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Journal Article**Author(s):**

Conrad, Christian; Enders, Zeno; Glas, Alexander

Publication date:

2022-04

Permanent link:

<https://doi.org/10.3929/ethz-b-000530955>

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Originally published in:

European Economic Review 143, <https://doi.org/10.1016/j.eurocorev.2021.104015>



The role of information and experience for households' inflation expectations[☆]

Christian Conrad^{a,b,*}, Zeno Enders^{a,c}, Alexander Glas^d

^a Heidelberg University, Germany

^b KOF Swiss Economic Institute, Switzerland

^c CESifo, Germany

^d FAU Erlangen-Nürnberg, Germany

ARTICLE INFO

JEL classification:

E31
D84
E71

Keywords:

Household expectations
Inflation expectations
Experience
Information channels
Bundesbank household survey

ABSTRACT

Based on a new survey of German households, we investigate the role that information channels and lifetime experience play in households' inflation expectations. We show that the types of information channels that households use to inform themselves about monetary policy are closely related to their socioeconomic characteristics. These information channels, in turn, have a major influence on the *level* of perceived past and expected future inflation, as well as on the uncertainty thereof. The expected future *change* in inflation and the unemployment rate, however, is strongly influenced by individual experience of these variables. Similarly, the expected response of inflation to a change in the interest rate is also shaped by experience. We propose the interpretation that households obtain inflation numbers from the media, but their 'economic model' is shaped by experience.

1. Introduction

What determines households' inflation expectations? Considering how important this question is for monetary policy, relatively few studies have explored this question empirically until recently. Moreover, most studies on this topic – see below for an overview – employ US data only. Presumably, data constraints are to blame for this research gap. In this paper, we take an explorative look at a large new survey of German households, conducted in 2019 by the Bundesbank, focusing on the role that information channels (e.g., traditional media or social media) and experiences play in shaping households' inflation expectations.¹ We find that both play a role, but for different aspects of how expectations are formed.

Expectations of economic variables can vary across households because of different information sets or due to alternative views on the workings of the economy, i.e., the 'economic model' of households. The information channels that households use will, at the very least, affect their information sets. First, there is evidence that the coverage of central bank news varies across information

[☆] This paper uses data from the Bundesbank Online Pilot Survey on Consumer Expectations. We are grateful to the Bundesbank for including our questions in the survey (Project-ID: 2019-0083). The results published and the related observations and analysis may not correspond to the results or analysis of the data producers. We would like to thank the Editor, Florin Bilbiie, an anonymous referee and Michael Lamla for comments and suggestions that greatly improved our paper. We also thank Sarah Engeler und Anke Witteler for valuable research assistance. This research has received financial support by the German Science Foundation (DFG) under Priority Program 1859.

* Corresponding author.

E-mail addresses: christian.conrad@awi.uni-heidelberg.de (C. Conrad), zeno.enders@uni-heidelberg.de (Z. Enders), alexander.glas@fau.de (A. Glas).

¹ Lagarde (2020) outlines the importance of both the public's economic expectations and communication about monetary policy for the ECB. Given that direct central bank communication finds it difficult to change households' inflation expectations (Lamla and Vinogradov, 2019), other communication channels might be crucial to fill this gap (Lamla and Lein, 2014).

<https://doi.org/10.1016/j.eurocorev.2021.104015>

Received 15 March 2021; Received in revised form 30 August 2021; Accepted 23 November 2021

Available online 17 January 2022

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channels (Binder, 2017). Second, even if distinct information channels cover the same news, they might present the news in different ways. We find that socioeconomic characteristics are related to the information channel that households mainly use to find out about monetary policy actions. This channel, in turn, plays an important role in what households expect about the *level* of past and future inflation, controlling for other household characteristics. Specifically, consumers of traditional media such as newspapers or television have lower and, as a result, more accurate views of inflation over the last year, as well as lower inflation expectations for the coming year. We show that the effect on future expected inflation works indirectly via perceived inflation. This finding is consistent with D'Acunto et al. (2020c) who present evidence that shopping experiences affect inflation expectations indirectly via inflation perceptions.

Households that use traditional media are also less uncertain about future inflation. These results can be rationalized by a high information content and a comprehensible presentation in traditional media. By contrast, we find no evidence that lifetime inflation experiences affect perceived inflation and only weak evidence that they affect expected inflation. However, the effect of using traditional media on inflation expectations becomes smaller for individuals with a high lifetime inflation experience. Having experienced high levels of inflation seems to make them less responsive to news about (low) inflation. Next, we show that households that inform themselves about monetary policy via social media report greater uncertainty regarding future inflation. As discussed in Bundesbank (2019), this latter finding suggests that central banks might want to increase their social media presence to facilitate the spread of accurate information via this channel.

Finally, lifetime experience of inflation turns out to be highly relevant for expectations regarding the *direction* of future inflation. The higher the inflation an individual has experienced, the more likely it is that the individual will expect inflation to increase over the next twelve months. This is consistent with the hypothesis that experiences, rather than information channels, influence individuals' economic model, i.e., the way agents think about the basic mechanics of the economy. We confirm this result with observations on the expected direction of the unemployment rate and the answers to a thought experiment in which the European Central Bank unexpectedly raises interest rates. When individuals are asked about the effects of such a change in interest rates, their consumption of traditional media loses its importance. Again, experience exerts a strong influence over the expected linkages between economic variables. Specifically, individuals who have experienced higher inflation over their lifetime expect inflation to rise after an increase in the interest rate.

The remainder of this paper is organized as follows. Section 2 discusses the related literature. Section 3 presents the data set. Section 4 investigates the determinants of households' information channels, while Section 5 explores the role that information channels and experience play in inflation expectations. Section 6 analyzes the effect of a hypothetical change in the policy rate on inflation expectations. Section 7 concludes.

2. Related literature

Our paper relates to the literature on the determinants of households' inflation expectations. In particular, we contribute to the evidence on the role that information channels and experience play in individual expectations.² Using a survey of Dutch households, van der Cruijssen et al. (2015) find that knowledge about the ECB's objectives is quite limited. Similarly, Lamla and Vinogradov (2019) observe no general effect of FOMC meetings on household expectations in the US. Andre et al. (2019) present households with hypothetical exogenous shocks and find that adjustments of households' expectations deviate strongly from those of economic experts. Household behavior is consistent with the notion that they believe in a co-movement of variables which they consider 'bad' or 'good'. Rather than using information about central bank actions, households seem to form inflation expectations based on their observations during grocery shopping, according to D'Acunto et al. (2019b). This also creates a significant gender gap in inflation perceptions (D'Acunto et al., 2020c). However, if confronted with alternative information treatments about current and next year's interest rates, households significantly adjust their inflation expectations (Coibion et al., 2020).

An early study that, among other things, investigates the channels that US households use to inform themselves about economic issues is Krueger and Blinder (2004). Television and newspapers are the two most frequent and most important sources of information. In one part of their analysis, Kumar et al. (2015) relate the information channels used by firm managers in New Zealand to their perceived and expected inflation, as well as to their estimate of the central bank's inflation target. They find that those managers who have the most accurate view on the inflation target primarily use television and newspapers to inform themselves, and that users of media have the lowest error for actual inflation. Coibion et al. (2019b) go one step further and test the reaction of households' inflation expectations to different forms of information about inflation. Reading the FOMC statement has approximately the same effect on households' forecast revisions as just providing the Federal Reserve's inflation target. Compared to these information channels, the reaction to reading news articles is about half as strong.

Regarding the role of experience, Malmendier and Nagel (2016) find that individuals overweigh inflation that occurred during their lifetimes. Young individuals therefore update their expectations more strongly, which is also documented by Mertens et al. (2020) for the impact of surprise changes in the Federal Funds target rate on household confidence. For Germany, Goldfayn-Frank and Wohlfart (2020) show that eastern Germans expect higher inflation, most likely due to higher experienced inflation rates after reunification.

Evidence on how households form inflation expectations is economically important, given new evidence that these expectations have a bearing on household decisions. While Bachmann et al. (2015) identified a small correlation between expected inflation and

² Previous studies have often focused on the socioeconomic determinants of inflation expectations, see, e.g., Jonung (1981) and Bruine de Bruin et al. (2010).

readiness to spend, Dräger and Nghiem (2020) find a stronger impact of inflation expectations on current spending for German households that are active in financial markets, are financially unconstrained, and display a high level of financial literacy. Coibion et al. (2019a) use randomized information treatments about expected inflation and observe large negative effects of higher inflation expectations on durable spending. This effect seems to be driven by a more pessimistic view about real income in case of higher inflation expectations. Vellekoop and Wiederholt (2019) find that households with higher inflation expectations save less, while D'Acunto et al. (2020b) show that an announced future VAT increase raises households' inflation expectations and their durable consumption.

