State-Dependent Sticky Expectations: Evidence and Theory*

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April 30, 2025

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Abstract

We document novel stylized facts regarding updating of households' inflation expectations. Using a randomized control trial design for the U.S. and Germany, we provide evidence that households react more to information with higher levels of precision, in line with Bayesian updating. However, in contrast to Bayesian updating, they respond differently to these signals only in the decision to update their expectations (extensive margin) and not in the size of the adjustment (intensive margin). We also find that the extensive margin displays a pronounced asymmetry depending on the position of the signal: Households more frequently update their expectations when the signal is above the prior compared to when the signal is below the prior. We propose a model where households' inflation expectations exhibit state-dependent inattentiveness to inflation signals. Not only does this model exhibit the novel features of inflation expectations that we document, but also shows that in times of high uncertainty elevated inflation expectations may persist because of the increased information processing costs of uncertain inflation signals and because of losses that are relatively smaller during the disinflation process when signals are often below the priors. Our model provides microfoundations for the asymmetric loss function that is commonly assumed to explain biases in inflation expectations.

Keywords: Inflation expectations, rational inattention, signal uncertainty, randomized control trial, survey experiment.

JEL classification: E31, E52, E58, D84.

*We are thankful for the support of the survey team at the Bundesbank Online Panel Households at the Deutsche Bundesbank. We thank Fabian Winkler and the participants at the MSU Brownbag Seminar at the Federal Reserve Board, University of Duisburg-Essen, University of Bochum, University of Innsbruck, Macquarie University, 2024 University of Oxford and CEPR Central Bank Communication RPN workshop, the 2023 Computing in Economics and Finance conference, SED 2024, and the Workshop Challenges for Monetary Policy in Times of High Inflation for their comments and suggestions. The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Federal Reserve Bank of Cleveland or the Federal Reserve System. The randomized control trial has been registered at the AEARCTR under the ID AEARCTR-0010292.

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1 Introduction

How economic agents form expectations remain an interesting area of research, as studies have recently shown that inflation expectations matter for their economic decisions. In addition, how households form their inflation expectations has implications for the inflation process, especially in an environment when inflation is high or when uncertainty about future inflation developments are high. Two of the popular assumptions for how households form their expectations are Bayesian updating and rational inattention. Following Bayes rule, uncertainty of the signal matters for the updating process of inflation expectations. However, there is little empirical evidence whether households recognize different levels of signal precision—as postulated by the Bayes' rule—when updating their expectations and about potential asymmetries when updating inflation expectations. Rational inattention instead postulates that economic agents cannot process all available information, but they can select which exact pieces of information to attend to. In this paper we study how agents update their expectations after they receive a signal about future inflation and whether any of these theories can explain the main features of observed expectation formation. As our empirical evidence points to significant departures from both theories, we then propose a new state-dependent model of how households form expectations, consistent with our empirical evidence, and evaluate the dynamics of inflation in this new environment. Knowledge about how households process signals with different precision is independently relevant also for central bank communication practices, as central banks regularly provide visualizations about uncertainty, for example, in the form of fan charts or figures with confidence bands.

In this paper we formalize the link between the precision of a signal regarding future inflation, household inattention, and updating inflation expectations, and their implications for the inflation process. We provide evidence for two new stylized facts regarding updating inflation expectations. We start by investigating how households update their inflation expectations when receiving signals with different precision. To derive hypotheses regarding updating inflation expectations depending on the variance of the signal, initial uncertainty, and the distance from the signal, we initially utilize a simple updating model based on the Bayes law. We also outline some straightforward predictions from the rational inattention model. We then test whether information treatments that differ in the precision of the signal affect inflation expectations using two distinct survey experiments featuring a randomized control trial (RCT) and the possibility to distinguish between the decision to update expectations (extensive margin) and the decision by how much to update their expectations (intensive margin), one fielded to U.S. households in December 2022 and one fielded to German households in August 2023 as part of the Bundesbank Online Panel of Households (BOP-HH). These survey experiments are designed to elicit their prior expectations (12-month ahead inflation expectations), uncertainty about prior expectations, and news heard about inflation. Following that we randomly provide the participants with different information about professional's forecasts of inflation that include measures of disagreement about those forecasts. After the information treatment, we elicit participants' posterior inflation expectations. We then test whether for a given prior, households who receive a high-variance inflation signal, on average, update their beliefs by a smaller amount relative to households who receive a low-variance signal (overall margin). We also test whether those who receive the high-variance signal choose to update less often than those who receive the low-variance signal (equality in the extensive margin) and whether the size of the update is smaller for those that decide to update their expectations (differences in the intensive margin). Additionally, households with higher prior uncertainty should more heavily reply on the signal and update their beliefs more compared to those with a more certain prior. These tests enable us to evaluate both Bayesian updating and rational inattention theories.

Our results indicate that households do adjust their expectations based on the signal strength but most of the variation comes through the extensive margin and not through the intensive margin as postulated by the Bayesian updating. We implement information treatments by providing different information on inflation forecasts: the mean forecast of the Survey of Professional Forecasters (SPF), the SPF mean with a low variance, the SPF mean with a high variance, a placebo piece of irrelevant news, and no additional news. In our analysis, we first show that households adjust to any meaningful signal in comparison to receiving no additional information. In terms of the relevance of signal strength, we provide evidence that households adjust their inflation expectations more strongly to a low variance signal in comparison to a high variance signal. Hence, households seem to be able to discriminate the level of uncertainty and factor this in when forming expectations. Interestingly, the response to the low variance signal is quantitatively similar to the response of providing information about the mean only (i.e., without any information of the signal strength), which suggests that consumers may understand that the mean forecast is uncertain as well. We further disentangle the effects along the extensive and intensive margins. For the extensive margin we show that the probability of adjusting expectation is higher after receiving a low variance signal compared to the treatment with high variance signal. With respect to the intensive margin the adjustment size is not statistically different across high and low variance signals. Hence, while there is a lower probability to adjust to a high variance signal, the strength of the adjustment is comparable across high and low variance signals. In fact, in the high variance treatment we observe that the participants that are quite far from the signal relatively often update their expectations. However, the participants that are closer to the signal update at a lower frequency than in other treatments. These findings are only partially in line with our simple Bayesian model, as our results show that the extensive margin—and not just the intensive margin—is important. These results, however, are in line with Andrade et al. (2023) and Dräger et al. (2024) that recently emphasized the importance of the extensive margin for the formation of inflation expectations.[1] Notably, these studies did not test the difference in updating frequency across treatments with different signals.

We also study the role of prior uncertainty and self-reported observance of news regarding inflation on updating inflation expectations. Households who reported higher certainty regarding their priors rely more on their priors and update with respect to the signal less. Households tend to put especially high weight on the signal if they are highly uncertain about the prior and they receive a signal with lower uncertainty. The response to both the large band and small band treatments is significantly larger for households with a high prior uncertainty. An investigation of the effects

[1] Andrade et al. (2023) defined the extensive margin as an answer to the question that inflation increased or decreased compared to saying that inflation remained about the same.

of hearing news before the survey experiment—which can also be an indication on the strength of the prior—also reveals an interesting pattern. When households are provided with a high precision signal, both those who report hearing news and those that report hearing no news update by about the same amount. Households that report hearing news about inflation update their expectations very little when exposed to high uncertainty signal, the weight is almost 50 percentage points lower than in the small bands treatment. In contrast, those that report hearing no news about inflation update their prior in a similar way when receiving large bands treatments compared to those receiving small bands treatment.

We then further study the extensive margin decision. We find that the likelihood of updating expectations is correlated with the distance between the prior and the signal: When the prior and signal are further apart there is higher likelihood of updating the expectations. Furthermore, we focus on the potential asymmetry with respect to the relative position of signal and prior. We indeed find a pronounced asymmetry. If the prior is below the signal, the likelihood of updating increase faster with the distance between the prior and the signal compared to the the case when the prior is above the signal. This finding is in line with evidence that consumers consumers are more attentive to unfavorable news about inflation (signals of higher inflation) compared to favorable news about inflation (lower inflation signal), previously documented in, e.g., Pfajfar and Santoro (2013). Armantier et al. (2022) also show that households long-run inflation expectations react more to positive than to negative inflation surprises in a high inflation environment, while D'Acunto et al. (2023) argue that households put a higher weight on positive relative to negative price changes when forming inflation expectations. It is also in line with the literature on asymmetric loss function of forecasters (e.g., Elliott et al., 2005, Elliott et al., 2008, and Capistrán and Timmermann, 2009).

After we establish these stylized facts about how consumers update their inflation expectations, noticing that it does not align with a Bayesian updating view when considering both intensive and extensive margins, we propose a model to match the role of the extensive margin we observe in the survey. We utilize insights from the rational inattention models of Woodford (2009) and Morales-Jiminez and Stevens (2024) that study the role of extensive margin in the firms pricing decisions and propose a model of household's attention problem: households optimize their inflation information source given information processing costs. As a result, the household observes a binary signal that randomly induces them to update, with the probability of updating increasing in the distance between the household's prior and the optimal inflation expectation, consistent with what we see in the RCT. This modeling framework is able to explain both the behavior of those who do update their beliefs, as well as the fraction of those who leave the beliefs unchanged. In specific, in this model, after the decision to update expectations the decision by how much to update is rational. This mechanism is able to reproduce both novel facts about the updating inflation expectations: the role of extensive margin in updating inflation expectations and the asymmetric response based on the position of the signal. with respect to the latter we also provide a detailed microfoundations for the asymmetric loss function. While some of this literature, in specific Elliott et al. (2008), allude that concavity of the utility function may be the reason for the asymmetric loss function, we detail the mechanism behind this observation. We note that the loss from under consuming due to too low inflation expectations is higher than the loss from over consuming due to higher inflation expectations. We then perform a partial equilibrium experiment where we put this mechanism at test using realized US inflation and interest rates and demonstrate that our model delivers key features of expectations data: lagged uptake of increasing inflation, and high persistence of elevated inflation beliefs.

Our model differs from those in Weber et al. (2023), Pfäuti (2025b), and Pfäuti (2025a), as it explicitly endogenizes the extensive margin of updating inflation expectations. While this margin exists in standard rational inattention models, it does not depend on other engodenous variables in the model. Hence, our variant of rational inattention represents an alternative source of inflation persistence not previously mentioned in the literature on inflation expectations. In the attention threshold models, as in Pfäuti (2025a), the attention increases the precision of the signal and the extensive margin is governed by the time-invariant cost of information acquisition and processing. In our model, the probability of updating is fully endogenous and is a function of the distance of the prior expectations from the underlying state and the cost of information processing. Compared to Pfäuti (2025a) who presents "time-series evidence" of attention thresholds, we provide cross-sectional evidence that observed heterogeneity in the distance of prior expectations from the signal results in different frequency updating. The implications for the dynamics inflation are similar to those in Pfäuti (2025a), as we also find the "last half mile" effect after a surge in inflation. However, our paper provides an alternative mechanism behind this result.

Our paper is also related to several strands of the empirical literature. Cavallo et al. (2017), Weber et al. (2023), Pfajfar and Žakelj (2014), and Dräger et al. (2024) study the formation of inflation expectations in a high inflation environment and how it compares with the formation of expectations in times of low inflation. In a high inflation environment consumers are more attentive to inflation developments (Cavallo et al., 2017) and the information effects of providing current inflation levels are smaller than in an environment with low inflation (Weber et al., 2023). Armantier et al. (2022) point out that in the current inflation environment there is substantial disagreement between households regarding the future course of inflation.[2] ECB's president Lagarde noticed that "[o]nce consumers took notice of rising inflation, their inflation perceptions responded quickly but reduced more sluggishly when inflation started to fall." Dräger et al. (2024) studies the updating of inflation expectations in the high inflation environment using the RCT survey experiment, where households are presented with different information about the future inflation developments—numeric and narrative based—and argue that inflation forecasts can affect the whole term structure of inflation expectations, where the effects are smaller for longer-run expectations.[3] The fact that we have conducted these information treatment in the high-inflation environment with elevated inflation uncertainty and disagreement among experts (i.e., team transitory vs. team persistent) comes to our advantage, as it allows us to study, in a real world environment, the effects of signals that have plausibly different uncertainty associated with them.

[2]In fact, they document that some households even have expectations of deflation.

[3]The paper by Andre et al. (2021) analyzes the inflation narratives that experts, households, and managers have in mind to explain the recent inflation surge. They find that experts view the reasons for the inflation surge very differently than households or managers.

The paper builds on previous papers utilizing the RCT environment to test how households/firms form their inflation expectations. Coibion et al. (2022) tests how different forms of communication affect expectations. They show that information about the current level of inflation reduces inflation expectations, making them more accurate. Coibion et al. (2020) employs an information treatment that presents current inflation to firms participating in the survey. Not only that treated firms adjust their inflation expectations, they also make decisions that ultimately lead to higher firm profits. Using the RCT design, Coibion et al. (2023) study the effect of different forms of forward guidance on several macroeconomic forecasts, while Haldane and McMahon (2018) use this design to test the relevance of layered communication adopted at the Bank of England.[4] Coibion et al. (2021) analyze the effect of variation of uncertainty on households spending and Kumar et al. (2022) study similar implications for firms decisions.

More generally, we study the formation of inflation expectations. There is a growing literature using survey data to better understand and explain inflation expectation formation processes.[5] Different papers have shown that (inflation) expectations are inconsistent with full information rational expectations hypothesis (Coibion and Gorodnichenko, 2015a); that informational frictions are present when forming expectations (Coibion and Gorodnichenko, 2012); that households use different models to form expectations (Branch, 2004, Pfajfar and Santoro, 2010); and that they rely on their lifetime experiences (Ehrmann and Tzamourani, 2012, Malmendier and Nagel, 2015), on recent shopping experiences (D'Acunto et al., 2021), and on gasoline prices (Coibion and Gorodnichenko, 2015b) when forming inflation expectations. Furthermore, sociodemographic characteristics capture heterogeneity due to economic status and life-time experiences (Ehrmann et al., 2017, Das et al., 2019).

The remainder of the paper is organized as follows: Section 2 presents a simple updating model to derive testing hypotheses. Section 3 details the data we use and the survey experiment on the U.S. households, while Section 4 discusses our empirical results. Section 5 presents a model updating expectations that explicitly takes into account the extensive margin and implements it in a simple consumption-savings model. Section 6 focuses on the results using German BOP-HH data and confirms similar stylized facts about updating inflation expectations also in an environment of decreasing inflation. Section 7 concludes.

2 A Simple Model of Expectation Updating

In this section we propose a simple Bayesian model of inflation expectation updating and derive some of its testable predictions.

Suppose a household's prior for future inflation is normally distributed about $\pi^e_{t|t-1}$ and with precision τ_0. They receive an inflation signal z_t that is normally distributed about true future infla-

[4] Hoffmann et al. (2022) implements information treatments to study the effects of a hypothetical move to flexible average inflation targeting on inflation expectations in Germany.

