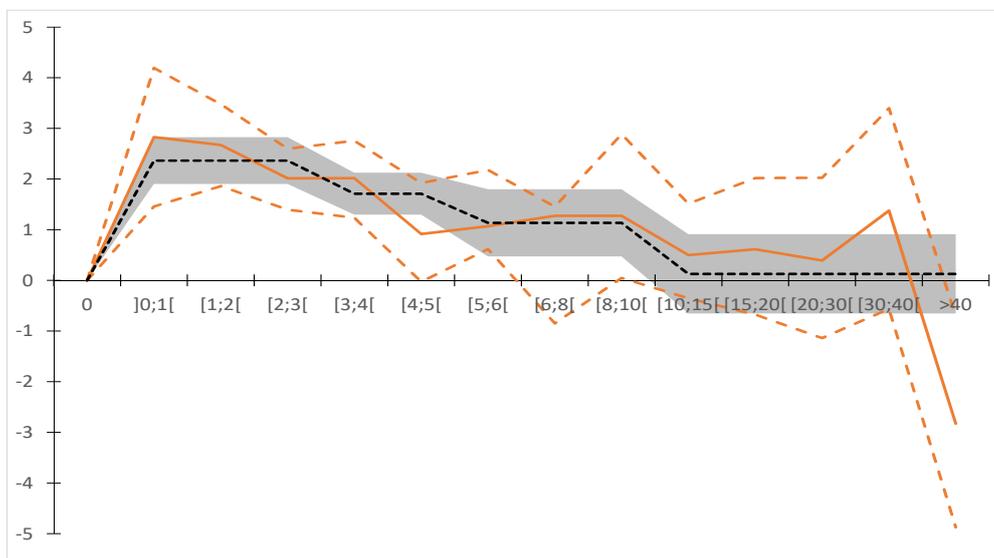
Note: These two figures plot our estimates of marginal effects of inflation expectations on perceptions of whether it is a 'right time' to buy durables. The orange line reports results where we have grouped answers by 'smaller' brackets. The reference is 0% (negative answers were grouped in a single bracket but not reported on the graph). Marginal effects are reported in percentage points. Dashed orange lines correspond to the 95% confidence interval. The dashed dark line corresponds to our baseline estimates with 'large' brackets (as reported in Table H.2) and the grey shaded area corresponds to the 95% confidence interval associated with these estimates.

I US Michigan survey

In this Appendix, we report some robustness results on the US Michigan survey. We first describe how the survey is designed and the questions that we are using. We then report our results.

Design of the survey and questions. To investigate our point, we look at the different questions related to future (short-term) inflation. As for the euro-area survey, we look at both the qualitative and the quantitative variables on inflation expectations.

Question 8 (Question A12). *During the next 12 months, do you think that prices in general will go up, or go down, or stay where they are now?*
1. Go up, 2. Stay the same, 3. Go down, 4. Don't know.

If households answer "Go up" or "Go down", they are then asked the following question:

Question 9 (Question A12b). *By about what percent do you expect prices to go (up/down) on the average, during the next 12 months?*

In the case where a household answers a number above 5%, the questionnaire requires to further probe the answer.
If households answer "stay the same" to question 8, they are asked the following question:

Question 10 (Question A12a). *Do you mean that prices will go up at the same rate as now, or that prices in general will not go up during the next 12 months?*
1. Go up, 2. Will not go up.

In the case where households answer "go up" to that question, they are asked Question 9. Otherwise a 0% inflation is imputed.

Remark. *It is important to note that the questions on inflation expectations in the Michigan survey share some similarities but also differences with the euro area surveys. As in the euro area surveys, households are first asked about their qualitative inflation expectations and then about their quantitative ones. In contrast with the euro area surveys, they are offered a smaller menu of qualitative questions – in the euro area surveys, households can give different answers regarding positive inflation, while in the Michigan survey, they can only answer that prices will go up. On the other hand, households answering that prices will stay the same are asked again about their qualitative inflation expectations. Arguably, both sets of questions allow to elicit households' inflation expectations but using different routes in terms of qualitative questions.*

Finally, we consider the following question on the "right time" to purchase as a proxy for durable consumption:

Question 11 (Question A18). *About the big things people buy for their homes–such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or a bad time for people to buy major household items?*
1. Good, 2. Pro-con, 3. Bad, 4. Don't know.

Controls. We use the same controls as for euro-area but with two important differences: as the corresponding variables are not available, we do not control for *perceived inflation* and for *expected own consumption*.

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Results. We look at the 1984-2020 period.[33] We report the results in Table I.1 that we confirm with "finer brackets" in Figure I.1.

We are able to identify several inflation regimes and confirm that households actually "discretize".

First, we find that households expecting inflation between 0 (excluded) and 3% consume more than the households expected no inflation. This result is robust to considering the qualitative answers 'go up' to Question 8 or 'same' at Question 8 and then 'go up' at Question 10. For values between 0 and 3%, consumption is roughly constant as this can be observed in Figure I.1.

Second, households expecting higher inflation rates than 3% do not consume more than households expecting prices to remain stable. A first step starts above 3% to go to almost 7%, where the connection between inflation expectations and durable consumption is positive but not significant.[34] Finally, as in the euro-area, when inflation becomes sufficiently high, consumption can be even lower.