3. Data

Our analysis is based on data from the Bundesbank Online Pilot Survey on Consumer Expectations, which was conducted in April, May, and June 2019 and covers a representative sample of the German population.³ In each wave, individuals were asked about their quantitative expectations of inflation, their qualitative expectations (i.e., the expected direction) of inflation and the unemployment rate, and other macroeconomic figures. The data also contain detailed information about the respondents' socioeconomic characteristics. In our analysis, we focus on the subset of individuals who participated in Wave 3 (June 2019). We contributed one question to this particular wave on the information channels through which individuals find out about the ECB's monetary policy and another on the effect of an unexpected policy rate change by the ECB on inflation expectations.

3.1. Socioeconomic characteristics

We use information about the socioeconomic characteristics of individuals who participated in Wave 3 as control variables. The survey targeted individuals aged 16 and older. The average age was 53. We consider indicator variables for individuals living in eastern Germany shortly before reunification (*east1989*), gender (*female*), full employment (*fullemploy*), whether the individuals intend to buy a house in the next 10 years (*homebuy*), and whether individuals do not own real estate (*no_property*). In addition, we use information about household size (*hsize*), monthly household income (*income*), and years of education (*yoec*). Table A.1 in the appendix provides further details on the construction of all variables, while Table A.2 presents descriptive statistics for the socioeconomic characteristics.

3.2. Information channels

We contributed the following question on the information channels about the ECB's monetary policy.

Q:314: Via which of the following channels do you most often receive information about the European Central Bank's (ECB) monetary policy? Please select all answers that apply.

- Traditional media such as newspapers, radio, television or the websites of such providers
- Social media such as Facebook or Twitter
- ECB communication channels (e.g., ECB's website, ECB's Economic Bulletin, ECB's monthly press conference)
- Other sources
- I do not inform myself about the ECB's monetary policy

Among the 2,591 households in Wave 3, 2,585 answered Question Q:314. 85% of the respondents stated that traditional media are among the most important information channels through which they receive information about the ECB's monetary policy. 6% of households receive information via social media, 6.3% rely on direct ECB communication channels, and 12.9% use other information sources. Only 10.4% of households do not inform themselves about monetary policy. This might appear surprising, given that Coibion et al. (2019b) find that US households are not well informed about the objectives of the Federal Reserve. For example, in their survey less than 20% of participants knew that the Federal Reserve's inflation target is 2%. Unfortunately, the Bundesbank survey does not ask whether households know the ECB's inflation target. Thus, it may well be that households who state that they receive information about monetary policy via one of the channels are not aware of the ECB's objectives. However, we can link the answer to the question about information channels to a feedback question on how "easy or difficult" it was to answer the questionnaire in general. 54.45% of households who do not inform themselves about monetary policy state that answering the questionnaire was somewhat or very difficult, while only 28.73% of households who inform themselves find the survey somewhat or very difficult. This suggests that households who inform themselves are indeed more familiar with concepts like inflation and the objectives of monetary policy.

The majority of respondents (70.8%) stated that they receive information about monetary policy through a single information channel. 16.8% of respondents use two information channels. Hardly any respondent uses three or four information channels (1.9% and 0.1%).

The upper left panel in Fig. 1 provides information about the information channels that respondents rely on when conditioning on the overall number of channels that are used. The panel shows that among those individuals who state that they use a single

³ For details on the process used to select respondents, see Bundesbank (2019).

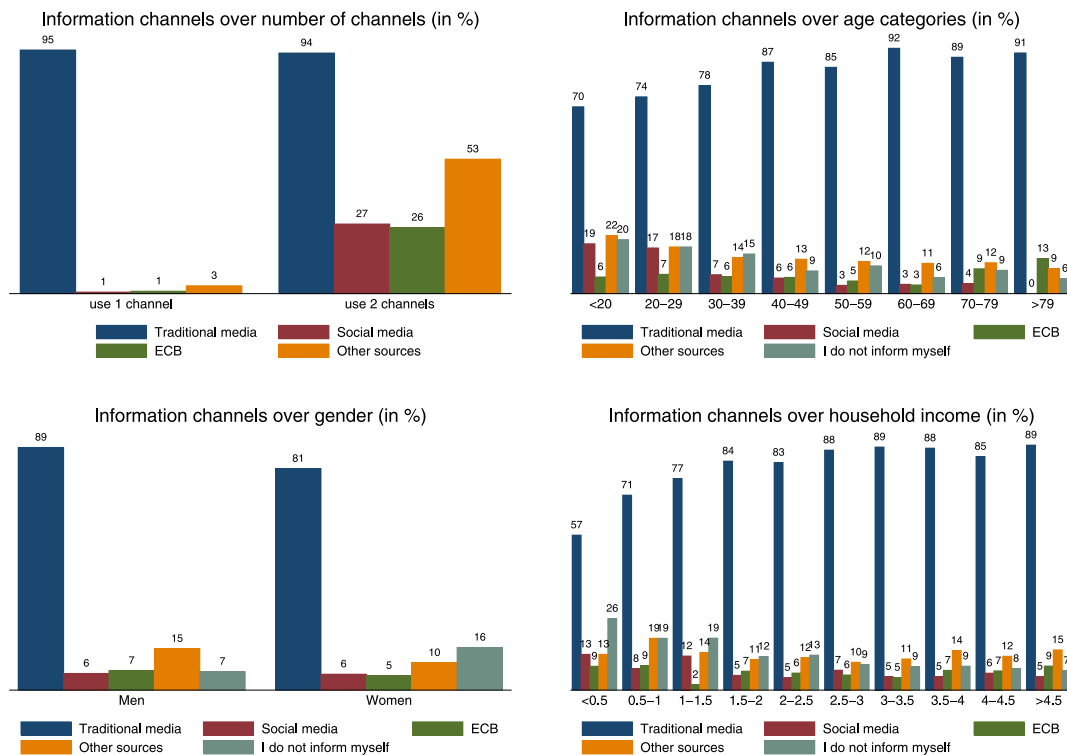


Fig. 1. Conditional distribution of information channels.

Notes: The panels depict the share of German households relying on distinct information channels of monetary policy conditional on the number of information channels (upper left), age (upper right), gender (lower left), and income (lower right). Household income is expressed in 1,000 euro.

information channel, 95% rely on traditional media. Respondents who use two information channels still predominantly rely on traditional media (94%), followed by other sources (53%). For those individuals who use two information channels, the frequency of social media and direct ECB communication channels is more than 25%. The upper right panel shows that the use of traditional media increases with age, while social media are most popular among below 30-year olds. The lower left panel indicates that men are more likely than women to use traditional media, and that 16% of women (vs. 7% of men) do not inform themselves about monetary policy. The lower right panel shows that the likelihood of using traditional media increases with income, and that the percentage of individuals who do not receive information about monetary policy is the highest among low-income households (26%).

3.3. Survey-based expectations data

The Bundesbank survey elicits different types of inflation expectations. First, the survey asks for a point prediction of the rate of inflation over the past twelve months. This question was only put to participants of Wave 3 who did not participate in Wave 2. We consider those predictions as the perceived rate of inflation, $\pi_{i,t-12:t|t}$, of each household. Second, each individual was asked to make a point prediction of the rate of inflation over the next twelve months, $\pi_{i,t:t+12|t}$. We refer to $\pi_{i,t:t+12|t}$ as expected future inflation. Panel A of Table 1 presents summary statistics for $\pi_{i,t-12:t|t}$ and $\pi_{i,t:t+12|t}$. Following Bundesbank (2019), we focus on individuals with perceptions/expectations in the range of -12% to 12% . For those individuals, the mean of the perceived inflation rate is 2.53%. This contrasts with an actual inflation rate over the May 2018 to May 2019 period of only 1.4%.⁴ That is, in line with the previous literature we find that households overestimate the actual inflation rate on average.⁵ In the following, we denote the individual perception errors by $e_{i,t-12:t|t}$. The expected rate of inflation over the next twelve months is on average 2.50%. The correlation between perceived and expected inflation is 0.64. This is in line with Jonung (1981) and D'Acunzio et al. (2019a) who also find a strong association between perceived and expected inflation.

⁴ We compute the actual inflation rate based on the German CPI ("Verbraucherpreisindex, VPI").

⁵ By restricting our sample to households with inflation perceptions (expectations) in the range of -12% to 12% , we exclude 65 (85) households with 'extreme' perceptions (expectations), which reduces the mean and the dispersion in our subsample relative to the full sample. For example, the mean and the standard deviation of perceived inflation is 2.53% and 1.95% in our subsample, while the corresponding figures for the full sample are 3.90% and 9.41%. The figures from our subsample are in line with numbers reported in Coibion et al. (2019b) after applying the Huber estimator (which removes outliers) to compute moments.

Table 1
Summary statistics for inflation expectations/uncertainty.