[5] For a recent literature review see Coibion et al. (2020).

tion π_{t+1} with perceived precision $\tau_{z,t}$. The household updates their beliefs about the distribution of π_{t+1} after viewing z_t to the conjugate posterior

$$\pi_{t+1}|z_t \sim N\left(\frac{\pi^e_{t|t-1}\tau_0 + z_t\tau_{z,t}}{\tau_0 + \tau_{z,t}}, (\tau_0 + \tau_{z,t})^{-1}\right),$$

and sets their updated point estimate $\pi^e_{t|t}$ to the posterior mode

$$\pi^e_{t|t} = \frac{\tau_0}{\tau_0 + \tau_{z,t}}\pi^e_{t|t-1} + \frac{\tau_{z,t}}{\tau_0 + \tau_{z,t}}z_t. \tag{1}$$

Equation 1 is our proposed updating process. The household's posterior point estimate of inflation is a weighted average of their prior point estimate and the inflation signal, with weights depending on signal precision $\tau_{z,t}$ and prior precision τ_0^2.

What does this model predict about households' expectation updating processes? Beginning with the level effects household's prior, households with higher prior inflation expectations should have higher posterior expectations. Subtracting $\pi^e_{t|t-1}$ from 1 and defining $\Delta\pi^e_t = \pi^e_{t|t} - \pi^e_{t|t-1}$ reveals

$$\Delta\pi^e_t = \frac{\tau_{z,t}}{\tau_0 + \tau_{z,t}}\left(z_t - \pi^e_{t|t-1}\right). \tag{2}$$

This tells us the size of a household's update is proportional to the distance of the inflation signal from their prior expectation. Holding signal and prior uncertainty fixed, the more surprising a signal, the more a household will change their beliefs. Additionally, holding the prior uncertainty and level of the signal fixed, as signal variance increases, households with prior expectations further from the signal will continue to update their expectations by noticeable amounts.

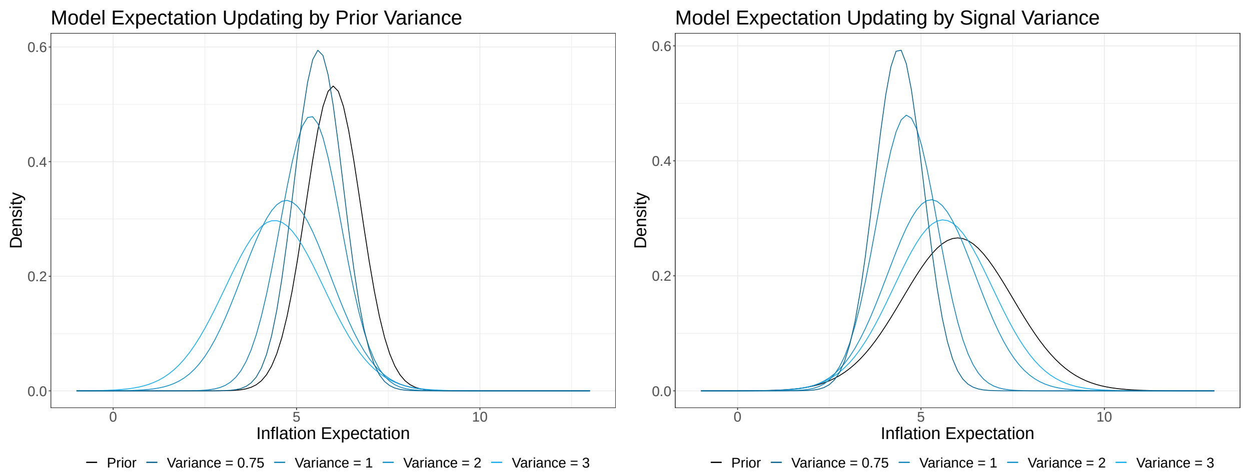
Next, consider the effects of prior and signal precision. The household's marginal response to the inflation signal is a decreasing function of the perceived forecast uncertainty, as demonstrated in the right panel of figure 1. The marginal response to the inflation signal is an increasing function of the prior uncertainty and households update their expectations more when they are initially uncertain. Analogously, as the signal variance increases, the household's response to the signal is diminished, as depicted in the left panel of figure 1. More subtly, consider the effect of signal uncertainty on the marginal effect of prior expectations

$$\frac{\partial^2\pi^e_{t|t}}{\partial\pi^e_{t|t-1}\partial\sigma^2_{z,t}} = \frac{\tau_0^2}{\sigma^4_{z,t}}\left(1 + \frac{\tau_0^2}{\sigma^2_{z,t}}\right)^{-2}. \tag{3}$$

Since both $\tau_0^2 > 0$ and $\sigma^2_{z,t} > 0$ always hold, this partial derivative is always positive. Therefore, the impact of prior expectations is dampened as signal uncertainty decreases.

Finally consider the limiting behavior of the posterior expectation function with respect to the signal and prior variances. As prior precision gets infinitely large the posterior converges to the prior, and as the precision goes to zero the posterior converges to the signal. Similarly, as signal precision goes to zero the posterior converges to the prior, and as signal precision gets sufficiently

Figure 1: Posterior expectations by varying prior precision and by varying signal precision.



large the posterior converges to the signal. In summary, agents who receive a highly precise signal or are initially highly uncertain should update entirely to the signal, and agents who receive an uninformative signal or are initially certain should leave their expectation unchanged.

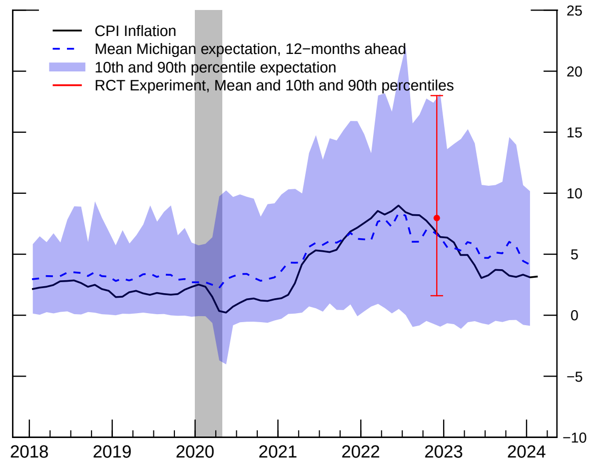
3 Data and RCT Design

Our U.S. data is collected via an online survey. This survey was conducted in December 2022 using the survey platform Pollfish. Pollfish sources respondents for our survey and guarantees a representative sample of the US population. For our survey we asked Pollfish to collect responses for 3,000 US households.[6] This implies that we have 600 respondents for each information treatment. Note we re-run this RCT using the Bundesbank Online Panel of Households (BOP-HH) which was fielded in August 2023. The results based on the BOP-HH are described in section 4.7.

Figure 2 displays the evolution of the inflation rate in the U.S. together with short-run inflation expectations from the Reuters/University of Michigan Survey of Consumers. The mean value from our survey is shown by the red point. We also display the measure disagreement, as portrayed by the difference between the 90^{th} and 10^{th} percentile of the distribution of one-year-ahead inflation expectations. We can observe from the figure that U.S. faced a rise in inflation starting in March 2021, after capacity constraints and supply bottlenecks constrained the supply of goods. At the same time both monetary and fiscal policies were accommodative in the post-pandemic period. At the time of our RCT survey experiment, inflation has already started to decline, but it remained elevated at 6.5 percent. The mean of short-run inflation expectations in the Michigan survey was about the same as the current values for the total CPI, while short-run inflation expectations in our survey were slightly higher at about 8 percent (median was 7 percent), as can be seen in table 1. In the quarters after the experiment, inflation continued to decline in the U.S, so that on average,

[6]Pollfish promises to tackle data quality issues related to respondents, such as panel fatigue, unconscious bias, bots or professional survey-takers.

Figure 2: Inflation and Inflation Expectations.



Notes: Solid black line is U.S. CPI Inflation as reported by the Bureau of Labor Statistics. The mean and disagreement measures are from Reuters/University of Michigan Survey of Consumers. The vertical-dashed line indicates December 2022, the time at which we fielded our survey using the Pollfish platform and panel.

the one-year-ahead inflation expectations in December 2022 prove to be too pessimistic with the realized value for the December 2023 total CPI at 3.4 percent. Inflation expectations in figure 2 display more persistence that CPI inflation.

Table A.1 contains summary statistics of respondent demographics by treatment arm. The information presented in this table demonstrates that there is no statistical difference in terms of demographics between treatment arms.[7]

The setup of our RCT is as follows. First, we elicit 12-months-ahead inflation expectations. Following that we provide each respondent with an information treatment and afterwards we ask the respondent if they want to adjust their previously voiced inflation expectations. To make sure that we avoid any potential effect from a memory laps we provide the figure of previously voiced inflation expectation on the screen. In terms of controls we have a large array of socioeconomic characteristics and added questions to elicit confidence in the voiced expectations, news exposure and literacy. The full list of questions included in the survey are available in the appendix C.

Our inflation expectations question reads as follows:

Q2: What do you expect the rate of inflation to be over the next 12 months (in percent)?

The wording is motivated by the existing surveys such as the New York Feds Survey of Consumer Expectations. We also ask a followup question to asses how certain respondents were about their expectations.

Respondents are then randomly assigned to five treatment arms. We provide respondents with the mean SPF forecast (but no information about the quality of the mean estimate), the mean

[7]ANOVA tests reveal all demographic variables are homogeneous between treatment groups.

SPF forecast with a small band (low variance) and the mean SPF forecast with large band (high variance). Lastly, we include a placebo treatment with irrelevant information. The advantage of using the SPF as our inflation news source is it eliminates the possibility that differences in news sources across treatments drive our results. If we had instead chosen inflation reports from two different newspapers, there is a risk the reputations of the papers could cause people to either heavily discount or heavily weight the information regardless of its information content. The panel dimension of the SPF allows us to construct the "mean only," "large band," and "small band" news treatments from the same source, therein preventing any differences in source credibility from affecting our results.

To eliminate the possibility that a difference in prior and posterior expectations is caused by forgetfulness rather than the treatment, we remind all respondents of their prior inflation expectations:

> Your previous inflation expectation was [insert answer from **Q2**]%.

In the first treatment arm, referred to as the "Baseline" treatment, we provide respondents with no additional information and ask:

> **Q5 [Treatment 1]:** Would you like to adjust your expectation? Note: if you do not wish to adjust your expectations please fill in the same figure in the box below.

In the second treatment arm, referred to as the "mean only" treatment, we provide respondents with information regarding the mean CPI inflation forecast from the November 2022 Survey of Professional Forecasters (SPF):

> **Q5 [Treatment 2]:** Would you like to adjust your expectations based on the following information?
>
> According to a mean response in the Survey of Professional Forecasters, inflation over the next 12 months will be 3.7 percent.

In the third treatment arm, referred to as the "large band" treatment, we provide respondents with both the mean CPI inflation forecast forecast and the range of individual responses from the SPF:

> **Q5 [Treatment 3]:** Would you like to adjust your expectations base on the following information?
>
> According to a mean response in the Survey of Professional Forecasters, inflation over the next 12 months will be 3.7 percent, where the range of responses was between 1.7 percent and 7.1 percent.

In the fourth treatment arm, referred to as the "small band" treatment, we provide respondents with both the mean CPI inflation forecast forecast and the range of the central 60% of individual responses from the SPF:

> **Q5 [Treatment 4]:** Would you like to adjust your expectations base on the following information?

According to a mean response in the Survey of Professional Forecasters, inflation over the next 12 months will be 3.7 percent, where most responses fell between 2.9 percent and 4.8 percent.

Finally, in the fifth "placebo" treatment arm, we provide respondents with a statement about US population growth that is not relevant for forming inflation expectations:

Q5 [Treatment 5]: Would you like to adjust your expectations base on the following information?

The U.S. population grew 1.2 percent over the last three years.

We then prompt respondents in the "mean only" and "placebo" arms to explain their posterior inflation expectations:

Q6 [Treatments 2 and 5]: Please explain your response to the previous question.

- I do not trust professional forecasters
- My personal forecast matches the information provided
- This information was not useful to me
- This information was new to me and I incorporated it
- Other:

For respondents in the "large band" and "small band" treatment arms, we provide a different set of options for respondents to explain their posterior inflation expectations:

Q6 [Treatments 3 and 4]: Please explain your response to the previous question.

- I only considered the information about the mean
- I considered equally the mean and the range of forecasters' responses
- I considered both the mean and the range of forecasters' responses, but I updated closer to the higher end forecasters' response
- I considered both the mean and the range of forecasters' responses, but I updated closer to the lower end forecasters' response
- I only considered the range of forecasters' responses
- I only considered the lower end forecasters' responses
- This information was not useful to me
- My personal forecast matches the information provided
- Other:

There are two design choices of ours worth justifying. First, we choose to focus on point inflation expectations rather than distributional inflation expectations. Existing studies, rather than explicitly asking for updated expectations, ask a followup question about the distribution of respondents' expectations. They then infer participants' revised expectations from moments of their reported distributions. Second, we explicitly ask whether they want to update their inflation expectations after the participants are treated, stating their prior inflation expectations. Similar to Dräger et al. (2024), our paper is concerned with the conscious process of expectation updating, therefore we directly ask respondents for revised point forecasts.

4 RCT Results

4.1 Summary Statistics

Table 1 shows the summary statistics for prior and posterior inflation expectations overall and across treatment arms. The mean figure for prior inflation expectations in our sample is 7.98 percent, the median 7 percent—the realized inflation (total CPI) in the U.S. was 3.4 percent in December 2023—and shows little variation across treatment arms. However, if we compare posterior inflation expectations we see substantial variation across treatment arms indicating an effect of the information treatments. We observe that the "baseline" treatment posterior inflation expectations remain almost identical to the prior inflation expectations while all other treatments seem to affect the level of posterior inflation expectations substantially. Specifically, we can document lower posterior inflation expectations with most sizeable changes for the "mean only" and the "small band" treatment. These results seem very plausible and in line with our model, as we see that respondents react more to signals that have lower uncertainty and react less to signals with higher uncertainty (or no and irrelevant information, respectively). In column (3) of this table we show the mean posterior expectations for respondents that revised their inflation expectations and the difference to the prior expectations further widens. Another interesting observations that is again indicative of the relevance of signal quality is presented in column (4). Here we calculate the share of respondents that revised their expectations. We can see that the share is higher for the "mean only" and "low variance" treatment with more than 60 percent and lower for the "high variance" treatment. In the "baseline" treatment arm substantially less people revised their expectations.