Third, 3% of households expect prices to fall on average in our sample (three times more than in euro area surveys). On average, these households consume strictly less than households expecting no inflation. A closer look at this connection in Table I.1 indicates that the fall in consumption is in fact is not statistically different from being constant for all negative inflation expectations.

[33]Focusing on a shorter time period as the one we have for the euro-area does not lead to different results.

[34]Note that we do not have access to all the controls that we have for the euro-area surveys. As put forward in Section 6.1, controls are important to obtain positive and significant response of consumption to inflation expectations.

Table I.1: Effects of 12M Inflation Expectations on Durables Consumption Outlook

	(1)	(2)	(3)	(4)	(5)	(6)
π^e Quantitative						
By intervals:						
>10%			-2.275***	-3.119***	0.731	-2.700***
			(0.410)	(0.396)	(0.997)	(0.434)
[5%,10%)			-0.265	-0.949***	0.568	-0.465
			(0.342)	(0.317)	(0.599)	(0.365)
[3%,5%)			0.663*	0.053	0.772	0.581
			(0.340)	(0.312)	(0.543)	(0.364)
(0%,3%)			1.333***	0.560*	1.900***	1.114***
			(0.348)	(0.321)	(0.491)	(0.377)
0%			Ref.	Ref.	Ref.	Ref.
[-3%,0%)			-2.799***	-3.314***	-2.625***	-2.825***
			(1.023)	(1.018)	(0.976)	(1.033)
[-5%,-3%)			-3.611***	-4.125***	-3.344***	-3.681***
			(1.025)	(1.023)	(0.980)	(1.035)
< -5 %			-3.823***	-4.331***	-3.548***	-3.892***
			(1.304)	(1.310)	(1.249)	(1.320)
π^e Qualitative						
Go up	-0.207					
	(0.303)					
Same/go up	0.943**					
	(0.372)					
Same/infl :	Ref.					
Go down	-3.930***					
	(0.697)					
Extended intervals:						
go up		-0.648***				
		(0.250)				
same		Ref.				
go down		-4.350***				
		(0.696)				
Observations	165,651	165,651	155,911	155,911	50,176	135,645
controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: this table reports marginal effects (in percentage points) from Ordered Probit regressions where the endogenous variable is a variable taking 3 different values 0 if the household answers 'Bad', 1 'Pro-Con', 2 'Good' to Question 11. Marginal effects are calculated for the value 'Good'. Control variables include household characteristics (age, location (city, region) diploma, job, income, ... Standard errors are clustered at the date level. * p<0.1; ** p<0.05; *** p<0.01. In regression (1), we report the regression with the qualitative inflation expectation. Regression (2): qualitative inflation expectations when households answering 'same' at Question 8 are pooled together. Regression (3) with quantitative inflation expectations (Question 9). Regression (4) with households answering 'same' at Question 8 and then 'go up' at Question 10 are imputed a 0%. Regression (5) on the subsample without households answering 'go up' at Question 8. Regression (6) on the subsample without households answering 'go up' at Question 10.

Figure I.1: Effects of 12M Inflation Expectations on Durables Consumption Outlook –
finer brackets
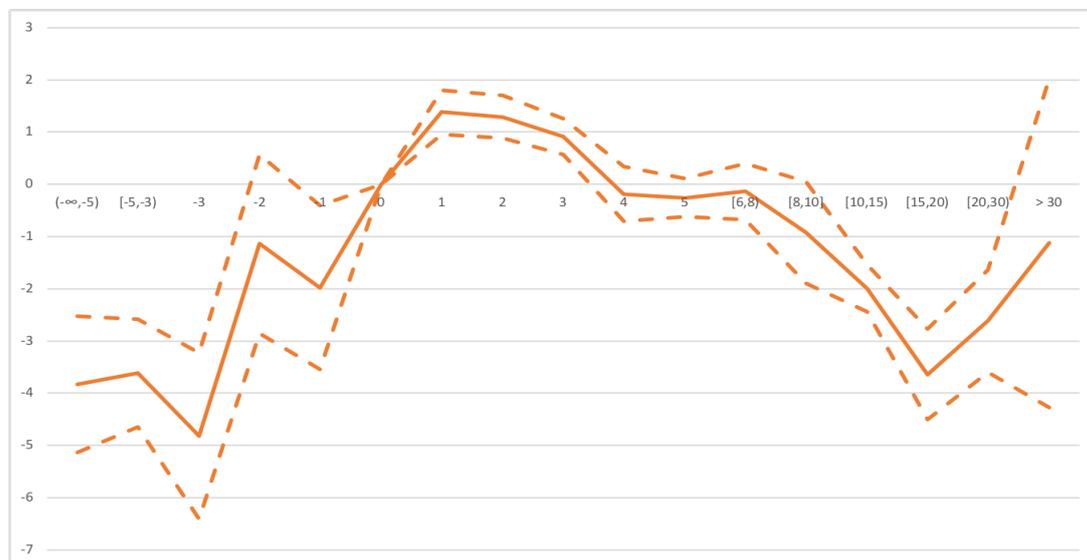
Note: This figure plots our estimates of marginal effects of inflation expectations on decision to buy
durables 'Right Time to consume'). The orange line reports the point estimates. The reference is 0%.
Marginal effects are reported in percentage points. Dashed orange lines correspond to the 95%
confidence interval.