Panel A: Quantitative expectations					
	Obs.	Mean	Std. dev.	Min.	Max.
$\pi_{i,t-12:t t}$	1389	2.53	1.95	-10.00	12.00
$ e_{i,t-12:t t} $	1389	1.31	1.84	0.00	11.40
$\pi_{i,t:t+12 t}$	2445	2.50	2.20	-12.00	12.00
$ e_{i,t:t+12 t} $	2445	2.14	1.97	0.00	12.60
$\pi_{i,t:t+12 t}^H$	2443	2.02	2.54	-14.00	14.00
$\sigma_{i,t:t+12 t}^H$	2443	1.60	1.82	0.00	12.07
Panel B: Qualitative expectations					
	Obs.	-1 (decrease)	0 (same)	1 (increase)	
<i>infl_exp</i>	2443	80 (3.27%)	856 (35.04%)	1507 (61.69%)	
<i>unemp_exp</i>	2444	401 (16.41%)	1198 (49.02%)	845 (34.57%)	

Notes: This table provides summary statistics for the macroeconomic expectations of the participants in Wave 3 of the Bundesbank Online Pilot Survey on Consumer Expectations. For $\pi_{i,t-12:t|t}$ and $|e_{i,t-12:t|t}|$, we only consider households with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. For $\pi_{i,t:t+12|t}$, $|e_{i,t:t+12|t}|$, *infl_exp*, and *unemp_exp*, we only consider households with $-12 \leq \pi_{i,t:t+12|t} \leq 12$.

Fig. 2 shows the average inflation expectation conditional on the information channel minus the average inflation expectation of all households (red bars). Households who rely on traditional media have below average inflation expectations (2.41% on average), while households who do not inform themselves have the highest inflation expectations (2.97% on average). Besides these point predictions, the Bundesbank survey also asked for histogram forecasts for the rate of inflation over the next twelve months. For each individual, we compute the mean, $\pi_{i,t:t+12|t}^H$, and standard deviation, $\sigma_{i,t:t+12|t}^H$, of the histogram forecast based on the assumption that the probabilities within the distinct outcome intervals are centered at the midpoint. Glas (2020) shows that the impact of alternative distributional assumptions (e.g., fitting beta distributions to the histograms) on quantifications of the mean and the standard deviation is negligible. The correlation between the point forecasts and the distribution implied mean forecasts is 0.49.

We use $\sigma_{i,t:t+12|t}^H$ as a measure of inflation uncertainty.⁶ The blue bars in Fig. 2 depict the average inflation uncertainty within each group minus average inflation uncertainty of all households. The figure reveals that users of social media are most uncertain, while users of traditional media are least uncertain.

Finally, the survey asks questions of a qualitative nature. We use questions about expected changes in inflation and the unemployment rate to better understand the economic model that individuals have in mind when forming expectations. Individuals were asked whether they believe that the inflation/unemployment rate would decrease significantly, decrease slightly, stay roughly the same, increase slightly or increase significantly. We reclassify the answers as -1, 0, 1, with -1 standing for a slight/significant decrease, 0 for no change, and 1 for a slight/significant increase. We denote the qualitative inflation and unemployment expectations by *infl_exp* and *unemp_exp*. For summary statistics see Panel B of Table 1.

3.4. Time series data

To compute lifetime experiences of inflation and unemployment rates, we make use of annualized aggregate time series for western Germany from 1950 until 2019. The data on inflation are provided by the Bundesbank and refer to the German CPI, seasonally and working day adjusted. Unemployment data are sourced from Germany’s Federal Employment Agency and refer to the official unemployment rate based on the dependent civilian labor force. There have been several distinct phases in the historical evolution of inflation and the unemployment rate in Germany since 1950. After WWII, unemployment came down from high levels, while inflation increased slowly. It remained high and volatile in the 1970s, fell in the 1980s, and has remained low and relatively stable since the mid-1990s. Unemployment rose in the 1970s, peaked in the late 1990s, and has fallen since. Given these developments, it is conceivable that households with different lifetime experiences of inflation and unemployment have different views of the future development of both variables.

Malmendier and Nagel (2011, 2016) have formally shown that individual experiences matter for the formation of expectations. We follow the methodological approach in Malmendier and Nagel (2011) and model inflation experience as a weighted average of the inflation rates that materialized during an individual’s lifetime. Specifically, the inflation experience of individual *i* is given by

$$\tilde{\pi}_{i,2019}^H(\lambda) = \sum_{k=1}^{age_i-1} w_i(k, \lambda) \tilde{\pi}_{2019-k}, \tag{1}$$

⁶ The survey also elicits a qualitative question about households’ confidence regarding their inflation outlook. We find that the histogram standard deviations are well aligned with this qualitative uncertainty measure: The conditional means of $\sigma_{i,t:t+12|t}^H$ are 1.33%, 1.61% and 1.90% for households who stated that they are (very/rather) certain, neither particularly certain nor particularly uncertain, or (rather/very) uncertain.

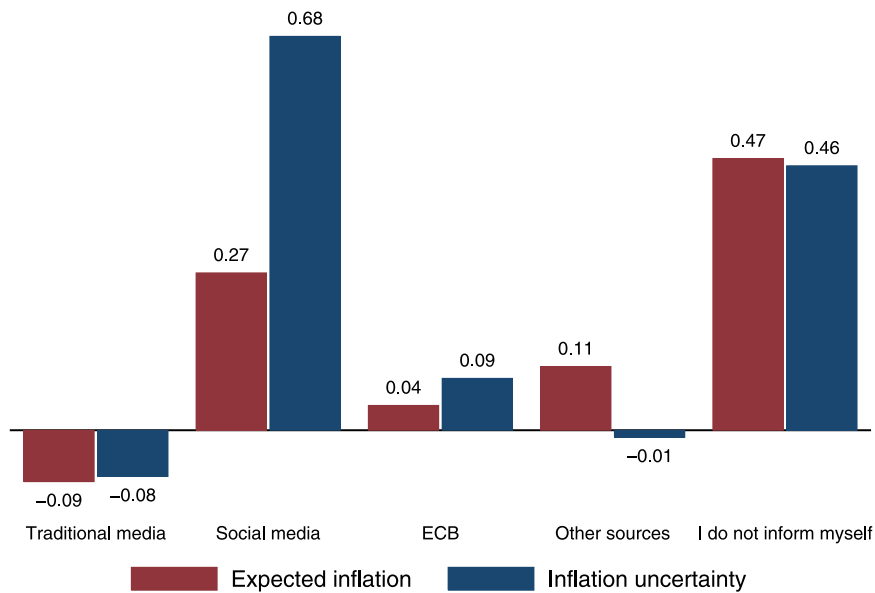


Fig. 2. Deviations of inflation expectations/uncertainty from full-sample averages.

Notes: The figure shows average expected inflation conditional on the information channel minus the unconditional average of expected inflation (red bars) and average inflation uncertainty conditional on the information channel minus the unconditional average of inflation uncertainty (blue bars). On average, expected inflation and inflation uncertainty are equal to 2.5% and 1.6%, respectively. All deviations are expressed in percentage points. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

where $\tilde{\pi}_{2019-k}$ is the annual inflation rate in (western) Germany in year $2019 - k$ and

$$w_i(k, \lambda) = \frac{(age_i - k)^\lambda}{\sum_{k=1}^{age_i-1} (age_i - k)^\lambda}. \quad (2)$$

We restrict λ to be non-negative. For $\lambda > 0$ the weights are declining from lag one onwards. This is in line with the empirical observation that individuals are usually influenced most strongly by recent inflation experiences (Malmendier and Nagel, 2016). Nevertheless, for a sufficiently small λ , individuals can attach considerable weight even to observations that lie in the distant past. In the extreme case where $\lambda = 0$, all lags receive the same weight. Additionally, we compute the lifetime experience of the unemployment rate, $\tilde{u}_{i,2019}^l(\lambda)$, in the same way.

In the empirical analysis, we estimate either linear regression models or probit models. We estimate those models for a fixed value of λ and then search over a grid of λ values for one that either minimizes the sum of the squared residuals (linear regression models) or maximizes the log likelihood (probit models).

4. Determinants of information channels

In a first step, we study the determinants of each household's most important information channels regarding monetary policy. For each information channel, we estimate a probit model that relates the choice of information channels to the households' socioeconomic characteristics. Motivated by the seemingly non-linear relationships depicted in the upper and lower right panels in Fig. 1, we include age and age^2 as regressors as well as the log of income. The average marginal effects (multiplied by 100) are presented in Table 2. The first column shows that the probability that an individual will use traditional media increases with age, household income and years of education. For example, the predicted probability of using traditional media is 66.52% for a 20-year-old individual but 93.30% for an 80-year-old individual (the change in the predicted probabilities is denoted by $\Delta P(y = 1|X)$ in Table 2). Increasing household income by one percent raises the probability of using traditional media by 5.52 percentage points. In addition, women are less likely to rely on traditional media. As expected, younger individuals use social media more often. By contrast, the probability that an individual will use direct ECB communication channels increases with age. Interestingly, individuals who intend to buy a house are more likely to inform themselves through direct ECB channels. This suggests that households that might take out a mortgage loan monitor the ECB's interest rate decisions more carefully than other households. Younger individuals, individuals with lower education, lower household income, women, and those who do not intend to buy a house are more likely not to inform themselves about monetary policy.

Table 2
Information channels and socioeconomic characteristics.