Table 1 provides already first evidence that signal uncertainty matters for households' inflation expectations. However, looking at means only might not capture the whole dynamics across all respondents. For this purpose we plot Kernel densities for all treatment arms for both prior as well as posterior expectations. Graphs are pictured in figure 3. The upper panel shows the complete sample of respondents while the lower panel depicts the distribution for respondents that revised their expectations after the treatment. Looking at left graph of the upper panel depicting the complete distribution of prior inflation expectations across treatments we can clearly confirm that not only for the mean but also for the complete distribution no difference is observable. Hence, there is no hidden sample heterogeneity across the different treatment sub-samples. The picture changes substantially if we consider the right hand graph. We clearly observe that some treatments have a substantial impact on the posterior densities. Again the "mean only" and the "small band" treatments seem to affect the distribution of inflation expectations substantially. Instead, the distributions of the

Table 1: Summary statistics by treatment, means and standard deviations.

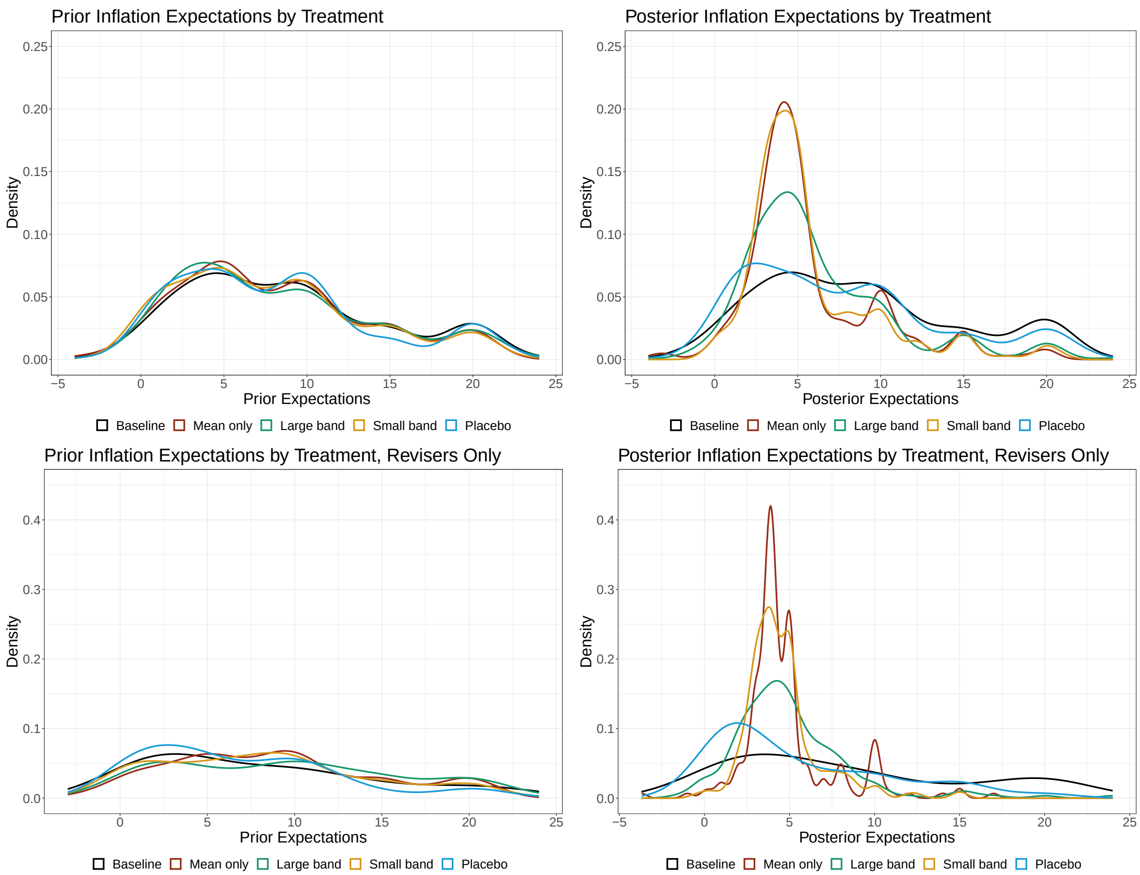
	$\pi^e_{i,prior}$	$\pi^e_{i,posterior}$	$\pi^e_{i,prior,revisers}$	$\pi^e_{i,posterior,revisers}$	Fraction revised
Baseline					
Mean	8.28	8.21	6.18	5.90	0.24
Median	8.00	8.00	5.00	4.00	
Std. Dev.	5.61	5.61	5.91	5.80	
Mean Only					
Mean	7.61	5.55	7.88	4.61	0.63
Median	6.70	5.00	8.00	4.00	
Std. Dev.	5.40	3.77	5.74	2.61	
Large Band					
Mean	8.31	6.55	8.94	5.06	0.45
Median	7.50	5.00	8.00	4.20	
Std. Dev.	5.85	4.73	6.47	3.52	
Small Band					
Mean	7.98	5.84	8.27	4.85	0.62
Median	8.00	5.00	8.00	4.50	
Std. Dev.	5.66	3.84	6.00	2.41	
Placebo					
Mean	7.69	7.38	6.90	5.91	0.32
Median	7.00	6.00	5.00	3.50	
Std. Dev.	5.45	5.45	5.63	5.43	
Total					
Mean	7.98	6.70	7.89	5.08	0.45
Median	7.00	5.00	8.00	4.00	
Std. Dev.	5.60	4.83	6.01	3.70	

Notes: Pollfish data for the U.S., fielded in December 2022. All inflation expectations are truncated to lie in the range between -5% and +25%.

"baseline" and the "placebo" treatments remain visually indistinguishable from the prior expectations densities.

In the lower panel we replicate the same exercise but limit the sample to those respondents that adjust their expectations after the information treatment. Qualitatively the observations in comparison to the figures in the upper panel remain the same. Again, looking at the left figure we see that all distribution across the treatment arms seem identical with little to no variation across the sub-samples. In the right figure the the effect of the information treatments becomes even more pronounced and visible but remains qualitatively identical to the upper panel graph. We observe strong effects for "mean only" treatment followed by the "small band" treatment. The "large band" treatment has some effect but is smaller than the previous two, however, bigger than the "baseline" and the “placebo” treatment. This visualization nicely shows that low signal uncertainty (small band treatment) leads to a much tighter distribution and lower variance of posterior expectations.[8]

Figure 3: Kernel densities of prior and posterior expectations for each treatment arm.



Notes: Pollfish data for the U.S., fielded in December 2022. Kernel densities plotted. The upper-left panel shows the distribution of prior inflation expectation for all respondents, while the upper-right panel shows the posterior expectations for each treatment arm. The lower-left panel shows the distribution of prior inflation expectation of those that revised their expectations for each treatment arm, while the lower-right panel shows posterior expectations for those that revised their forecast for each treatment arm.

4.2 Regression Analysis

We now evaluate the treatment effects on inflation expectations in a regression model. In the literature on survey experiments, it is common to assume that agents behave in a Bayesian way (see Coibion et al., 2018 or Armantier et al., 2016), where agents form beliefs as a weighted average of the prior, $\pi^e_{i,prior}$, and the signal, $\pi^e_{i,info}$:

[8] Kolmogorov-Smirnov tests reveal the posterior distributions of the “mean only”, “small band,” and “large band” treatments are significantly different from the “baseline” posterior distribution at the 1 percent level, while the difference between the “placebo” and “baseline” posterior distributions is not significant at the 10 percent level. Additionally, the posterior distributions of “mean only” and “small band” are different from the posterior distributions of “large band” at the 5 percent level.

$$\pi^e_{i,post} = a_1 \cdot \pi^e_{i,prior} + (1 - a_1) \cdot \pi^e_{i,info}, \tag{4}$$

where $\pi^e_{i,post}$ denotes participant i's posterior inflation expectation after the treatment. Following Coibion et al. (2022) and Coibion et al. (2023), we use the following specification for all margins (overall, extensive, and intensive) where we estimate the effect of each treatment controlling for prior inflation expectations:

$$\pi^e_{i,post} = \alpha_0 + \alpha_1 \pi^e_{i,prior} + \beta_1 T_i + \beta_2 T_i \pi^e_{i,prior} + \boldsymbol{\gamma}' X^c_i + u_i, \tag{5}$$

where X^c_i is a vector of age, gender, and income indicator variables, T_i is a vector of treatment dummies, and u_i is an i.i.d. error term. The regression models are estimated using population and Huber (1964) weights.[9] In the literature, the results from the specification in eq. (5) are often interpreted under the assumption that the restriction on coefficients holds ($a_1 = \alpha_1$), as in eq. (4).

Table 2: Main Results

	Overall		Extensive		Intensive	
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.7299***	0.9846***	-0.0003	-0.0140***	0.2149***	0.4559***
	(0.0159)	(0.0063)	(0.0022)	(0.0039)	(0.0139)	(0.0701)
Mean Only	-1.8307***	1.1757***	0.4641***	0.3075***	0.1968	1.2801***
	(0.1823)	(0.1878)	(0.0371)	(0.0685)	(0.2765)	(0.4029)
Large Band	-1.2101***	0.1210	0.2582***	0.0721	0.2030	1.8714***
	(0.1796)	(0.1192)	(0.0372)	(0.0678)	(0.2984)	(0.4306)
Small Band	-1.6819***	1.7791***	0.4646***	0.2887***	0.3671	1.6181***
	(0.1883)	(0.2227)	(0.0370)	(0.0671)	(0.2734)	(0.3984)
Placebo	-0.3457**	-0.1745*	0.1171***	0.0746	-0.7907**	-0.4253
	(0.1645)	(0.1028)	(0.0335)	(0.0639)	(0.3309)	(0.4629)
Mean Only $\times \pi^e_{prior}$		-0.3659***		0.0194***		-0.2456***
		(0.0367)		(0.0063)		(0.0740)
L. Band $\times \pi^e_{prior}$		-0.0324**		0.0223***		-0.3296***
		(0.0139)		(0.0063)		(0.0748)
Sm. Band $\times \pi^e_{prior}$		-0.4827***		0.0220***		-0.2681***
		(0.0423)		(0.0062)		(0.0740)
Placebo $\times \pi^e_{prior}$		0.0082		0.0042		0.0647
		(0.0096)		(0.0061)		(0.0849)
Constant	2.3644***	0.1577	0.0180	0.1092	1.4535	1.0651
	(0.6030)	(0.2304)	(0.0980)	(0.1034)	(0.9189)	(0.9595)
N	1605	1467	1609	1609	727	733
R^2	0.720	0.935	0.182	0.197	0.364	0.414
Mean Only = L. Band	0.002	0.000	0.000	0.001	0.974	0.057
Sm. Band = L.Band	0.023	0.000	0.000	0.003	0.384	0.399
Mean Only = L. Band (int)		0.000		0.682		0.027
Sm. Band = L. Band (int)		0.000		0.960		0.090

Notes: Pollfish data for the U.S., fielded in December 2022. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population and Huber (1964) adjusted weights and show heteroscedasticity-robust standard errors in parentheses. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

[9] We truncate the sample to include those with prior expectations between -5 and 25.

Table 2 contains the main results and shows the estimated average treatment effects on posterior inflation expectations (overall) as well as on the intensive and the extensive margin. For each specification we show the resulting average impact of the treatment and the treatment effects dissected into the intercept and slope component following the intuition in eq. (4).[10]

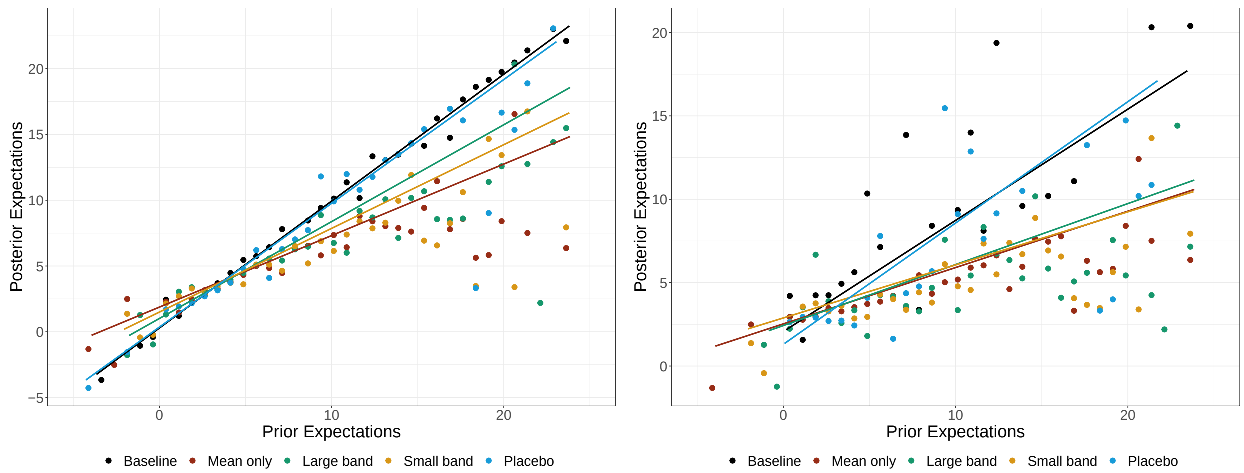
Starting with the overall effect and looking at column (1), we find that respondents in "mean only," "high variance," and "low variance" treatments, on average, significantly adjust their expectations downwards after being treated. This adjustment is lower in the "high variance" treatment than in the "mean only" and "low variance" treatment implying—in accordance with our model—that the strength of the signal matters for the process of updating inflation expectations. As can be seen at the bottom of Table 2, these differences are significant at 5% for the "mean only" treatment and the "low variance" treatment. In these three treatments posterior inflation expectations have been, on average, revised downward in response to the information about the SPF forecasters. The information effect of the placebo treatment is small and statistically significant only at 5% significance level. In column (2) of this table we further study whether the information treatment effects come from a lower reliance on priors when treated with the information. Our results imply that the majority of the effect comes from the lower reliance on priors. Again, we observe that the "large band" treatment leads to larger reliance on priors in comparison to the "mean only" and "small band" treatments. Hence, we can document, for the first time, that consumers are able to discriminate between high and low uncertainty signals as they respond more strongly to the "small band" information treatment relative to the "large band" treatment. This difference is not only quantitatively different but also significantly different as shown by the t-tests on those coefficient estimates. Another interesting observation appears. We observe only a minor difference between the "mean only" treatment and the "small band" treatment. This may indicate that, although we do not explicitly state that the mean forecast is uncertain, consumers automatically account for some uncertainty of the mean forecast leading to an adjustment of expectations which is not statistically different from each other.

As the results discussed in columns (1) and (2) are a combination of extensive and intensive margins, we further study these margins in the columns (3)–(4) ("Extensive") and (5)–(6) ("Intensive"). Looking at the results of the extensive margin in columns (3)–(4) it mirrors the observation from the overall estimation. Generally speaking, all our information treatments increase the probability to adjust expectations. Again, being treated by the "mean only" or "small band" leads to the strongest adjustment in the probability to adjust expectations followed by the "large band" treatment relative to the baseline "baseline" treatment. The "placebo" treatment is only statistically significant in the aggregate specification. as can be expected already from the results in the summary statistics table 1. On average, those with higher priors update expectations slightly more frequently, but the results are similar across the three treatments with relevant information.

In the last two columns we show the results for the intensive margin, i.e., by how much the participant update their prior inflation expectations after they have been treated given that they have decided to update. In contrast to our previous results, we see only minor differences in the size

[10] The results are very similar in models with and without demographic controls.

Figure 4: Inflation Expectations: Overall and Intensive Margins



Notes: Pollfish data for the U.S., fielded in December 2022. We show binscatter plots across treatments with population and Huber (1964) robust weights from estimations in Table 2.

of the coefficient estimates across treatment arms for the intensive margin. For the specification in column (5) no treatment dummy (except the placebo) is statistically different from the baseline. Results in column (6) suggest that the reliance on priors is very small in all our treatments where we provide relevant inflation outlook. If anything, the reliance on priors may be a bit lower in the "large band" treatment than in the "small band" treatment, suggestion the opposite results compared to the overall margin. These results suggest that the main difference between the "large band" treatment and the "small band" treatment (or the "mean only" treatment), on average, mostly comes from the extensive margin. Implying that the variation is driven by the decision to update but not in the size of adjustment which is very similar across treatments. In fact, in Table 1 we can see that in the frequency of updates is about 60% for the "mean only" and "small band" treatment, while the frequency in the for the "large band" treatment is 46% only.

Figure 4 is a visualization of our empirical estimates for the overall effect and the intensive margin as presented in Table 2. These figures are informative to check whether outliers are driving the results, or to study the heterogeneity of responses. Looking at the figure on the left, it it present the results for the overall specification with slope and intercept effects of different treatment arms. The slope represents the reliance on priors, which can be observed from the treatment interaction with the priors. It shows that in comparison to the baseline consumers react most strongly to the "mean only" treatment (read line) and the "small band" (yellow line) followed by the "large band" (green line) treatment represented by the downward tilting of the lines. The placebo treatment (blue line) is indistinguishable from baseline graph. The figure clearly shows that there is more heterogeneity in response to information treatments when priors are relatively high. The figure on the right is representing the results of the same specification but for the intensive margin. Here we observe stark differences in comparison to the previous picture. While there is a significant reaction to the information treatments "small band", "large band" and "mean only" in comparison to the baseline and the placebo treatments as before, the difference is that all three lines now almost identical, supporting the econometric results that the observed differences across treatments are driven by the probability to update, while the size of the reaction is very similar.

4.3 Prior Reported Uncertainty

To measure prior uncertainty we ask the respondents how certain they are in their prediction for inflation. As outlined above, we would expect that those that have stronger priors—and thus lower uncertainty regarding their forecast of inflation—to update less after we provided them with information treatments.

Table 3: Treatment Effects: Prior Uncertainty

	high prior uncertainty			low prior uncertainty		
	Overall	Extensive	Intensive	Overall	Extensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.9601***	-0.0093	0.5364***	0.9843***	-0.0157***	0.3559***
	(0.0194)	(0.0059)	(0.0587)	(0.0093)	(0.0051)	(0.0993)
Mean Only	1.7421***	0.2951***	1.8351***	0.7761***	0.3608***	0.8505
	(0.2973)	(0.0964)	(0.5723)	(0.2608)	(0.0912)	(0.6305)
Large Band	0.2589	0.2057**	1.7939***	0.1988	-0.0223	1.8269***
	(0.2989)	(0.0913)	(0.6514)	(0.1833)	(0.0978)	(0.6177)
Small Band	2.1883***	0.4480***	2.3557***	1.7293***	0.1622*	1.3350**
	(0.3280)	(0.0900)	(0.5580)	(0.2508)	(0.0929)	(0.6002)
Placebo	0.1761	0.1777*	0.1731	-0.2717*	0.0251	-2.1112***
	(0.2807)	(0.0926)	(0.6334)	(0.1429)	(0.0863)	(0.7415)
Mean Only $\times\pi^e_{prior}$	-0.5728***	0.0235**	-0.3700***	-0.2662***	0.0135	-0.1097
	(0.0519)	(0.0095)	(0.0652)	(0.0454)	(0.0082)	(0.1070)
L. Band $\times\pi^e_{prior}$	-0.1080***	0.0117	-0.4067***	-0.0330	0.0309***	-0.2183**
	(0.0405)	(0.0085)	(0.0727)	(0.0228)	(0.0091)	(0.1054)
Sm. Band $\times\pi^e_{prior}$	-0.5650***	0.0095	-0.4794***	-0.4783***	0.0315***	-0.1372
	(0.0601)	(0.0095)	(0.0645)	(0.0382)	(0.0081)	(0.1054)
Placebo $\times\pi^e_{prior}$	-0.0427	0.0023	-0.0031	0.0172	0.0050	0.5801***
	(0.0351)	(0.0098)	(0.0811)	(0.0129)	(0.0079)	(0.1391)
Constant	0.6891	0.0289	1.2329	0.0913	0.1084	7.7949***
	(0.6635)	(0.1458)	(0.9891)	(0.2263)	(0.1144)	(0.6520)
N	703	717	337	820	892	390
R^2	0.830	0.212	0.478	0.935	0.229	0.534

Notes: Pollfish data for the U.S., fielded in December 2022. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

Table 3 provides the results where we split the sample between those who reported high prior uncertainty and those who reported low prior uncertainty. Again, we observe that the the main results remain valid for both sub-samples: Respondents respond less to the signal with the higher uncertainty compared to signal with lower uncertainty. However, while qualitatively similar, there are sizable differences in the coefficient estimates. Households who reported lower uncertainty regarding their priors rely more on their priors compared to households with higher uncertainty and update less with respect to the signal they received. The response to both the large band and small band treatments is significantly larger for households with a high prior uncertainty. Households tend to put especially high weight on the signal if they are highly uncertain about the prior and they receive a signal with lower uncertainty, in line with what Bayesian updating would suggest. In contrast, when households have high certainty about their prior, they update very little, if any, when they receive a signal in a large band treatment.

To further investigate the differences between those that report high and low uncertainty about their prior expectations, we investigate extensive and intensive margins separately. High prior uncertainty group also has a higher propensity to update their expectations that is significantly different across treatments, but generally does not rely on level of their prior expectations (see column 2). Once the respondents decide to update expectations, the results for the intensive margin—see column (3)—suggest relatively low, and not significantly different, reliance of priors among all information treatment with forecast information. Thus, for the group with high prior uncertainty we can emphasize again the role of extensive margin for the overall results. For the low prior uncertainty group, we observe less differences in the extensive margin, but at the same time in both treatments where we provide measures of signal precision, households with higher priors tend to update more often. This result suggest that especially consumers with lower priors tend to update very infrequently (rely mostly on their prior) and only those that learned that they are relatively far from the signal decide to update their expectations (column 5). Regarding the intensive margin for the low prior uncertainty group, the reliance on priors is similar for the large band treatment, but significantly larger for the low prior uncertainty group than high prior uncertainty group, consistent with Bayesian updating. Hence, the results highlight the role of the extensive margin for both subgroups. However, the results also suggest that role of the intensive margin is relatively larger for those with low prior uncertainty then for those with high prior uncertainty.

4.4 The Role of Self-reported Information on Bands

Our results show that consumers are able to discriminate between high and low uncertainty information. To improve the validity of our results we explicitly asked respondents whether they incorporated this information provided. This allows to filter those people out that did not incorporate this information although it was provided. We utilize the question that asked them if they considered bands in updating inflation expectations, as described in Q6 in the appendix C. Results are reported in table 4, where the reference treatment is small bands as the other treatments (e.g., "means only") had no information about bands provided.

Looking at the coefficient estimate of the dummy variable "Considered Band" which identifies respondents who state that they incorporated this information on the bands, we can immediately see from the "overall" effect column (1) that those respondents adjusted expectations more strongly

Table 4: Treatment Effects: Bands

	Overall (1)	Extensive (2)	Intensive (3)
π^e_{prior}	0.4102***	0.0051	0.1605***
	(0.0209)	(0.0034)	(0.0164)
Large Band	0.1794	-0.1553***	-0.0933
	(0.1655)	(0.0409)	(0.1730)
Considered Band	-1.4015***	0.2778***	-0.2702
	(0.1710)	(0.0423)	(0.2029)
Constant	1.2299	0.3113*	2.1630***
	(0.9481)	(0.1689)	(0.6461)
N	652	661	364
R^2	0.500	0.159	0.295

Notes: Pollfish data for the U.S., fielded in December 2022. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

and from the "extensive" column (2) that they have significantly higher probability to update their expectations. Hence, this is direct evidence that respondents use actively this information. Those that report using this information they respond more on average to the signal and have a higher probability to update their expectations as compared to those that leave this information aside.

4.5 The Effect of Observing Inflation News on Updating Expectations

We also study the role of news for the expectation formation mechanism by examining any differences in Bayesian updating between those consumers who reported recently observing news on inflation and those that reported that they have not seen any news on inflation. Our prior would be that those that have seen news may attach less uncertainty around their priors and therefore update less with the provided information.[11]

Results for all three margins are reported in table 5.[12] The results for those that report hearing news about inflation are very similar to our overall results: the reliance on priors is very high in the "large band" treatment and considerably smaller in the "small band" treatment. When households are exposed to "small band" treatment, both those who report hearing news and those that report

[11] In fact, using a similar approach to our standard regressions analysis, we observe that those respondents that report hearing news report on on average about 9 percentage points lower prior uncertainty after controlling for demographic characteristics and financial literacy.

[12] Note that a high proportion of individuals report observing news about inflation, consistent with our expectations, as inflation was high in December 2022.

Table 5: Treatment Effects: News

	reported hearing news			reported hearing no news		
	Overall	Extensive	Intensive	Overall	Extensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.9672***	-0.0143***	0.4896***	0.9725***	-0.0088**	0.2850
	(0.0122)	(0.0055)	(0.0710)	(0.0190)	(0.0043)	(0.2027)
Mean Only	1.6885***	0.3534***	1.6213***	1.1635***	0.2282**	-0.3137
	(0.2354)	(0.0809)	(0.3818)	(0.3761)	(0.1022)	(0.9417)
Large Band	0.1667	-0.0274	2.8474***	2.0916***	0.4782***	-0.6082
	(0.1918)	(0.0810)	(0.4783)	(0.3627)	(0.1089)	(0.8525)
Small Band	2.1567***	0.2616***	2.0774***	1.7154***	0.3836***	-0.2368
	(0.2528)	(0.0821)	(0.3841)	(0.3727)	(0.1108)	(0.9115)
Placebo	-0.0773	0.1498*	-0.1936	-0.4472	-0.0130	-2.0467**
	(0.1844)	(0.0825)	(0.4982)	(0.2895)	(0.0840)	(0.9793)
Mean Only $\times\pi^e_{prior}$	-0.4818***	0.0089	-0.2943***	-0.4696***	0.0380***	0.0037
	(0.0426)	(0.0082)	(0.0753)	(0.0503)	(0.0074)	(0.2068)
L. Band $\times\pi^e_{prior}$	-0.0754**	0.0273***	-0.4306***	-0.6466***	0.0023	-0.0096
	(0.0292)	(0.0080)	(0.0795)	(0.0481)	(0.0092)	(0.2036)
Sm. Band $\times\pi^e_{prior}$	-0.5419***	0.0204***	-0.3146***	-0.5472***	0.0312***	0.0056
	(0.0403)	(0.0077)	(0.0761)	(0.0568)	(0.0108)	(0.2090)
Placebo $\times\pi^e_{prior}$	0.0032	-0.0053	0.1276	0.0257	0.0139	0.1162
	(0.0193)	(0.0078)	(0.0933)	(0.0226)	(0.0092)	(0.2128)
Constant	0.2025	0.0362	0.1954	2.0855**	0.2489	3.3961***
	(0.4157)	(0.1156)	(0.9696)	(0.8747)	(0.1619)	(0.9387)
N	1174	1203	551	391	405	177
R^2	0.854	0.171	0.434	0.897	0.392	0.579

Notes: Pollfish data for the U.S., fielded in December 2022. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

hearing no news have a similar reliance on the prior. However, those that report hearing no news about inflation update their prior in a similar way when receiving ”large bands” treatments compared to those receiving “small bands” treatment, in stark difference compared to those that report hearing news. In fact, households that report hearing news about inflation update their expectations very little when exposed to “large band,” the weight is almost 50 percentage points lower than in the small bands treatment. Extensive margin decisions seem to be responsible for most of these effects.

4.6 Decomposition of the Intensive and Extensive Margin Effects

We study the relevance of extensive and intensive margins in our survey experiment by using a similar decomposition of the average level of posterior inflation expectations and their cross-sectional variance as in Dräger et al. (2024). Dräger et al. (2024) adapts the Klenow and Kryvtsov (2008) decomposition in Andrade et al. (2023) for a cross-sectional comparison in our RCT environment (see appendix B for details).

Table 6: Cross-Sectional Variation of Average Inflation Expectations: The Role of Intensive and Extensive Margins

	Base	Mean	Large	Small	Pl.
$\pi^{e,h}_{j,post}$	8.22	4.88	6.91	5.07	7.31
$\pi^{e,h}_{i,post} - \overline{\pi^e}$	1.60	-1.73	0.29	-1.54	0.70
IM contr.	0.69	-1.28	0.07	-1.18	0.07
EM contr.	0.70	-0.61	0.07	-0.60	0.42
$V\left(\pi^{e,h}_{i,post}\right)$	30.9	9.9	24.1	8.9	29.0
IM contr. (in %)	62.0	45.3	46.2	47.4	54.4
EM contr. (in %)	38.0	54.7	53.8	52.6	45.9

Note: Pollfish data for the U.S., fielded in December 2022. All statistics are calculated using Huber (1964) robust and population weights from the overall margin estimation in Table 2. IM stands for intensive margin and EM for extensive margin. Base, Mean, Large, Small, Pl. stand for Baseline, Mean only, Large bands, Small bands, and Placebo treatments. $\pi^{e,h}_{i,post} - \overline{\pi^e}$ is the difference in average expectations in treatment i and the average expectations in this RCT.

The results in Table 6 suggest that in "mean only" and "small bands" treatments about two-thirds of the variation in the level of average posterior inflation expectations across treatments can be explained by the contributions of the intensive margin and about one-third from the extensive margin. In the remaining treatments the split is close to half from the intensive margin and half from an extensive margin. The variance of posterior inflation expectations across treatments is also explained by both margins. The contributions of the extensive margin range from 38.0 to 54.7 percent for short-run expectations collected using the Pollfish platform. The contribution of the extensive margin is relatively smaller in the case of the the two control treatments, while for the main three treatments it exceeds 50 percent.