	(1) <i>traditional</i>	(2) <i>social</i>	(3) <i>ecb</i>	(4) <i>other</i>	(5) <i>noinform</i>
<i>age</i>	0.39*** (0.06)	-0.17*** (0.04)	0.15*** (0.06)	-0.09 (0.06)	-0.27*** (0.05)
<i>east1989</i>	-3.06 (2.19)	0.24 (1.41)	-2.40* (1.31)	2.26 (2.10)	1.73 (1.88)
<i>female</i>	-6.61*** (1.54)	-0.51 (0.96)	-0.92 (1.04)	-5.56*** (1.40)	7.91*** (1.38)
<i>fullemploy</i>	-1.08 (1.84)	-0.10 (1.20)	2.94** (1.45)	-1.88 (1.83)	0.59 (1.59)
<i>hhsz</i>	-0.66 (0.79)	0.60 (0.48)	-0.79 (0.67)	-0.28 (0.81)	0.55 (0.68)
<i>homebuy</i>	2.10 (1.70)	-0.48 (1.16)	6.41*** (1.82)	3.88** (1.97)	-3.20** (1.34)
<i>ln(income)</i>	5.52*** (1.63)	-1.24 (0.95)	1.12 (1.45)	-1.87 (1.68)	-3.86*** (1.36)
<i>no_property</i>	-0.17 (1.61)	1.55 (1.11)	-0.70 (1.25)	-3.67** (1.57)	1.36 (1.40)
<i>yoe</i>	0.73*** (0.23)	-0.09 (0.15)	0.00 (0.15)	0.49** (0.20)	-0.52*** (0.20)
Observations	2,307	2,307	2,307	2,307	2,307
% corr. pred.	65.76	74.99	59.90	59.73	65.06
$\Delta P(y = 1 X)$	26.78	-12.38	8.81	-5.35	-18.87

Notes: This table presents average marginal effects from probit regressions of households' information channels on their socioeconomic characteristics. The underlying regression model includes age and age squared. Heteroskedasticity-consistent standard errors are reported in parentheses. The reported average marginal effects and standard errors are the estimated ones times 100. The estimation sample includes individuals with $-12 \leq \pi_{i,t:t+12}|_t \leq 12$. In the second-to-last row, we report the fraction of correct predictions for each information channel. In the last row, we report the difference in the predicted probability of using a particular information channel for a 20- and an 80-year-old individual.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

5. Inflation expectations

Next, we investigate whether information channels and/or individual experience can explain inflation expectations. In all regressions, we include dummies for the four information channels *traditional*, *social*, *ecb*, and *other*. Individuals who state that they do not inform themselves about monetary policy serve as the reference group. For all individuals, the inflation experience in Eq. (1) is based on western German historical inflation rates. That is, we assign western German inflation rates to individuals who lived in eastern Germany before 1989 as well. Nevertheless, in order to control for their specific experience we include the *east1989* dummy in all regressions and conduct appropriate robustness checks.

5.1. Quantitative expectations

5.1.1. Point predictions

The first three columns of Table 3 show the results of linear regressions of the point predictions for perceived inflation ($\pi_{i,t-12:t|t}$), absolute perception errors ($|e_{i,t-12:t|t}|$), and future expected inflation ($\pi_{i,t+12:t|t}$) on information channels and individual inflation experience while controlling for socioeconomic characteristics.⁷ Columns (1)-(3) show that the only information channel which has a significant effect is traditional media. For individuals who use this information channel, perceived inflation is on average 0.55 percentage point lower than for individuals who do not inform themselves. Furthermore, as shown in Columns (2) and (3), users of traditional media have significantly lower absolute prediction errors and expect significantly lower future rates of inflation. The effect of traditional media on expected inflation may be direct and/or indirect via perceived inflation. If we re-estimate the regression for expected inflation and include perceived inflation as an additional control variable, traditional media indeed become insignificant, see Column (1) of Table A.3 in the appendix. To further check for this indirect effect, Column (4) of Table 3 reports results from a regression of expected inflation on the same variables as before, while additionally controlling for the residual from Column (1),

⁷ Due to the cross-sectional nature of our data set, we cannot include age dummies as done in Malmendier and Nagel (2011). If we did, these dummies would capture the effect of lifetime experience of inflation. Instead, we leave out age controls in the baseline and resort to cohort dummies in a robustness check, as suggested by Malmendier and Nagel (2011) for cases of multicollinearity. As we discuss below, including cohort dummies does not affect our results.

Table 3
Regressions of expectations on information channels and lifetime experience.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\pi_{i,t-12:t t}$	$ e_{i,t-12:t t} $	$\pi_{i,t:t+12 t}$	$\pi_{i,t:t+12 t}$	$\sigma_{i,t:t+12 t}^H$	<i>infl_exp</i>	<i>unemp_exp</i>
<i>traditional</i>	-0.55*** (0.18)	-0.57*** (0.17)	-0.51*** (0.18)	-0.55*** (0.16)	-0.34** (0.13)	-0.03 (0.03)	-0.02 (0.03)
<i>social</i>	0.16 (0.27)	0.15 (0.25)	0.27 (0.22)	0.33* (0.18)	0.54*** (0.20)	0.01 (0.04)	0.05 (0.04)
<i>ecb</i>	0.04 (0.24)	0.17 (0.21)	0.01 (0.19)	-0.11 (0.16)	0.07 (0.17)	-0.06 (0.04)	0.05 (0.04)
<i>other</i>	-0.03 (0.14)	-0.10 (0.13)	0.06 (0.14)	-0.11 (0.14)	-0.09 (0.11)	-0.02 (0.03)	0.07** (0.03)
$\bar{\pi}_{i,2019}^H$	0.30 (0.31)	0.28 (0.28)	0.91 (0.73)	0.99* (0.52)	-0.70*** (0.12)	0.45*** (0.13)	
$\bar{u}_{i,2019}^H$							0.11*** (0.02)
$\pi_{i,t-12:t t}^R$				0.74*** (0.06)			
Constant	3.96*** (1.11)	3.97*** (1.00)	3.66*** (1.23)	3.32*** (1.02)	5.06*** (0.75)		
Observations	1,309	1,309	2,307	1,289	2,317	2,305	2,306
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
λ	1.70	1.60	5.10	3.90	0.20	4.40	2.70
\bar{R}^2	0.07	0.09	0.03	0.41	0.04	-	-
% corr. pred.	-	-	-	-	-	61.95	49.96
$\Delta P(y = 1 X)$	-	-	-	-	-	14.47	12.56

Notes: Columns (1)–(5) present OLS estimates from regressions of households' quantitative expectations on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Column (4) includes the residual from Column (1), $\pi_{i,t-12:t|t}^R$, as an additional covariate. Columns (6)–(7) present average marginal effects for an increase (=1) in the respective dependent variable from ordered probit regressions of households' qualitative expectations on information channels, lifetime experience, and socioeconomic controls. Heteroskedasticity-consistent standard errors are reported in parentheses. The estimation sample in Columns (1) and (2) includes individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. Columns (3), (6), and (7) include those with $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (4) is based on individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$ and $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (5) includes all individuals. In the second-to-last row, we report the fraction of correct predictions for each qualitative expectation. In the last row, we report the difference in the predicted probability of stating an increase (=1) in the respective dependent variable when comparing an individual with experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

$\pi_{i,t-12:t|t}^R$. Traditional media as well as $\pi_{i,t-12:t|t}^R$ both turn out to be significant. This suggests that the effect of traditional media on expected inflation works via perceived inflation.⁸ When controlling for $\pi_{i,t-12:t|t}^R$, the effect of social media becomes significantly positive (at the 10% level). Similarly, while the estimated coefficients for the effect of lifetime inflation experience are insignificant in Columns (1)–(3), the effect now becomes significantly positive (again at the 10% level), as in (Malmendier and Nagel, 2016). Our coefficient estimate suggests an almost one-to-one relation between experienced and expected inflation. The finding that social media and lifetime inflation experience are only significant in Column (4) may be explained by the fact that $\pi_{i,t-12:t|t}^R$ substantially increases the adjusted R^2 while, by construction, being orthogonal to the other regressors. Hence, including $\pi_{i,t-12:t|t}^R$ allows the effects of the other regressors to be estimated more precisely.⁹

Note that we control for each household's socioeconomic characteristics. For brevity, detailed results are omitted from Table 3 (the detailed estimates can be found in Table A.4). In line with the previous literature, we find that women report higher perceived and expected inflation, and have larger perception errors. In contrast, years of education have a significantly negative effect on all three variables (see, for example, Bruine de Bruin et al., 2010). The *no_property* dummy is significantly positive in Columns (1) and (2), while higher income tends to go along with lower future expected inflation, see D'Acunto et al. (2019b). We also find that the *east1989* dummy is significantly positive in Column (3), which is in line with the findings in Goldfayn-Frank and Wohlfart (2020).

Finally, we analyze whether the effect of traditional media varies in the cross-section of households. First, we are interested in the question whether households are better informed about inflation because they use traditional media, as assumed so far, or whether

⁸ As shown in Columns (2) and (3) of Table A.3, usage of traditional media also tends to significantly reduce inflation forecast errors, which reinforces the result from Column (2) of Table 3.