4.7 Asymmetries in Updating Inflation Expectations

We now look at the potential asymmetries in updating of expectation, depending on whether the signal is above or below their prior. Table 7 presents the results; see also tables A.7–A.8 in the appendix for the full regressions, like in our main table 2. The results indicate that such asymmetries indeed exist, in particular when it comes to the adjustment on the intensive an extensive margins. When the prior is below the signal, consumers tend to update their expectations more often, but by a smaller amount, compared to the case when prior is above the signal. Another result is that the extensive margin depends on the distance between the prior and the signal, where the probability to update is significantly more sensitive to the distance between prior and signal when prior is below the signal. In other words, when inflation is increasing and the prior lags behind, consumers have a higher probability to update their expectations compared to the case when inflation is decreasing and priors are above the signal.

Table 7: Updating Expectations for Those with Priors Above/Below the Signal

	Overall		Extensive		Intensive	
	Above	Below	Above	Below	Above	Below
	(1)	(2)	(3)	(4)	(5)	(6)
$\lvert\pi^e_{t\lvert t-1} - z_t\rvert$	0.2631***	-0.5513***	0.0200***	0.1602***	0.1016***	-0.5322***
	(0.0237)	(0.0600)	(0.0036)	(0.0261)	(0.0194)	(0.0871)
Large Band	0.6884***	0.0318	-0.2365***	-0.0495	0.1852	0.2203
	(0.2293)	(0.1362)	(0.0465)	(0.0786)	(0.2140)	(0.2253)
Small Band	-0.0260	0.6114***	-0.0102	0.0712	0.0882	0.9216***
	(0.2073)	(0.1674)	(0.0477)	(0.0704)	(0.1648)	(0.2547)
Constant	3.6919***	1.7487***	0.3180*	-0.3313	3.3323***	1.4404
	(1.0530)	(0.5602)	(0.1652)	(0.2399)	(0.5491)	(0.9398)
N	723	240	733	244	415	145
R^2	0.195	0.399	0.133	0.261	0.104	0.331

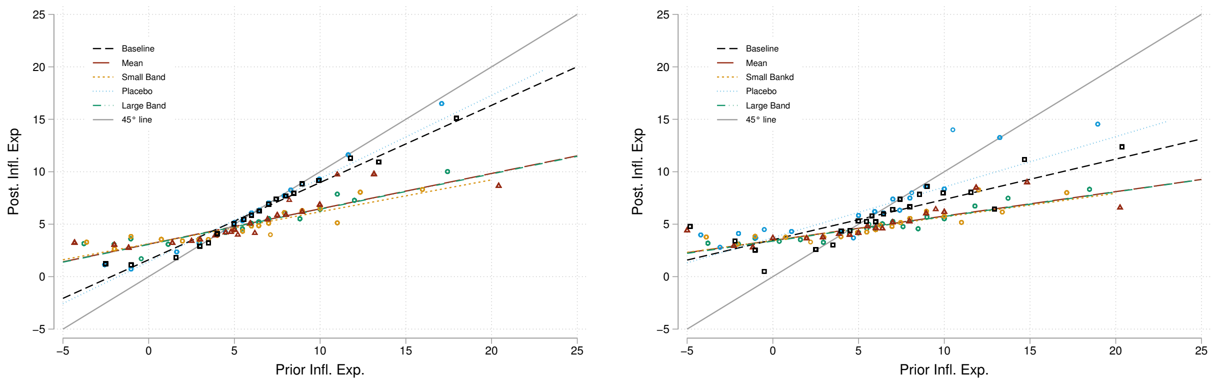
Notes: Pollfish data for the U.S., fielded in December 2022. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population and Huber (1964) adjusted weights and show heteroscedasticity-robust standard errors in parentheses. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

This result is in line with evidence that consumers consumers are more attentive to negative news about inflation compared to positive news about inflation as outlined in, for example, Pfajfar and Santoro (2013). Armantier et al. (2022) outline that households long-run inflation expectations react more to positive than to negative inflation surprises in a high inflation environment. In addition, D'Acunto et al. (2023) argue that households put a higher weight on positive relative to negative price changes when forming inflation expectations.

Analysis of the Bundesbank's Online Panel Data To provide additional empirical evidence we re-run our analysis on the Bundesbank Online Panel of Households (BOP-HH). While the BOP-HH is a survey administered by the Bundesbank since 2019, our survey was fielded in August 2023. In comparison to the US, the inflation forecast for Germany was 3.9 percent, the small band signal was ranging between 3.3 and 4.6 percent and the large band signal spanned 1.7 to 5.3 percent. Hence, while the mean inflation projection was similar to the US sample, the signal band with difference between small and large band variance is substantially smaller for Germany. Furthermore, while in 2022 Q3 inflation in the US was reaching its peak, the survey in Germany was fielded where inflation rates were on a downward trajectory. Consequently, due to this difference in the inflation environment, we expect the effects to be slightly less pronounced in the BOP-HH data as in the Pollfish U.S. data.

In table A.5 we provide the summary statistics across treatment arms including the share of people that adjust expectations. We can observe that the mean and median is substantially smaller in the German sample. We can see, when looking at the medians, no changes for the baseline and the placebo treatment, but differences in size for our three information treatments. When looking at the share of people that adjust a similar picture emerges that indicates that people find the mean only, large and small band treatments informative relative to the baseline and placebo treatment. This qualitative result is in line with our US sample. However, we observe slightly higher updating shares for Germany and a bigger difference between small band and large band.[13]

Figure 5: Binscatterplot Based on BOP-HH Data for Germany



Notes: Bundesbank Online Panel of Households (BOP-HH), August 2023 wave. We show binscatter plots across treatments with population and Huber (1964) robust weights from estimations in Table 8.

Table 8 shows the estimation results based on specification in equation (4). Overall, we can confirm our previous results. There is clear evidence that small and large band treatments have different effects. Furthermore we can re-confirm that this difference is mainly driven by the intensive margin, hence the decision to adjust expectations. Notably, the we find little statistically significant differences in the desegregation of the overall effect into the slope and intercept effect. Only in the first OLS regression with population weights, we observe a statistically different coefficient estimate between small and large band. However, aggregating the slope and intercept effect we can see that the small band treatment exert a significant stronger effect on the probability to update inflation expectations as the large band (p-value of 0.031 using OLS with population weights and 0.022 for the Huber regression, see Table A.6 in the appendix). The scatter-plots presented in Figure 5 are a graphical representation of the estimation results. We observe that the information provided clearly matters for consumers. We can again confirm that providing information about signal uncertainty is a valuable source for consumers. The small band signal has the strongest impact followed by the large band and the mean only information treatment. Again, it seems that the mean only treatment is viewed has having an implicit level of uncertainty as it has similar response as the large band treatment.

[13] The slightly higher updating share might be country specific or due to a slight change in the wording of this question due to requirements of the Bundesbank. See details in the Appendix.

Table 8: Inflation Expectations in the BOP-HH data: Treatment Effects

	Overall		Extensive		Intensive	
	Pop. Weight	Huber	Pop. Weight	Huber	Pop. Weight	Huber
π^e_{prior}	0.699***	0.735***	0.001	-0.000	0.551***	0.384***
	(0.07)	(0.03)	(0.01)	(0.01)	(0.11)	(0.05)
Mean Only	1.028**	1.511***	0.356***	0.362***	0.076	-0.035
	(0.45)	(0.27)	(0.06)	(0.06)	(0.50)	(0.31)
Large Band	0.682	1.469***	0.319***	0.326***	0.001	-0.106
	(0.47)	(0.23)	(0.06)	(0.06)	(0.49)	(0.29)
Small Band	1.301***	1.520***	0.371***	0.378***	0.293	-0.045
	(0.47)	(0.24)	(0.06)	(0.05)	(0.53)	(0.31)
Placebo	0.720	-0.207	0.110*	0.111*	1.176	0.201
	(0.59)	(0.26)	(0.07)	(0.06)	(0.72)	(0.41)
Mean Only $\times \pi^e_{prior}$	-0.317***	-0.403***	-0.007	-0.006	-0.275**	-0.154***
	(0.09)	(0.05)	(0.01)	(0.01)	(0.11)	(0.05)
L. Band $\times \pi^e_{prior}$	-0.257***	-0.402***	-0.001	-0.000	-0.253**	-0.150***
	(0.09)	(0.04)	(0.01)	(0.01)	(0.11)	(0.05)
Sm. Band $\times \pi^e_{prior}$	-0.382***	-0.431***	0.001	0.003	-0.300**	-0.161***
	(0.09)	(0.04)	(0.01)	(0.01)	(0.12)	(0.05)
Placebo $\times \pi^e_{prior}$	-0.082	0.056	-0.018*	-0.018*	-0.131	0.099
	(0.10)	(0.04)	(0.01)	(0.01)	(0.13)	(0.07)
Constant	2.001***	1.216***	0.273***	0.261***	3.529***	3.088***
	(0.41)	(0.21)	(0.06)	(0.06)	(0.54)	(0.33)
N	3761	3748	3761	3761	2094	2085
R^2	0.512	0.651	0.129	0.139	0.386	0.415
Mean Only = L.Band	0.315	0.858	0.462	0.457	0.771	0.709
Sm. Band = L.Band	0.093	0.802	0.294	0.275	0.352	0.762
Mean Only = L. Band (int)	0.388	0.986	0.403	0.400	0.698	0.914
Sm. Band = L. Band (int)	0.068	0.459	0.680	0.668	0.419	0.777

Notes: Bundesbank Online Panel of Households (BOP-HH), August 2023 wave. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

5 A Simple Model of Inflation

The dominance of the extensive margin in the RCT experiment is at odds with the classic Bayesian model of belief updating: a Bayesian household would always update their beliefs when presented with an inflation signal. The difference between the large band, small band, and mean only groups would be along the intensive margin. That is, participants who saw less precise information would still update their beliefs, but by a smaller amount. Instead, participants in the large band treatment group were more likely to leave their beliefs unchanged compared to the small band group. Additionally, the distance of a participant's prior from the inflation signal on average increased the likelihood of them updating their beliefs. Therefore, a model akin to sticky expectations that depend on the uncertainty of the signal and the error of the prior is more in line with our RCT results.

To account for the effect of the extensive margin we observe in the RCT, we propose an alternative model where households are rationally inattentive to inflation news. First proposed by Sims (2003), the rational inattention hypothesis posits that collecting and processing information is costly for a decision maker. Measuring information costs in Shannon entropy, the decision maker must trade off between the loss of being uninformed and the cost of keeping their information up to date.

In this section we present an inflation belief updating mechanism based on Woodford (2008) and Morales-Jiminez and Stevens (2024), who use this mechanism to explain why many firms leave their prices unchanged. To the best of our knowledge, we are the first to apply this mechanism to households' inflation beliefs.

In the remainder of the section, we first present a two-period partial equilibrium decision problem to study the implications of the rational inattention model for belief updating. We demonstrate that the two-period model is able to match two of our new empirical facts: households with less certain information are less likely to update their beliefs, and households behave asymmetrically when their beliefs are above and below the true value of inflation. We then extend to an infinite horizon decision problem where the household's steady state information policy depends on both their inflation prior and their asset holdings. Lastly, we embed the steady state information policy into a standard New Keynesian model and study the implications of this behavior for inflation dynamics.

5.1 Rational Inattention

Consider a household who enters a period with assets a and prior π^e about next period's inflation rate. The household could learn about the underlying state of the economy and update their inflation beliefs to the model-consistent π', but this updating is subject to information costs.

Woodford (2008) proves in a two-period decision problem that the optimal information policy is to arrange a binary signal $\Lambda(\pi^e, a)$, where a signal of 1 updates the household to π' and a signal of 0 leaves beliefs unchanged. Woodford (2009) and Morales-Jiminez and Stevens (2024) extend this mechanism to an infinite horizon model, but specifically for firm pricing decisions. To the best of our knowledge, we are the first to apply this mechanism to the household block of a model.

We now formulate the household's problem as in Morales-Jiminez and Stevens (2024). Let $\overline{\Lambda}$ be the household's reference distribution, or the information policy the household may use at no information cost. Given the state (π^e, a), the household may choose a random binary signal to update their beliefs $\Lambda(\pi^e, a)$, subject to the information cost

$$\theta D\left(\Lambda(\pi^e, a)\,||\,\overline{\Lambda}\right),$$

where $D(\cdot\,||\,\overline{\Lambda})$ is the Kullback-Leibler divergence of $\Lambda(\pi^e, a)$ from $\overline{\Lambda}$ and θ is a unit cost of information. To find the optimal information policy, the household solves the problem

$$V_\Lambda(\pi^e, a) = \max_{\Lambda} \left\{\Lambda(V(\pi', a) - \kappa) + (1 - \Lambda)V(\pi^e, a) - \theta D(\Lambda\,||\,\overline{\Lambda})\right\}$$

where $V(\pi^e, a)$ is the household's expected lifetime utility given consume and save under the conviction that tomorrow's prices will grow at rate π^e.

5.2 A Two-Period Decision Problem

To anchor ideas, we now write down and solve a two-period attention decision problem. We demonstrate that even in this simple environment, our belief updating mechanism is able to match two key facts from our RCT experiment: households are less responsive to noisy information and respond to information more strongly when they are below the signal than when they are above.

Consider a household with CRRA preferences over consumption and nominal income w in each period. They can buy or sell one-period ahead bonds with nominal interest rate i, and have initial asset holdings $a = 0$. The price level in the first period is normalized to 1, and have prior beliefs π^e over second period inflation. The true level of inflation in the next period is π', which in the exercise we set to 0.

As before, their information problem has the Bellman form

$$V_\Lambda(\pi^e) = \max_\Lambda \left\{\Lambda(V(\pi') - \kappa) + (1 - \Lambda)V(\pi^e) - \theta D(\Lambda||\bar{\Lambda})\right\}. \tag{6}$$

Given π^e, the household chooses consumption c and assets a' to solve

$$\max_{c,a'} \frac{c^{1-\sigma}}{1-\sigma} + \beta\frac{\tilde{c}^{1-\sigma}}{1-\sigma} \text{ s.t.} \tag{7}$$

$$c + a' = w; \quad (1 + \pi^e)\tilde{c} = w + (1 + i)a'; \quad a' \geq -\frac{w}{1+i}.$$

Their value from their consumption-savings choice given their prior π^e is therefore

$$V(\pi^e) = \frac{c^{1-\sigma}}{1-\sigma} + \beta\frac{(c')^{1-\sigma}}{1-\sigma}, \tag{8}$$

where c solves (7) and

$$c' = \frac{(1 + i)(w - c) + w}{1 + \pi^e}.$$

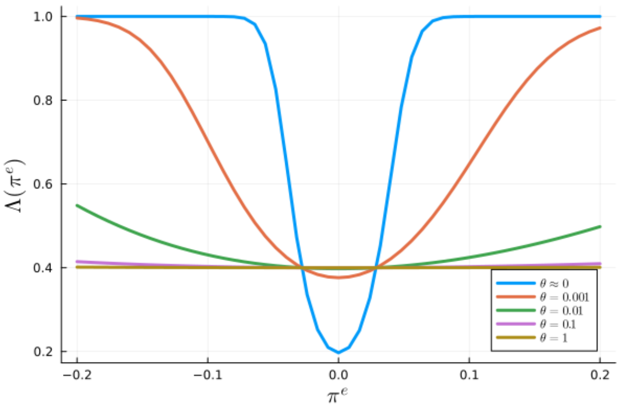
Taking first-order conditions of (6), we arrive at the optimality condition for Λ

$$\Lambda(\pi^e) = \frac{\frac{\bar{\Lambda}}{1-\bar{\Lambda}} \exp\left\{\frac{1}{\theta}\left[V(\pi') - \kappa - V(\pi^e)\right]\right\}}{1 + \frac{\bar{\Lambda}}{1-\bar{\Lambda}} \exp\left\{\frac{1}{\theta}\left[V(\pi') - \kappa - V(\pi^e)\right]\right\}}. \tag{9}$$

The difference between $V(\pi') - \kappa$ and $V(\pi^e)$ is the loss associated with having incorrect inflation beliefs. Hence, (9) is an increasing function of the loss function, and we expect to see households with less accurate priors more likely to update their inflation beliefs.

Figure 6 depicts the updating policy from equation (9) with varying levels of the information cost θ. A few properties of the information policy are worth detailing. First, as the distance between the prior and the true level of π' increases, the household is more likely to update. Second, for

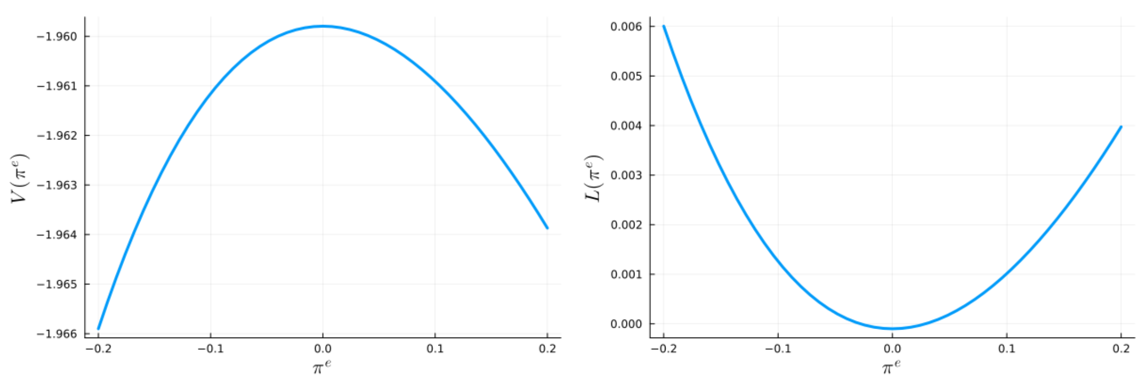
Figure 6: Household's probability of updating inflation beliefs as a function of π^e.



Notes: This figure depicts optimal expectation updating probabilities in a two-period model as a function of prior inflation beliefs. The horizontal axis represents the deviation fo the household's expected inflation from the true level of inflation $\pi' = 0$. The vertical axis represents the optimal updating hazard of the household.

inflation beliefs below π', the household is slightly more likely to update their beliefs than if their beliefs are above π'. That is, the hazard rate for updating inflation beliefs is asymmetric about π', with households with too-low beliefs more likely to update than household with too-high beliefs. Finally, as information becomes more costly, households arrange to receive less certain signals, and as a result they are more likely to leave incorrect beliefs unchanged.

Figure 7: Household's value function $V(\pi^e)$ and loss function $L(\pi^e)$.



Notes: This figure depicts the value function $V(\pi^e)$ for a household at a given level of inflation beliefs. The horizontal axis represents the deviation of the household's expected inflation from the true level of inflation $\pi' = 0$. The vertical axis represents the value function of the household, defined as the difference between lifetime utility with correct inflation beliefs and lifetime utility with incorrect inflation beliefs.

Figure 7 depicts the value function from equation (8) and the loss function from mis-specified inflation beliefs

$$L(\pi^e) = V(\pi') - \kappa - V(\pi^e).$$

Comparing the value function for $\pi^e < 0$ with $\pi^e > 0$, notice there is an asymmetry, with the value function being lower for too-low inflation beliefs than for too-high inflation beliefs. It is exactly this asymmetry in the value function that causes the asymmetry in the updating policy function in figure 6. Since the difference between $V(\pi')$ and $V(\pi^e)$ is greater for $\pi^e < 0$, the household would rather pay the cost of updating inflation expectations than consume less than the optimal amount.

The behavior of this model is consistent with the behavior we observe in the RCT. At all levels of distance from the prior and the signal, only a fraction of participants chose to update. Participants with prior beliefs further from the inflation signal were more likely to update their beliefs on average. Also, participants with prior inflation beliefs below the signal were slightly more likely to update than participants with prior beliefs above the signal.

5.3 Infinite Horizon Decision Problem

We now characterize the steady state information policy in an infinite horizon model following Woodford (2009) and Morales-Jiminez and Stevens (2024).

Let the economy be in steady state with nominal wage w, nominal interest rate i, inflation $\pi = 0$, and price level p normalized to 1. Suppose a household believes that next period there will be a one-time burst of inflation π^e, causing a one-time change in the real interest rate and a permanent change in the real wage. Prior to making their consumption and labor choice, they will update their beliefs to the true steady state rate of inflation $\pi = 0$ with probability $\Lambda(\pi^e, a)$. They will leave the beliefs unchanged with probability $1 - \Lambda(\pi^e, a)$. Their optimal attention problem has the Bellman representation

$$V_\Lambda(\pi^e, a) = \max_{\Lambda} \left\{ \Lambda(V(\pi, a) - \kappa) + (1 - \Lambda)V(\pi^e, a) - \theta D(\Lambda \,||\, \overline{\Lambda}) \right\} \text{ s.t.} \tag{10}$$

$$D(\Lambda \,||\, \overline{\Lambda}) = \Lambda \log\left(\frac{\Lambda}{\overline{\Lambda}}\right) + (1 - \Lambda) \log\left(\frac{1 - \Lambda}{1 - \overline{\Lambda}}\right)$$

where $V(\pi^e, a)$ is the true value to the household when they consume and save under the incorrect conviction that the price level in the next period will be $1 + \pi^e$.

We now characterize $\Lambda(\pi^e, a)$. Taking first-order conditions of the information problem, the optimal choice of $\Lambda(\pi^e, a)$ satisfies the same condition as the two-period model

$$\theta\left[\log\left(\frac{\Lambda}{\overline{\Lambda}}\right) - \log\left(\frac{1 - \Lambda}{1 - \overline{\Lambda}}\right)\right] = V(\pi_{ss}, a) - \kappa - V(\pi^e, a). \tag{11}$$

The left-hand side is the marginal cost of another unit of information, and the right-hand side is the net benefit of having full information, less the adjustment cost κ.

We now characterize $V(\pi^e, a)$. If the household has mis-specified belief π^e about next period's inflation, they will choose c, ℓ, a' to solve the problem

$$\max_{c,\ell,a'} \frac{c^{1-\sigma}}{1 - \sigma} - \frac{\ell^{1+\varphi}}{1 + \varphi} + \beta \tilde{V}(\pi^e, a') \text{ s.t.}$$

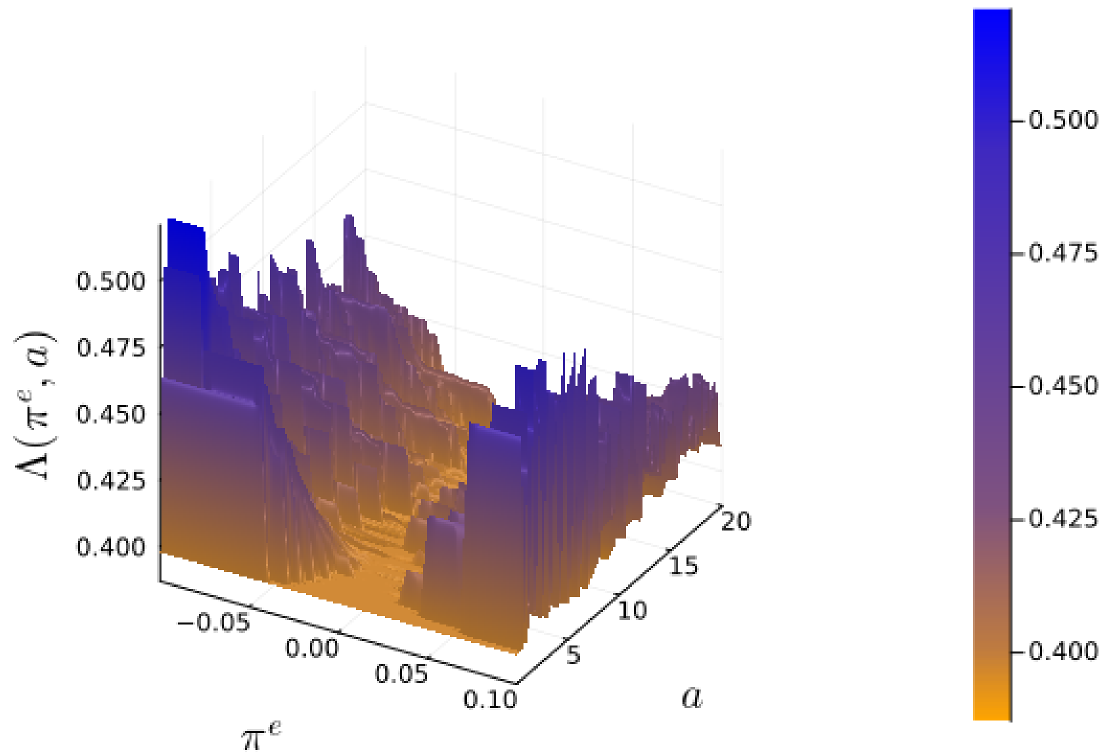
$$c + a' \leq (1+i)a + w\ell$$

$$a' \geq 0,$$

where $\tilde{V}(\pi^e, a')$ is the perceived continuation value of having asset level a' at the permanent price level $1+\pi^e$. Denote the optimal choices above as c^*, ℓ^*, and a'^*. Since the household's expected price level is mis-specified, their actual value at state (π^e, a) is

$$V(\pi^e, a) = \frac{(c^*)^{1-\sigma}}{1-\sigma} - \frac{(\ell^*)^{1+\varphi}}{1+\varphi} + \beta V_\Lambda(\pi^e, a'^*).$$

Figure 8: Household's probability of updating inflation beliefs as a function of (π^e, a).



Notes: This figure depicts optimal expectation updating probabilities in the infinite horizon steady state as a function of prior inflation beliefs and current asset holdings. The left-hand horizontal axis represents prior expectations for inflation. The right-hand horizontal axis represents current asset holdings. The vertical axis represents the hazard rate, or the probability of updating inflation beliefs given the state (π', a).

Figure 8 contains a graph of the optimal Λ as a function of (π^e, a). In this model, true inflation tomorrow is $\pi = 0$. A few features are worth noting. First, the lowest region of the surface corresponds to points where $\pi^e = 0$. Households with near-correct beliefs about inflation have no incentive to pay additional attention to the underlying state, so they lower their likelihood of updating their beliefs to avoid paying the adjustment cost κ. Second, conditional on $\pi^e > 0$, households with lower assets are more likely to update their beliefs. Because they are relatively poorer, a sub-optimal increase in today's consumption brought on by expected high inflation tomorrow incurs more disutility than for richer households. Therefore, acting on a mis-specified expectation and over-spending today would be relatively worse for low asset households, so they pay closer attention. Third, if $\pi^e < 0$, then high asset households are more likely to update their beliefs. Asset rich households with too low inflation beliefs underspend relative to the optimal full information consumption policy.

5.4 Partial Equilibrium Expectation Dynamics

We now present a partial equilibrium exercise to demonstrate the inflation expectation updating mechanism. The economy starts in steady state with gross inflation $\pi_t = 1$ and net interest rate $i_t = 0.03$. Starting in period zero, inflation and interest rates follow a path equal to that seen in the US between 2020:Q3 and 2024:Q3. Afterward, the economy returns immediately to steady state, with the same inflation and interest rate as before, but at an elevated price level relative to the start of the simulation. To solve for the model implied expectation path, we solve the consumption-savings problem backward over the simulation horizon, and then iterate forward. For agents at state (π^e, a_t) who choose a_{t+1} for their assets tomorrow, measure $\Lambda(\pi^e, a_t)$ of them update their beliefs correctly and transit to (π_{t+2}, a_{t+1}), and measure $1 - \Lambda(\pi^e_t, a_t)$ leave their beliefs unchanged and transit to (π^e, a_{t+1}).

Figure 9 depicts the trajectory of average one-period-ahead inflation beliefs as well as the actual level of future inflation. The model implied inflation expectations match key features survey data on inflation expectations. As actual inflation ticks up, expected future inflation rises, but at a delay. Expectations peak only when actual inflation has started to fall, and they fall at a much slower rate than actual inflation does. Furthermore, expectations fall at a slower pace during the disinflation than they rose during the initial inflation, capturing the "long last mile" effect. This can be explained by the hazard rate in figure 8. Consider an agent with low asset holdings $a_0 = 0.25$. As inflation takes off, the optimal information policy raises their probability of updating from 0.1 to around 0.4. However, once inflation has peaked, having too-high inflation beliefs is less costly than having too-low inflation beliefs, and as a result their probability of updating their beliefs falls back down to 0.1.