⁹ We conduct several robustness checks to investigate whether the relationship between inflation expectations and inflation experience differs for western and eastern Germans. In Table A.5, we focus on a subsample of households who lived in western Germany before reunification. In Table A.6, we assign eastern German inflation rates (which were officially always close to zero) to individuals who lived in eastern Germany before 1990. In both cases, the estimates are very similar to those reported in Table 3.

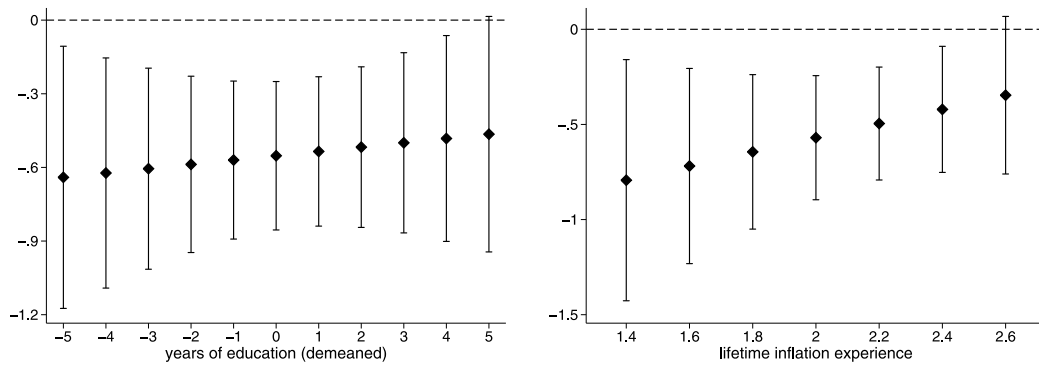


Fig. 3. Marginal effects of traditional media on perceived inflation.

Notes: The figure shows average marginal effects of using traditional media on perceived inflation as a function of years of education (left panel) and lifetime inflation experience (right panel) along with 90% confidence intervals, based on a regression as in Column (1) of Table 3 that additionally includes an interaction term of traditional media with either years of education or inflation experience. Years of education is normalized such that a value of zero corresponds to average education in our sample.

households that are better informed (independently of their socioeconomic characteristics) are just more likely to use traditional media. To answer this question, we have re-estimated Column (1) of Table 3 and interacted traditional media with years of education. The left panel of Fig. 3 plots the average marginal effect of using traditional media as a function of years of education. To increase the readability of the figure, we have normalized years of education such that a value of zero corresponds to the average education in the sample (see Table A.2). The figure suggests that the marginal effect is slightly stronger for households with below-average levels of education than for households with above-average levels. Given our finding that households with higher years of education have lower inflation expectations, this supports the view that individuals are indeed better informed because they use traditional media.¹⁰ Second, we re-estimated Column (1) of Table 3 and interacted traditional media with lifetime inflation experience. The right panel of Fig. 3 suggests that the marginal effect of traditional media is muted for households with higher inflation experience. This is in line with the notion that households who have experienced higher inflation rates are less responsive to news about (low) inflation in the media and thus illustrates a potential cost of periods of high inflation: Household expectations become subsequently more difficult to manage via communication through traditional media.

5.1.2. Inflation uncertainty

In Column (5), we explore the effects on inflation uncertainty. We find that individuals who rely on traditional media are significantly less uncertain than those who do not inform themselves. Interestingly, we also find that individuals who use social media are more uncertain. According to Bundesbank (2019), the data from all three waves of the survey suggest that individuals with higher inflation uncertainty have less stable and potentially de-anchored inflation expectations. Hence, as discussed in Bundesbank (2019), our finding that users of social media are more uncertain about future inflation suggests that central banks should disseminate accurate information through social media. Moreover, higher lifetime inflation experience significantly reduces inflation uncertainty. This finding could be related to the empirical observation that higher levels of inflation typically go hand in hand with higher inflation variability (see, for example, Conrad and Hartmann, 2019). Individuals who have experienced phases of high inflation and, as a result, also high inflation volatility might therefore be more certain about the inflation outlook in the current low inflation environment with comparably low volatility. The estimate of 0.2 for λ implies that individuals take into account inflation experiences from large parts of their life when asked for the possible range of future inflation. In addition, we find that men are significantly less uncertain than women and that individual uncertainty decreases with income and years of education.

5.2. Qualitative expectations: directions of change

In the following, we analyze the determinants for the expected direction of inflation. To this end, we employ the qualitative question on inflation expectations, as it directly measures our object of interest. Before doing so, we note that the qualitative inflation expectations are well aligned with the quantitative expectations: For individuals with $-12 \leq \pi_{i,t:t+12}|_t \leq 12$, the conditional means of expected inflation are 1.65%, 2.16% and 2.74% when the qualitative expectations are -1 , 0 and 1 . Moreover, the conditional means of expected minus perceived inflation are -0.42% , -0.09% and 0.09% , respectively. Column (6) of Table 3 presents the average marginal effects from an ordered probit regression of the qualitative inflation expectations on information channels, lifetime inflation experience as well as control variables. We report marginal effects on the probability that individuals expect a slight or significant increase in the inflation rate. It turns out that information channels are no longer relevant when explaining directional changes in

¹⁰ This finding is consistent with D'Acunto et al. (2020a), who report that low-IQ individuals respond more strongly to information about policy targets than high-IQ individuals.

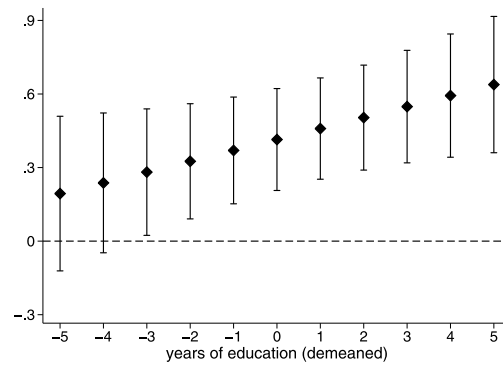


Fig. 4. Marginal effect of inflation experience on qualitative inflation expectations.

Notes: The figure shows the average marginal effect of inflation experience on qualitative inflation expectations as a function of years of education along with 90% confidence intervals, based on a regression as in Column (6) of Table 3 that additionally includes an interaction term of lifetime inflation experience with years of education. Years of education is normalized such that a value of zero corresponds to average education in our sample.

inflation expectations. Instead, lifetime inflation experience plays a crucial role. Individuals who have experienced higher inflation rates are more likely to expect an increase in the inflation rate. The optimal λ is estimated to be 4.4. This estimate implies that the weights in Eq. (2) decline quickly for a 20-year-old individual while an 80-year-old individual will attach non-negative weights to inflation rates over the last 40 years. The last line in Table 3 shows that the predicted probability of expecting a slight or significant increase is 14.47 percentage points higher for an individual with an inflation experience at the 95th percentile than for an individual at the 5th percentile.

We also investigated whether the effect of lifetime experience varies in the cross-section of individuals. We addressed this issue by interacting lifetime experience with years of education (demeaned). Fig. 4 reveals that the marginal effect of inflation experience increases with higher levels of education. Because years of education has no direct effect on the expected change in the inflation rate (see Table A.4), it might, in this context, proxy an individuals' ability to remember past inflation rates. Thus, our weighted measure of inflation experience might be a more accurate measure for the subjective inflation experience of those households with higher years of education and, hence, has a stronger effect for them. This finding is line with the idea that inflation expectations depend on the individual perception of experienced actual inflation.

Concerning the control variables, we again find that individuals who lived in eastern Germany before reunification are more likely to expect an increase in the inflation rate.

5.3. Further robustness checks

We conducted several robustness checks which are presented in Table A.7 in the appendix.

In Columns (3) and (4) of Table 3 we rely on the point forecast of inflation as the dependent variable. As a robustness check, we replace the point forecast by the mean of the histogram inflation expectations as the dependent variable. As shown in Columns (1) and (2) of Table A.7, this does not change our findings.

We also re-estimate Column (5) of Table 3 with an alternative measure of inflation uncertainty as the dependent variable. Krüger and Pavlova (2020) propose a new uncertainty measure for histogram forecasts, which they call the 'expected ranked probability score' (ERPS). The ERPS is based solely on the probabilities that an individual assigns to each bin and does not require any further distributional assumptions. When this new uncertainty measure was used, however, all results remained unchanged, see Column (3) in Table A.7.

In Column (4) of Table A.7 we re-estimate Column (5) of Table 3 and replace lifetime inflation experience with lifetime inflation volatility experience (computed as the within-year standard deviation of monthly inflation rates). Again, we find a negative effect, i.e., individuals who experienced higher inflation volatility in the past are currently less uncertain.

As a robustness check for Column (6) of Table 3, we calculate the expected direction of inflation from quantitative inflation expectations and perceptions (which reduces the sample size by approximately half). Specifically, we assign a value of $-1/0/1$ to individuals whose inflation expectation is below/equal to/above their current inflation perception. Column (5) of Table A.7 displays the corresponding results. Lifetime inflation experience remains the only significant regressor. Further, Column (6) in Table A.7 shows that the results in Column (6) of Table 3 are robust to including cohort dummies, constructed as in Fig. 1. When including cohort dummies, we find that the use of traditional media is still significant in the regressions for perceived and expected inflation while inflation experience remains insignificant (results available upon request).

Finally, Binder (2018) provides evidence for 'panel conditioning effects' in surveys on inflation. In our case, it could be that participation in the first or second survey wave might affect response behavior in the third wave. For example, participants might inform themselves about monetary policy and recent inflation numbers before they participate in the third wave. To make sure that our findings are not distorted by such effects, we have re-estimated Table 3 based on those households that participated for the

first time in Wave 3. We find that our results are still valid for this smaller sample. That is, traditional media significantly reduce perceived and expected inflation, while lifetime inflation experience is important for qualitative inflation expectations (detailed results available upon request).

5.4. Summary and interpretation

Our findings so far are consistent with the following interpretation. Households learn about the level of current and future inflation rates mainly from traditional media, but individual inflation experience is key to explaining the expected change in inflation. In order to understand whether this finding applies more generally, we also investigate the determinants of the expected changes in the unemployment rate. As Column (7) of Table 3 shows, lifetime unemployment experience plays a crucial role in explaining the expected change in the unemployment rate. The predicted probability of expecting a slight or significant increase in the unemployment rate increases in the lifetime unemployment experience. Specifically, the difference in the predicted probability for individuals at the 95th and 5th percentile is 12.56 percentage points. Additionally, individuals who rely on other information channels to inform themselves about monetary policy (e.g., personal interactions) are more likely to expect unemployment to rise. Thus, our analysis of the unemployment rate reveals a picture similar to that for the expected change in the inflation rate.

Our interpretation of these findings is that traditional media channels are important for gaining an accurate picture of the current state of the economy, i.e., for obtaining the correct numbers. Information channels, however, either do not convey an economic model of the workings of the economy or households do not absorb this information. Instead, the economic model used by households to forecast future developments appears to be shaped to a large degree by their own experiences.

Finally, it is interesting to note that our finding on the importance of traditional media is somewhat at odds with the results in Coibion et al. (2019b) who conclude that "...relying on the media to transmit the central bank's message is unlikely to be very successful...". Their finding is based on a sample of US households and is driven by the fact that US households consider traditional media (newspapers, TV) as less credible than social media or direct communication of the Federal Reserve (the FOMC statement). In contrast, our results suggest that the German population heavily relies on traditional media and, hence, appears to attach high credibility to this channel. Whether our results extend to other countries might hence depend on the credibility that is attached to traditional media in those countries.

6. Response to changes in the policy rate

In order to learn more about the economic model that households implicitly use when thinking about the economy, we investigate how individuals respond to a monetary policy shock. Specifically, we asked households how they would update their inflation expectations in response to an unexpected increase in the policy rate by the ECB. There were two randomly assigned versions of this question, which were preceded by the information that the Governing Council of the ECB is responsible for setting interest rates:

Q:311A/B: Imagine that you have just found out that the Governing Council of the European Central Bank has unexpectedly announced that it is raising the policy rate by. . .

- weak treatment (WT): . . . 0.25 percentage point.
- strong treatment (ST): . . . 1.00 percentage point.

What impact does this information have on your expectations regarding the rate of inflation over the next twelve months?

- I expect inflation to be lower
- It has no impact on my expectations
- I expect inflation to be higher

Panel A of Table 4 summarizes the answers. While Column (1) presents the results for the combined treatments, Columns (2) and (3) report results for the weak and strong treatments separately. Roughly 50% of individuals do not update their inflation expectations in response to an unexpected increase in the policy rate. The fraction of individuals who do not update expectations is somewhat lower in the treatment with a stronger increase in the policy rate, but still higher than the fraction of individuals who change their inflation expectations upwards or downwards. Interestingly, in both treatments the fraction of individuals who increase their inflation expectations is higher than the fraction of those who decrease their expectations. Although this behavior is at odds with standard theory, it has been previously observed for households and is in line with the notion that the increase in the interest rate has an information effect, i.e., households infer from the policy rate change that the central bank has a more positive view on the current state of the economy than the household previously thought, see Eminidou et al. (2020), or (Enders et al., 2019) in the context of a firm survey. Alternatively, households might adhere to a neo-Fisherian view of monetary policy (Uribe, 2021) and/or have a mis-specified model of the effect of monetary policy shocks on inflation, see Andre et al. (2019) and Candia et al. (2020).

Panel B of Table 4 shows the results of ordered probit regressions of the change in inflation expectations (*adj_infl_exp*) on information channels and inflation experience while controlling for socioeconomic characteristics. In all three columns, we report marginal effects for the probability that a household will increase its inflation expectation in response to an unanticipated rise in the interest rate, i.e., for the response which is at odds with standard theory. For the strong and the combined treatment, we find that

Table 4
Regressions of inflation updating on information channels and lifetime inflation.

	(1) WT+ST	(2) WT	(3) ST
Panel A: Summary of outcomes			
Lower expected inflation	586 (24.10%)	274 (22.50%)	312 (25.70%)
Same expected inflation	1131 (46.50%)	613 (50.33%)	518 (42.67%)
Higher expected inflation	715 (29.40%)	331 (27.18%)	384 (31.63%)
	2432	1218	1214
Panel B: Ordered probit regression <i>adj_infl_exp</i>			
<i>traditional</i>	-0.65 (2.38)	-2.90 (3.31)	1.44 (3.43)
<i>social</i>	-0.86 (3.73)	2.07 (5.45)	-2.15 (5.28)
<i>ecb</i>	-6.12* (3.13)	-4.85 (4.34)	-7.55* (4.46)
<i>other</i>	3.62 (2.43)	6.16* (3.64)	1.02 (3.28)
$\bar{\pi}_{i,2019}^H$	8.27*** (2.80)	8.19** (3.57)	9.55** (4.66)
Observations	2,295	1,150	1,145
Controls	Yes	Yes	Yes
λ	0.10	0.00	0.40
% corr. pred.	46.14	50.26	42.79
$\Delta P(y = 1 X)$	8.84	9.06	9.05

Notes: Panel A: Absolute frequencies of the reactions to hypothetical ECB announcements for the full sample, the ‘weak treatment group’ (WT) and the ‘strong treatment group’ (ST). Relative frequencies conditional on treatment status are reported in parentheses. Panel B: Average marginal effects for an increase (=1) in *adj_infl_exp* from ordered probit regressions of households’ inflation updating on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Heteroskedasticity-consistent standard errors are reported in parentheses. The reported average marginal effects and standard errors are the estimated ones times 100. The estimation sample includes individuals with $-12 \leq \pi_{i,t:t+12|t} \leq 12$. In the second-to-last row, we report the fraction of correct predictions. In the last row, we report the difference in the predicted probability of stating an increase (=1) in *adj_infl_exp* when comparing an individual with inflation experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

individuals who rely on the direct ECB communication channel are significantly less likely to increase their inflation expectations in response to an unexpected rise in the policy rate. This suggests that those households have an economic model of the economy that is in line with standard theory. In the weak treatment, using other channels increases the likelihood of revising the inflation expectation upwards. Interestingly, neither the traditional nor the social media channel are important for expectation updating.

Experience, however, is highly relevant to updating behavior. Specifically, individuals with experience of higher inflation are more likely to revise their inflation expectations upwards in response to an unexpected increase in the interest rate. One potential interpretation could be that these households have experienced rising interest rates during times of high inflation (e.g., when the Bundesbank tried to combat high inflation in the 1970s) and hence mentally connect these two phenomena. Alternatively, high experienced inflation rates could impact negatively on the perception that monetary policy is capable of reducing inflation. Lastly, as shown theoretically by Bilbiie (2018), the effects of an interest-rate increase at the currently prevailing zero lower bound depend on the nature of this liquidity trap: They are inflationary in case of confidence-driven liquidity traps, contrary to fundamental ones. This result could therefore explain our findings, if individuals with higher inflation experience (e.g., by witnessing the volatile 1970s) believe more in confidence-driven business cycles, while followers of the ECB communication channels adhere to the more traditional view of fundamental factors driving economic developments. In all cases, inflation experience has shaped the economic model used by individuals. Note that the estimate of λ is now much smaller than in Column (5) of Table 3. This suggests that the lifetime inflation experience which essentially applies equal weights to all experienced inflation rates is most informative for understanding an individual’s updating behavior.

In the strong treatment, the *east1989* dummy is significantly positive (see [Table A.8](#) in the appendix). That is, individuals who lived in eastern Germany before reunification are more likely to expect the inflation rate to increase in response to a contractionary policy shock. By contrast, individuals who plan to buy real estate are less likely to increase their inflation expectations.