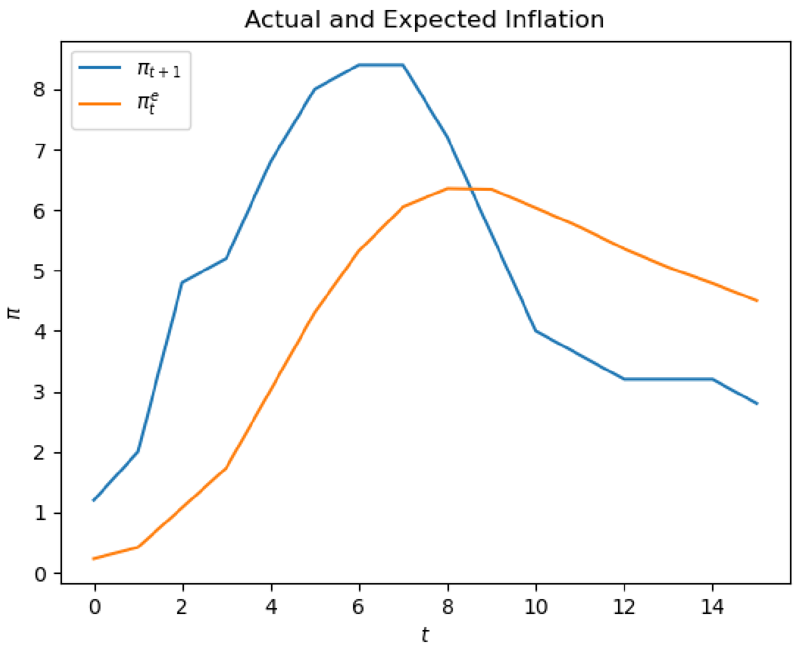
5.5 Analysis of the HENK model

[TBW]

6 Conclusion

This paper explores whether households update their expectation in response to signals with varying levels of uncertainty in a way consistent with a simple Bayesian updating rule. We show that the extensive margin—and not just the intensive margin—is important. Using a randomized control trial experiment in U.S. and Germany, we study several hypotheses derived from a simple Bayesian

Figure 9: Actual and expected inflation in partial equilibrium model.



Notes: This figure depicts model implied expected inflation in a partial equilibrium setting. In this partial equilibrium exercise, we use quarterly averages of US inflation and policy rates between 2020:Q3 and 2024:Q4. The blue line depicts quarterly averages of US inflation, shifted one quarter ahead. The orange line depicts model implied expected one-period-ahead inflation. The gap between the two lines represents the model implied expectation error.

updating model and find that agents that receive a more precise signal update their expectations by more than those that receive less informative signal. However, unlike postulated by the Bayesian updating, the differences in the adjustment mostly come from the extensive margin—when household's decide whether to react to the signal and update their expectations—and not from the intensive margin. Furthermore, we test if households that have priors with lower variance update their expectations less than those with more dispersed priors. We find some support for this implication of Bayesian updating, but only in the information treatment that gave a more precise signal.

We then proceed by building a model that exhibit the main features of expectations formations we document in our survey experiment. We use the intuition in Woodford (2008), and build a model with households being rationally inattentive to inflation news by explicitly endogenizing the extensive margin. We show that in this environment we are able to explain both the behavior of those who do update their beliefs, as well as the fraction of those who leave the beliefs unchanged. In addition, we study the implications of forming inflation expectations using this mechanism for the dynamics of inflation and find that the last mile or the last half a mile in the disinflation process may be slow, as less households update their expectations compared to the environment with significantly elevated inflation.

References

Andrade, P., E. Gautier, and E. Mengus (2023). What matters in households' inflation expectations? *Journal of Monetary Economics 138*, 50–68.

Andre, P., I. Haaland, C. Roth, and J. Wohlfahrt (2021). Inflation narratives. *ECONtribute Discussion Papers Series 127.*

Armantier, O., G. Koşar, J. Somerville, G. Topa, W. V. der Klaauw, and J. C. Williams (2022, October). The Curious Case of the Rise in Deflation Expectations. Staff Reports 1037, Federal Reserve Bank of New York.

Armantier, O., S. Nelson, G. Topa, W. van der Klaauw, and B. Zafar (2016, 07). The Price Is Right: Updating Inflation Expectations in a Randomized Price Information Experiment. *The Review of Economics and Statistics 98*(3), 503–523.

Armantier, O., A. Sbordone, G. Topa, W. van der Klaauw, and J. C. Williams (2022). A new approach to assess inflation expectations anchoring using strategic surveys. *Journal of Monetary Economics 129*, S82–S101.

Branch, W. A. (2004). The theory of rationally heterogeneous expectations: Evidence from survey data on inflation expectations. *Economic Journal 114*(497), 592–621.

Capistrán, C. and A. Timmermann (2009). Disagreement and biases in inflation expectations. *Journal of Money, Credit and Banking 41*(2/3), 365–396.

Cavallo, A., G. Cruces, and R. Perez-Truglia (2017, July). Inflation expectations, learning, and supermarket prices: Evidence from survey experiments. *American Economic Journal: Macroeconomics 9*(3), 1–35.

Coibion, O., D. Georgarakos, Y. Gorodnichenko, G. Kenny, and M. Weber (2021, March). The Effect of Macroeconomic Uncertainty on Household Spending. CEPR Discussion Papers 15966, C.E.P.R. Discussion Papers.

Coibion, O., D. Georgarakos, Y. Gorodnichenko, and M. van Rooij (2023, July). How does consumption respond to news about inflation? field evidence from a randomized control trial. *American Economic Journal: Macroeconomics 15*(3), 109–52.

Coibion, O., D. Georgarakos, Y. Gorodnichenko, and M. Weber (2023, 01). Forward Guidance and Household Expectations. *Journal of the European Economic Association*, jvad003.

Coibion, O. and Y. Gorodnichenko (2012). What can survey forecasts tell us about information rigidities? *Journal of Political Economy 120*(1), 116–159.

Coibion, O. and Y. Gorodnichenko (2015a). Information rigidity and the expectations formation process: A simple framework and new facts. *American Economic Review 105*(8), 2644–78.

Coibion, O. and Y. Gorodnichenko (2015b). Is the Phillips Curve alive and well after all? Inflation expectations and the missing disinflation. *American Economic Journal: Macroeconomics 7*(1), 197–232.

Coibion, O., Y. Gorodnichenko, and S. Kumar (2018, September). How do firms form their expectations? new survey evidence. *American Economic Review 108*(9), 2671–2713.

Coibion, O., Y. Gorodnichenko, S. Kumar, and M. Pedemonte (2020). Inflation expectations as a policy tool? *Journal of International Economics 124*, 103297.

Coibion, O., Y. Gorodnichenko, and T. Ropele (2020). Inflation expectations and firm decisions: New causal evidence. *The Quarterly Journal of Economics 135*(1), 165–219.

Coibion, O., Y. Gorodnichenko, and M. Weber (2022). Monetary policy communications and their effects on household inflation expectations. *Journal of Political Economy 130*(6), 1537–1584.

D'Acunto, F., U. Malmendier, and M. Weber (2023). Chapter 5 - what do the data tell us about inflation expectations? In R. Bachmann, G. Topa, and W. van der Klaauw (Eds.), *Handbook of Economic Expectations*, pp. 133–161. Academic Press.

Das, S., C. M. Kuhnen, and S. Nagel (2019). Socioeconomic status and macroeconomic expectations. *The Review of Financial Studies 33*(1), 395–432.

Dräger, L., M. J. Lamla, and D. Pfajfar (2024). How to limit the spillover from an inflation surge to inflation expectations? *Journal of Monetary Economics 144*, 103546.

D'Acunto, F., U. Malmendier, J. Ospina, and M. Weber (2021). Exposure to Grocery Prices and Inflation Expectations. *Journal of Political Economy 129*(5), 1615–1639.

Ehrmann, M., D. Pfajfar, and E. Santoro (2017). Consumers' attitudes and their inflation expectations. *International Journal of Central Banking 13*(1), 225–259.

Ehrmann, M. and P. Tzamourani (2012). Memories of high inflation. *European Journal of Political Economy 28*(2), 174–191.

Elliott, G., I. Komunjer, and A. Timmermann (2005). Estimation and testing of forecast rationality under flexible loss. *The Review of Economic Studies 72*(4), 1107–1125.

Elliott, G., I. Komunjer, and A. Timmermann (2008, 03). Biases in macroeconomic forecasts: Irrationality or asymmetric loss? *Journal of the European Economic Association 6*(1), 122–157.

Haldane, A. and M. McMahon (2018, May). Central bank communications and the general public. *AEA Papers and Proceedings 108*, 578–583.

Hoffmann, M., E. Moench, G. Schultefrankenfeld, and L. Pavlova (2022). Would households understand average inflation targeting? *Journal of Monetary Economics 129*, S52–S66.

Huber, P. J. (1964). Robust estimation of a location parameter. *The Annals of Mathematical Statistics 35*(1), 73–101.

Klenow, P. J. and O. Kryvtsov (2008, 08). State-Dependent or Time-Dependent Pricing: Does it Matter for Recent U.S. Inflation? *The Quarterly Journal of Economics 123*(3), 863–904.

Kumar, S., Y. Gorodnichenko, and O. Coibion (2022, July). The Effect of Macroeconomic Uncertainty on Firm Decisions. NBER Working Papers 30288, National Bureau of Economic Research, Inc.

Malmendier, U. and S. Nagel (2015, 10). Learning from inflation experiences. *The Quarterly Journal of Economics 131*(1), 53–87.

Morales-Jiminez, C. and L. Stevens (2024). Price Rigidities in U.S. Business Cycles. *Working Paper*.

Pfajfar, D. and E. Santoro (2010). Heterogeneity, learning and information stickiness in inflation expectations. *Journal of Economic Behavior & Organization 75*(3), 426–444.

Pfajfar, D. and E. Santoro (2013). News on Inflation and the Epidemiology of Inflation Expectations. *Journal of Money, Credit and Banking 45*(6), 1045–1067.

Pfajfar, D. and B. Žakelj (2014). Experimental evidence on inflation expectation formation. *Journal of Economic Dynamics and Control 44*, 147–168.

Pfäuti, O. (2025a). The inflation attention threshold and inflation surges. *Manuscript*.

Pfäuti, O. (2025b). Inflation—who cares? Monetary policy in times of low attention. *Journal of Money, Credit and Banking forthcoming.*

Sims, C. A. (2003). Implications of rational inattention. *Journal of Monetary Economics 50*(3), 665–690.

Weber, M., B. Candia, T. Ropele, R. Lluberas, S. Frache, B. H. Meyer, S. Kumar, Y. Gorodnichenko, D. Georgarakos, O. Coibion, G. Kenny, and J. Ponce (2023, July). Tell Me Something I Don't Already Know: Learning in Low and High-Inflation Settings. Working Paper 31485, National Bureau of Economic Research.

Woodford, M. (2008). Inattention as a source of randomized discrete adjustment. *Unpublished*.

Woodford, M. (2009). Information-constrained state-dependent pricing. *Journal of Monetary Economics* (56), S100–S124.

A Additional Tables

Figure A.1: Kernel densities of expectation revisions for each treatment arm.

Notes: Pollfish data for the U.S., fielded in December 2022. Kernel densities plotted. The panels show the distribution of revisions in inflation expectations, where we plot separately revisions of those that revised upward and downward.

Table A.1: Demographic breakdown by treatment group

	Female	Over 54	Mid. inc.	High inc.	High school	Voc.	Uni.
Baseline	0.55	0.19	0.28	0.09	0.35	0.14	0.49
Mean only	0.57	0.19	0.26	0.11	0.34	0.16	0.48
Large Band	0.57	0.16	0.24	0.11	0.35	0.18	0.45
Small Band	0.54	0.19	0.28	0.11	0.33	0.19	0.48
Placebo	0.56	0.17	0.27	0.10	0.27	0.19	0.53
Tot.	0.56	0.18	0.27	0.10	0.33	0.17	0.49

Table A.2: Treatment Effects: Prior Uncertainty

	high uncertainty			low uncertainty		
	Overall	Extensive	Intensive	Overall	Extensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.7133***	0.0004	0.1791***	0.7579***	-0.0079***	0.2288***
	(0.0242)	(0.0032)	(0.0185)	(0.0202)	(0.0026)	(0.0208)
Mean Only	-1.5985***	0.4650***	0.3266	-1.9112***	0.0496	0.3757
	(0.2794)	(0.0560)	(0.3718)	(0.2400)	(0.0635)	(0.3891)
Large Band	-1.1225***	0.2953***	0.1188	-1.1913***	-0.0342	0.4686
	(0.2914)	(0.0548)	(0.4139)	(0.2226)	(0.0406)	(0.4159)
Small Band	-0.9981***	0.5182***	0.3716	-2.0351***	-0.0230	0.6491*
	(0.2996)	(0.0572)	(0.3831)	(0.2327)	(0.0524)	(0.3802)
Placebo	-0.2794	0.1994***	-0.4198	-0.3712*	-0.0622*	-1.0809**
	(0.2710)	(0.0549)	(0.4682)	(0.1984)	(0.0353)	(0.4507)
Constant	2.7404***	-0.0290	1.8589**	1.6754**	0.0873	8.0751***
	(0.8960)	(0.1398)	(0.7650)	(0.6851)	(0.0733)	(0.6234)
N	711	717	333	892	524	390
R^2	0.719	0.201	0.335	0.735	0.050	0.402

Notes: Pollfish data for the U.S., fielded in December 2022. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

Table A.3: Treatment Effects: Bands

	Overall (1)	Extensive (2)	Intensive (3)
Large Band	-0.6242	-0.1304	-0.2380
	(0.4232)	(0.1108)	(0.4595)
Considered Band	1.6613***	0.1491	-0.2979
	(0.4104)	(0.1008)	(0.3763)
L. Band × Considered Band	0.4698	-0.1515	0.6192
	(0.5420)	(0.1433)	(0.5615)
π^e_{prior}	0.7543***	-0.0210**	0.1541***
	(0.0499)	(0.0091)	(0.0536)
L. Band × π^e_{prior}	0.0804	0.0152	0.0497
	(0.0597)	(0.0118)	(0.0695)
Cons. Bd. × π^e_{prior}	-0.5665***	0.0316***	0.0128
	(0.0577)	(0.0103)	(0.0590)
L. Band × Cons. Bd. × π^e_{prior}	-0.0619	-0.0084	-0.1243
	(0.0810)	(0.0142)	(0.0781)
Constant	0.7167	0.3648**	2.6654***
	(0.6870)	(0.1784)	(0.7709)
N	636	661	365
R^2	0.737	0.186	0.289

Notes: Pollfish data for the U.S., fielded in December 2022. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

Table A.4: Treatment Effects: News

	reported hearing news			reported hearing no news		
	Overall	Extensive	Intensive	Overall	Extensive	Intensive
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.7766***	-0.0029	0.2013***	0.7090***	0.0004	0.2991***
	(0.0169)	(0.0028)	(0.0164)	(0.0291)	(0.0044)	(0.0255)
Mean Only	-1.3685***	0.3746***	0.2559	-2.6013***	0.4228***	0.0782
	(0.1915)	(0.0488)	(0.3003)	(0.3492)	(0.0889)	(0.5678)
Large Band	-0.8861***	0.1649***	0.4683	-1.6768***	0.3814***	-0.2148
	(0.1810)	(0.0489)	(0.3403)	(0.3878)	(0.0885)	(0.5716)
Small Band	-1.3755***	0.3709***	0.5896*	-2.0547***	0.4848***	0.0802
	(0.1986)	(0.0492)	(0.3002)	(0.3581)	(0.0891)	(0.5431)
Placebo	-0.0836	0.0976**	-0.4203	-1.1029***	0.0448	-1.3896**
	(0.1691)	(0.0473)	(0.3796)	(0.3439)	(0.0773)	(0.6569)
Constant	1.8237***	0.0499	-0.2835	4.6116***	0.2992	6.3512***
	(0.5945)	(0.1209)	(0.6793)	(1.0420)	(0.2044)	(0.7161)
N	1194	1203	544	403	403	178
R^2	0.757	0.128	0.348	0.750	0.234	0.590

Notes: Pollfish data for the U.S., fielded in December 2022. The extensive margin measures the likelihood of an update in posterior expectations. The intensive margin measures posterior expectations given that an update in expectations occurred after treatment. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population weights and show heteroscedasticity-robust standard errors in parentheses. Huber (1964) robust regressions endogenously account for outliers. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

Table A.5: Summary Statistics BOP-HH Inflation Data

	Prior	**Posterior**	**Frac. Revised**
Baseline			
mean	6.09	6.26	0.38
median	6.00	6.00	
Std. Dev.	4.22	3.73	
N	751	751	
Mean Only			
mean	5.43	5.11	0.70
median	5.00	4.90	
Std. Dev.	4.36	2.48	
N	756	756	
Large Band			
mean	5.87	5.28	0.70
median	6.00	4.80	
Std. Dev.	4.25	2.84	
N	764	764	
Small Band			
mean	5.69	5.11	0.77
median	6.00	4.60	
Std. Dev.	3.90	2.21	
N	754	754	
Placebo			
mean	5.52	6.13	0.39
median	6.00	6.00	
Std. Dev.	3.81	3.38	
N	736	736	
Total			
mean	5.72	5.57	0.59
median	6.00	5.00	
Std. Dev.	4.12	3.01	
N	3761	3761	3761

Notes: Bundesbank Online Panel of Households (BOP-HH), August 2023 wave. All inflation expectations are truncated to lie in the range between -5% and +25%.