7. Conclusion

We interpret our findings as follows. Only traditional media provide households with comparatively accurate information about the *level* of inflation. Perceived inflation and quantitative forecasts, which typically do not move too far away from perceived inflation rates, are, therefore, very dependent on the information channel used. In contrast, lifetime inflation experience appears to play a limited role. This may be either because experience is not remembered in the form of numerical values or because an existing effect is hard to identify in our data set which lacks a time series dimension. When forming expectations about the *direction* of future inflation, however, experience is crucial, while information channels are less important. This finding is consistent with the hypothesis that experiences, rather than information channels, influence individuals' economic model, i.e., how agents think about the basic mechanics of the economy. This is supported by our observations regarding the expected direction of the unemployment rate and the answers to a thought experiment in which the European Central Bank unexpectedly raises interest rates. In this context, we also observe that households that follow the ECB's communication have an economic model that is in line with standard economic reasoning. Yet, these households are no better at forecasting inflation than consumers of traditional media. Our findings suggest that central banks should communicate in a way that ensures coverage in the broader media (see also the argumentation in [Bundesbank 2019](#), which is based on our results). In addition, our findings highlight that distinct information channels are used by different types of households. For example, younger individuals are mostly likely to receive monetary policy-related news if it is covered in social media.

Appendix

Table A.1
Variable construction.

Variable	Questionnaire	Description
Socioeconomic characteristics		
<i>age</i>	<i>age</i>	Age of individual. Set to 80 if <i>age</i> equals '80 years or older'.
<i>east1989</i>	<i>eastwest1989</i>	Equals unity if <i>eastwest1989</i> equals 'eastern Germany', and zero otherwise.
<i>female</i>	<i>gender</i>	Equals unity if <i>gender</i> equals 'female', and zero otherwise.
<i>fullemploy</i>	<i>employ</i>	Equals unity if <i>employ</i> equals 'employed, full-time', and zero otherwise.
<i>hhszize</i>	<i>hhszize</i>	Household size. Set to 6 if <i>hhszize</i> equals '6 or more'.
<i>homebuy</i>	<i>intbuyprop_renter</i> (Q:003A) and <i>intbuyprop_owner</i> (Q:003B)	Equals unity if either <i>intbuyprop_renter</i> or <i>intbuyprop_owner</i> equal 'yes', and zero otherwise.
<i>income</i>	<i>hhinc</i>	Monthly household income in €1,000 (interval midpoints): $\left\{ \begin{array}{l} = 0.25 \text{ if } hhinc \text{ equals } '<€500', \\ = 0.75 \text{ if } hhinc \text{ equals } '€500 - <€1,000', \\ = 1.25 \text{ if } hhinc \text{ equals } '€1,000 - <€1,500', \\ = 1.75 \text{ if } hhinc \text{ equals } '€1,500 - <€2,000', \\ = 2.25 \text{ if } hhinc \text{ equals } '€2,000 - <€2,500', \\ = 2.75 \text{ if } hhinc \text{ equals } '€2,500 - <€3,000', \\ = 3.25 \text{ if } hhinc \text{ equals } '€3,000 - <€3,500', \\ = 3.75 \text{ if } hhinc \text{ equals } '€3,500 - <€4,000', \\ = 4.25 \text{ if } hhinc \text{ equals } '€4,000 - <€4,500', \\ = 4.75 \text{ if } hhinc \text{ equals } '≥€4,500 \text{ EUR}.' \end{array} \right.$
<i>no_property</i>	<i>homeown</i>	Equals unity if <i>homeown</i> equals 'rent and do not own any other home(s)', and zero otherwise.
<i>yoe</i>	<i>eduschool</i>	Years of education of individual following (SOEP-IS Group, 2017): $\left\{ \begin{array}{l} = 7 \text{ if } eduschool \text{ equals } 'No \text{ school-leaving certificate}', \\ = 9 \text{ if } eduschool \text{ equals } 'Secondary \text{ school-leaving certificate}', \\ = 10 \text{ if } eduschool \text{ equals } 'Other \text{ school-leaving certificate}', \\ = 10 \text{ if } eduschool \text{ equals } 'Intermediate \text{ secondary school certificate}', \\ = 10 \text{ if } eduschool \text{ equals } 'Polytechnical \text{ secondary school certificate (8th/10th grade)}', \\ = 13 \text{ if } eduschool \text{ equals } 'University \text{ of applied sciences entrance diploma/completed technical school}', \\ = 13 \text{ if } eduschool \text{ equals } 'Senior \text{ school-leaving certificate/ general or subject-specific university entrance diploma}', \\ = 18 \text{ if } eduschool \text{ equals } 'College/university degree'.' \end{array} \right.$
Information channels		
<i>traditional</i>	<i>source_mpecb_a</i> (Q:314)	Equals unity if individual selects 'Traditional media such as newspapers, radio, television or the websites of such providers' as one of the channels through which he/she most often receives information about the ECB's monetary policy, and zero otherwise.
<i>social</i>	<i>source_mpecb_b</i> (Q:314)	Equals unity if individual selects 'Social media such as Facebook or Twitter', and zero otherwise.
<i>ecb</i>	<i>source_mpecb_c</i> (Q:314)	Equals unity if individual selects 'ECB communication channels (e.g., ECB's website, ECB's Economic Bulletin, ECB's monthly press conference)', and zero otherwise.
<i>other</i>	<i>source_mpecb_d</i> (Q:314)	Equals unity if individual selects 'Other sources', and zero otherwise.
<i>noinform</i>	<i>source_mpecb_e</i> (Q:314)	Equals unity if individual selects 'I do not inform myself about the ECB's monetary policy', and zero otherwise.
Quantitative expectations		
$\pi_{i,t-12:t}$	<i>devinfpoin</i> (Q:307)	Perceived German inflation rate over the previous twelve months in percent. This question was only asked to participants of Wave 3 of the Bundesbank survey who did not already participate in Wave 2.
$ \epsilon_{i,t-12:t} $	<i>devinfpoin</i> (Q:307)	Perception error. Defined as $ \pi_{i,t-12:t} - 1.4 $, where 1.4 is the German CPI inflation rate in May 2019.
$\pi_{i,t:t+12}$	<i>infdef</i> (Q:005A) and <i>inflexppoin</i> (Q:005B)	Expected German inflation rate over the next twelve months in percent. Equals <i>inflexppoin</i> if <i>infdef</i> equals 'Inflation' and $(-1) \cdot \textit{inflexppoin}$ if <i>infdef</i> equals 'Deflation'.

(continued on next page)

Table A.1 (continued).

Variable	Questionnaire	Description
$ \varepsilon_{i,t:t+12} $	<i>infdef</i> (Q:005A) and <i>infexppoint</i> (Q:005B)	Forecast error. Defined as $ \pi_{i,t:t+12} - 0.6$, where 0.6 is the German CPI inflation rate in May 2020.
$\pi_{i,t:t+12}^H$	<i>infexprob_a</i> – <i>infexprob_j</i> (Q:308)	Mean of the histogram forecast for the German inflation rate over the next twelve months. We assume i) that the exterior bins have a width of four percentage points and ii) that the probability mass in each bin is located at the midpoint.
$\sigma_{i,t:t+12}^H$	<i>infexprob_a</i> – <i>infexprob_j</i> (Q:308)	Standard deviation of the histogram forecast for the German inflation rate over the next twelve months.
Qualitative expectations		
<i>infl_exp</i>	<i>expmacroquali_e</i> (Q:004)	Expected development of the German inflation rate over the next twelve months: $\begin{cases} = -1 \text{ if } \textit{expmacroquali_e} \text{ equals 'decrease significantly' or 'decrease slightly',} \\ = 0 \text{ if } \textit{expmacroquali_e} \text{ equals 'stay roughly the same',} \\ = 1 \text{ if } \textit{expmacroquali_e} \text{ equals 'increase slightly' or 'increase significantly'.} \end{cases}$
<i>unemp_exp</i>	<i>expmacroquali_a</i> (Q:004)	Expected development of the German unemployment rate over the next twelve months: $\begin{cases} = -1 \text{ if } \textit{expmacroquali_a} \text{ equals 'decrease significantly' or 'decrease slightly',} \\ = 0 \text{ if } \textit{expmacroquali_a} \text{ equals 'stay roughly the same',} \\ = 1 \text{ if } \textit{expmacroquali_a} \text{ equals 'increase slightly' or 'increase significantly'.} \end{cases}$
Inflation updating		
<i>adj_infl_exp</i>	<i>infexchange1</i> (Q:311A/Q:311B)	Adjustment in inflation expectations over the next twelve months in reaction to unexpected announcement that the Governing Council of the ECB is raising the policy rate by 0.25 (Q:311A)/1.0 (Q:311B) percentage point: $\begin{cases} = -1 \text{ if } \textit{infexchange1} \text{ equals 'lower expected inflation',} \\ = 0 \text{ if } \textit{infexchange1} \text{ equals 'same expected inflation',} \\ = 1 \text{ if } \textit{infexchange1} \text{ equals 'higher expected inflation'.} \end{cases}$

Notes: This table describes the construction of the variables used in the empirical analysis. In the middle column, we refer to the names of the original variables as listed in the questionnaire for Wave 3 of the Bundesbank Online Pilot Survey on Consumer Expectations. Question Q:307 is assigned only to individuals who did not already participate in Wave 2.