Table A.6: Treatment Effects Data on Germany

	Overall		Extensive		Intensive	
	Pop. Weight	Huber	Pop. Weight	Huber	Pop. Weight	Huber
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.488***	0.498***	-0.004	-0.004	0.344***	0.289***
	(0.03)	(0.01)	(0.00)	(0.00)	(0.03)	(0.01)
Mean Only	-0.834***	-0.726***	0.314***	0.326***	-1.560***	-0.911***
	(0.19)	(0.09)	(0.03)	(0.03)	(0.44)	(0.17)
Large Band	-0.875***	-0.813***	0.311***	0.322***	-1.551***	-0.999***
	(0.20)	(0.09)	(0.03)	(0.03)	(0.45)	(0.18)
Small Band	-0.958***	-0.854***	0.377***	0.389***	-1.524***	-0.923***
	(0.20)	(0.10)	(0.03)	(0.03)	(0.46)	(0.18)
Placebo	0.149	0.114	0.005	0.008	0.275	0.539**
	(0.21)	(0.10)	(0.04)	(0.04)	(0.49)	(0.23)
Constant	3.296***	2.602***	0.304***	0.299***	4.883***	3.889***
	(0.34)	(0.16)	(0.06)	(0.05)	(0.67)	(0.26)
N	3761	3749	3761	3761	2094	2087
R^2	0.473	0.582	0.126	0.135	0.355	0.395
Mean Only = L.Band	0.788	0.354	0.913	0.911	0.957	0.396
Sm. Band = L.Band	0.603	0.686	0.031	0.022	0.884	0.547

Table A.7: Updating Expectations for Those with Priors Above the Signal

	Overall		Extensive		Intensive	
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.7017***	0.9744***	0.0115***	-0.0014	0.1768***	0.4608***
	(0.0234)	(0.0164)	(0.0026)	(0.0039)	(0.0232)	(0.0742)
Mean Only	-2.7173***	2.7317***	0.5321***	0.3724***	-1.8920***	0.8960
	(0.2440)	(0.3834)	(0.0388)	(0.0867)	(0.5061)	(0.8873)
Large Band	-1.9212***	0.6214	0.2935***	0.0320	-1.9601***	1.8410*
	(0.2510)	(0.3922)	(0.0387)	(0.0820)	(0.5325)	(0.9507)
Small Band	-2.7878***	2.5311***	0.5193***	0.2812***	-1.8616***	0.4373
	(0.2435)	(0.3864)	(0.0394)	(0.0876)	(0.5107)	(0.9002)
Placebo	-0.4115*	-0.2751	0.1381***	0.1275*	-1.0998*	-0.8673
	(0.2123)	(0.2989)	(0.0332)	(0.0744)	(0.6427)	(1.2422)
Mean Only $\times \pi^e_{prior}$		-0.5998***		0.0164**		-0.3406***
		(0.0491)		(0.0072)		(0.0822)
L. Band $\times \pi^e_{prior}$		-0.1967***		0.0254***		-0.4274***
		(0.0478)		(0.0071)		(0.0842)
Sm. Band $\times \pi^e_{prior}$		-0.5924***		0.0244***		-0.2864***
		(0.0485)		(0.0071)		(0.0834)
Placebo $\times \pi^e_{prior}$		0.0139		0.0005		-0.0184
		(0.0274)		(0.0069)		(0.1118)
Constant	3.4585***	1.4775**	-0.1155	-0.0259	4.4201***	2.7233**
	(0.9711)	(0.6822)	(0.1169)	(0.1250)	(1.0946)	(1.1918)
N	1212	1198	1213	1213	530	521
R^2	0.599	0.746	0.243	0.260	0.178	0.270
Mean Only = L. Band	0.006	0.000	0.000	0.001	0.797	0.106
Sm. Band = L.Band	0.003	0.000	0.000	0.016	0.710	0.020
Mean Only = L. Band (int)		0.000		0.290		0.093
Sm. Band = L. Band (int)		0.000		0.909		0.010

Notes: Pollfish data for the U.S., fielded in December 2022. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population and Huber (1964) adjusted weights and show heteroscedasticity-robust standard errors in parentheses. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

Table A.8: Updating Expectations for Those with Priors Below the Signal

	Overall		Extensive		Intensive	
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.7130***	1.0160***	-0.1421***	-0.1054**	0.6396***	1.1246***
	(0.0475)	(0.0580)	(0.0220)	(0.0434)	(0.0780)	(0.1177)
Mean Only	0.5393***	1.0301***	0.1176	0.1229	0.9479***	1.7094***
	(0.1567)	(0.2309)	(0.0881)	(0.1152)	(0.3192)	(0.3564)
Large Band	0.5076***	0.9922***	0.0690	0.1649	1.0738***	1.5464***
	(0.1466)	(0.3137)	(0.0849)	(0.1425)	(0.3495)	(0.3991)
Small Band	1.1139***	2.2612***	0.1703**	0.3372***	1.8398***	2.7483***
	(0.1741)	(0.2565)	(0.0823)	(0.1088)	(0.3045)	(0.2848)
Placebo	-0.0528	0.2754	-0.0406	-0.0206	-0.2240	0.9394***
	(0.1395)	(0.2040)	(0.0871)	(0.1467)	(0.3235)	(0.3395)
Mean Only $\times\pi^e_{prior}$		-0.3157***		-0.0054		-0.5814***
		(0.1010)		(0.0585)		(0.1974)
L. Band $\times\pi^e_{prior}$		-0.3134**		-0.0663		-0.4827**
		(0.1342)		(0.0688)		(0.2026)
Sm. Band $\times\pi^e_{prior}$		-0.6930***		-0.1287**		-0.7791***
		(0.1158)		(0.0604)		(0.1902)
Placebo $\times\pi^e_{prior}$		-0.2189**		-0.0210		-0.9358***
		(0.1026)		(0.0709)		(0.1910)
Constant	-0.3224	-0.7360**	0.1358	0.1300	-0.8581	-1.1983
	(0.3027)	(0.2870)	(0.1867)	(0.1916)	(0.9477)	(0.7747)
N	387	383	396	396	205	203
R^2	0.541	0.602	0.214	0.224	0.511	0.578
Mean Only = L. Band	0.834	0.920	0.538	0.750	0.608	0.731
Sm. Band = L.Band	0.000	0.001	0.163	0.170	0.002	0.007
Mean Only = L. Band (int)		0.987		0.370		0.661
Sm. Band = L. Band (int)		0.015		0.361		0.179

Notes: Pollfish data for the U.S., fielded in December 2022. Inflation expectations prior to and post treatment are truncated to lie in the range $-5 \leq \pi^e \leq 25$. All regressions use population and Huber (1964) adjusted weights and show heteroscedasticity-robust standard errors in parentheses. Demographic control variables include gender, age, and income groups. *** p<0.01, ** p<0.05, * p<0.1

B Decomposing the Overall Treatment Effect into Extensive and Intensive Margin

In line with Dräger et al. (2024), following the logic of the Klenow and Kryvtsov (2008) decomposition as presented in Andrade et al. (2023), we can decompose the treatment effects using the cross-sectional data in the following way:

$$\pi_{i,post}^{e,h} = fr_i \cdot \pi_{i,post}^{e,ch} + (1 - fr_i) \cdot \pi_{i,post}^{e,nch}, \tag{12}$$

where $\pi_{i,post}^{e,h}$ is the average expectation in treatment i for horizon h and fr_i is the fraction of households who update expectations in treatment i. $\pi_{i,post}^{e,ch}$ represents the average expectation of those who decide to update their expectations in treatment i and $\pi_{i,post}^{e,nch}$ is the average inflation expectation of those who do not update their expectations in treatment i.

Furthermore, by taking a first-order approximation around the average inflation expectations in this survey experiment ($\overline{\pi^e}$), we can decompose the differences in the average inflation expectations to changes in the intensive and extensive margins:

$$\pi_{i,post}^{e,h} - \overline{\pi^e} = \underbrace{\left(fr_i - \overline{fr}\right)\left(\overline{\pi_{post}^{e,ch}} - \overline{\pi_{post}^{e,nch}}\right)}_{\text{extensive}} + \underbrace{\left(\pi_{i,post}^{e,ch} - \overline{\pi_{post}^{e,ch}}\right)\overline{fr} + \left(\pi_{i,post}^{e,nch} - \overline{\pi_{post}^{e,nch}}\right)\left(1 - \overline{fr}\right)}_{\text{intensive}} + O_i. \tag{13}$$

where O_i is the residual. Note that variables with the upper bar represent averages across all treatments. The cross-sectional variance of inflation expectations, $V\left(\pi_{i,post}^{e,h}\right)$, can be decomposed into the contributions of the extensive margin and the intensive margin, where the contribution of the intensive margin is equal to:

$$V\left(\pi_{i,post}^{e,ch}\right)\overline{fr}^2 + V\left(\pi_{i,post}^{e,nch}\right)\left(1 - \overline{fr}\right)^2 + 2cov\left(\pi_{i,post}^{e,ch}, \pi_{i,post}^{e,nch}\right)\overline{fr}\left(1 - \overline{fr}\right). \tag{14}$$

The contribution of the extensive margin is thus:

$$\begin{aligned} V\left(fr_i\right)\left(\overline{\pi_{post}^{e,ch}} - \overline{\pi_{post}^{e,nch}}\right)^2 + 2cov\left(\pi_{i,post}^{e,ch}, fr_i\right)\left(\overline{\pi_{post}^{e,ch}} - \overline{\pi_{post}^{e,nch}}\right)\overline{fr} \\ + 2cov\left(\pi_{i,post}^{e,nch}, fr_i\right)\left(\overline{\pi_{post}^{e,ch}} - \overline{\pi_{post}^{e,nch}}\right)\left(1 - \overline{fr}\right). \end{aligned} \tag{15}$$

C Questionnaire Pollfish

Question 0

This survey is not for profit, but for academic research. It is designed to improve the understanding of economic decision-making. There are no right or wrong answers. The information you provide is confidential and is only shared in an aggregate (not individual) level.

Question 1

Over the next 12 months, do you think that there will be inflation or deflation? (Note: deflation is the opposite of inflation)

- inflation
- deflation

Question 2

What do you expect the rate of inflation to be over the next 12 months (in percent)? Please give your best guess up to one decimal place. (Note, for deflation please enter a negative number.)

-

Question 3

How certain, on a scale from 0 to 100, are you about your inflation expectation?

- Very uncertain 0: to 100: Very certain

Question 4

In the last month did you hear any news about inflation in the media that you follow?

- Yes, favorable news
- Yes, but unfavorable news
- I heard no news about inflation

Question 5 [IF TREATMENT 1]

Your previous inflation expectation was [Q1]Would you like to adjust your expectation? Note: if you do not wish to adjust your expectations please fill in the same figure in the box below.

-

Question 5 [IF TREATMENT 2]

Your previous inflation expectation was [Q1]Would you like to adjust your expectations based on the following information? According to a mean response in the Survey of Professional Forecasters, inflation over the next 12 months will be 3.7 percent. Note: if you do not wish to adjust your expectations please fill in the same figure in the box below.

-

Question 5 [IF TREATMENT 3]

Your previous inflation expectation was [Q1]Would you like to adjust your expectations base on the following information? According to a mean response in the Survey of Professional Forecasters, inflation over the next 12 months will be 3.7 percent, where the range of responses was between 1.7 percent and 7.1 percent. Note: if you do not wish to adjust your expectations please fill in the same figure in the box below.

-

Question 5 [IF TREATMENT 4]

Your previous inflation expectation was [Q1]Would you like to adjust your expectations base on the following information? According to a mean response in the Survey of Professional Forecasters, inflation over the next 12 months will be 3.7 percent, where most responses fell between 2.9 percent and 4.8 percent. Note: if you do not wish to adjust your expectations please fill in the same figure in the box below.

-

Question 5 [IF TREATMENT 5]

Your previous inflation expectation was [Q1]Would you like to adjust your expectations base on the following information? The U.S. population grew 1.2 percent over the last three years. Note: if you do not wish to adjust your expectations please fill in the same figure in the box below.

-

Question 6 [SKIPPED IF TREATMENT 1]

Question 6 [IF TREATMENT 2 OR 5]

Please explain your response to the previous question.

- I do not trust professional forecasters
- My personal forecast matches the information provided
- This information was not useful to me
- This information was new to me and I incorporated it
- Other

Question 6 [IF TREATMENT 3 OR 4]

Please explain your response to the previous question.

- I only considered the information about the mean
- I considered equally the mean and the range of forecasters' responses
- I considered both the mean and the range of forecasters' responses, but I updated closer to the higher end forecasters' response
- I considered both the mean and the range of forecasters' responses, but I updated closer to the lower end forecasters' response
- I only considered the range of forecasters' responses
- I only considered the lower end forecasters' responses

- This information was not useful to me
- My personal forecast matches the information provided
- Other:

Question 7
How would you rank your understanding of economic and business issues?

- 1 to 5 stars

Question 8
Many thanks again for taking your time and answering our survey. If you have something to add or comment on please feel free to share it with us in the textbox below.