Table A.2
Summary statistics for socioeconomic characteristics.

	Obs.	Mean	Std. dev.	Min.	Max.
<i>age</i>	2585	53.01	16.85	16	80
<i>east1989</i>	2583	0.14	0.35	0	1
<i>female</i>	2585	0.42	0.49	0	1
<i>fullemploy</i>	2585	0.43	0.50	0	1
<i>hhszize</i>	2580	2.24	1.08	1	6
<i>homebuy</i>	2584	0.22	0.41	0	1
<i>income</i>	2434	3.06	1.21	0.25	4.75
<i>no_property</i>	2584	0.36	0.48	0	1
<i>yoe</i>	2583	12.23	3.56	7	18

Notes: This table provides summary statistics for the socioeconomic characteristics of the participants in Wave 3 of the Bundesbank Online Pilot Survey on Consumer Expectations. Household income is expressed in 1,000 euro. We consider only responses from households who revealed their information channels of monetary policy.

Table A.3

Regressions of expectations on information channels and lifetime experience: controlling for perceived inflation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\pi_{i,t:t+12 t}$	$ e_{i,t:t+12 t} $	$ e_{i,t:t+12 t} $	$\sigma_{i,t:t+12 t}^H$	$\sigma_{i,t:t+12 t}^H$	<i>infl_exp</i>	<i>infl_exp</i>
<i>traditional</i>	-0.14 (0.16)	-0.25** (0.13)	-0.66*** (0.13)	-0.25 (0.17)	-0.34** (0.17)	-0.00 (0.04)	-0.01 (0.04)
<i>social</i>	0.21 (0.19)	0.06 (0.17)	0.18 (0.17)	0.15 (0.23)	0.18 (0.23)	0.04 (0.06)	0.04 (0.06)
<i>ecb</i>	-0.14 (0.16)	-0.24* (0.14)	-0.21 (0.14)	0.19 (0.25)	0.20 (0.25)	-0.03 (0.06)	-0.03 (0.06)
<i>other</i>	-0.09 (0.14)	0.07 (0.10)	0.05 (0.10)	-0.17 (0.13)	-0.17 (0.13)	-0.00 (0.04)	-0.00 (0.04)
$\bar{\pi}_{i,2019}^H$	0.57 (0.54)	0.22 (0.15)	0.44** (0.18)	-0.58*** (0.14)	-0.56*** (0.14)	0.46*** (0.16)	0.47*** (0.16)
$\pi_{i,t-12:t t}$	0.74*** (0.06)	0.75*** (0.04)		0.17*** (0.04)		0.02** (0.01)	
$\pi_{i,t-12:t t}^R$			0.75*** (0.04)		0.17*** (0.04)		0.02** (0.01)
Constant	0.65 (1.09)	0.43 (0.69)	3.43*** (0.69)	3.81*** (0.99)	4.52*** (0.97)		
Observations	1,289	1,289	1,289	1,264	1,264	1,289	1,289
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
λ	4.00	0.60	1.10	0.00	0.00	4.20	4.20
\bar{R}^2	0.41	0.57	0.57	0.06	0.06	-	-
% corr. pred.	-	-	-	-	-	63.38	63.38
$\Delta P(y = 1 X)$	-	-	-	-	-	15.55	16.02

Notes: Columns (1)–(5) present OLS estimates from regressions of households' quantitative expectations on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Columns (6)–(7) present average marginal effects for an increase (=1) in expected inflation from ordered probit regressions of households' qualitative expectations on information channels, lifetime inflation, and socioeconomic controls. Columns (1), (2), (4), and (6) include perceived inflation as an additional regressor. In Columns (3), (5), and (7) we replace perceived inflation with the residual from Table 3 Column (1). Heteroskedasticity-consistent standard errors are reported in parentheses. The estimation sample in Columns (1)–(3) and (6)–(7) includes respondents with $-12 \leq \pi_{i,t-12:t|t} \leq 12$ and $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Columns (4)–(5) are based on those with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. In the second-to-last row, we report the fraction of correct predictions. In the last row, we report the difference in the predicted probability of stating an increase (=1) in inflation when comparing an individual with experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

Table A.4
Regressions of expectations on information channels and lifetime experience: control variables shown.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\pi_{i,t-12:t t}$	$ e_{i,t-12:t t} $	$\pi_{i,t:t+12 t}$	$\pi_{i,t:t+12 t}$	$\sigma_{i,t:t+12 t}^H$	<i>infl_exp</i>	<i>unemp_exp</i>
<i>traditional</i>	-0.55*** (0.18)	-0.57*** (0.17)	-0.51*** (0.18)	-0.55*** (0.16)	-0.34** (0.13)	-0.03 (0.03)	-0.02 (0.03)
<i>social</i>	0.16 (0.27)	0.15 (0.25)	0.27 (0.22)	0.33* (0.18)	0.54*** (0.20)	0.01 (0.04)	0.05 (0.04)
<i>ecb</i>	0.04 (0.24)	0.17 (0.21)	0.01 (0.19)	-0.11 (0.16)	0.07 (0.17)	-0.06 (0.04)	0.05 (0.04)
<i>other</i>	-0.03 (0.14)	-0.10 (0.13)	0.06 (0.14)	-0.11 (0.14)	-0.09 (0.11)	-0.02 (0.03)	0.07** (0.03)
$\hat{\pi}_{i,2019}^H$	0.30 (0.31)	0.28 (0.28)	0.91 (0.73)	0.99* (0.52)	-0.70*** (0.12)	0.45*** (0.13)	
$\hat{u}_{i,2019}^H$							0.11*** (0.02)
$\pi_{i,t-12:t t}^R$				0.74*** (0.06)			
<i>east1989</i>	0.24 (0.16)	0.20 (0.15)	0.32** (0.14)	0.18 (0.16)	0.09 (0.11)	0.07*** (0.03)	-0.06** (0.02)
<i>female</i>	0.53*** (0.12)	0.64*** (0.11)	0.36*** (0.10)	0.43*** (0.10)	0.21*** (0.08)	0.05** (0.02)	-0.04** (0.02)
<i>fullemploy</i>	-0.16 (0.13)	-0.07 (0.12)	-0.05 (0.12)	-0.04 (0.12)	-0.02 (0.08)	0.08*** (0.02)	0.03 (0.02)
<i>hhszise</i>	0.12* (0.06)	0.12** (0.06)	0.14*** (0.05)	0.12** (0.05)	0.05 (0.04)	0.03*** (0.01)	-0.00 (0.01)
<i>homebuy</i>	-0.05 (0.12)	-0.07 (0.11)	0.04 (0.11)	-0.04 (0.11)	0.01 (0.10)	0.05* (0.02)	-0.01 (0.02)
<i>ln(income)</i>	-0.22 (0.15)	-0.37*** (0.13)	-0.28** (0.12)	-0.24** (0.11)	-0.18** (0.09)	-0.09*** (0.02)	-0.01 (0.02)
<i>no_property</i>	0.57*** (0.14)	0.52*** (0.13)	0.17 (0.11)	0.34*** (0.12)	0.07 (0.09)	-0.01 (0.02)	0.01 (0.02)
<i>yoe</i>	-0.03** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.00 (0.00)	-0.00 (0.00)
Constant	3.96*** (1.11)	3.97*** (1.00)	3.66*** (1.23)	3.32*** (1.02)	5.06*** (0.75)		
Observations	1,309	1,309	2,307	1,289	2,317	2,305	2,306
λ	1.70	1.60	5.10	3.90	0.20	4.40	2.70
\bar{R}^2	0.07	0.09	0.03	0.41	0.04	-	-
% corr. pred.	-	-	-	-	-	61.95	49.96
$\Delta P(y = 1 X)$	-	-	-	-	-	14.47	12.56

Notes: Columns (1)–(5) present OLS estimates from regressions of households’ quantitative expectations on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Column (4) includes the residual from Column (1), $\pi_{i,t-12:t|t}^R$, as an additional covariate. Columns (6)–(7) present average marginal effects for an increase (=1) in the respective dependent variable from ordered probit regressions of households’ qualitative expectations on information channels, lifetime experience, and socioeconomic controls. Heteroskedasticity-consistent standard errors are reported in parentheses. The estimation sample in Columns (1) and (2) includes individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. Columns (3), (6), and (7) include those with $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (4) is based on individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$ and $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (5) includes all individuals. In the second-to-last row, we report the fraction of correct predictions for each qualitative expectation. In the last row, we report the difference in the predicted probability of stating an increase (=1) in the respective dependent variable when comparing an individual with experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

Table A.5

Regressions of expectations on information channels and lifetime experience: results for western Germany.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\pi_{i,t-12:t t}$	$ e_{i,t-12:t t} $	$\pi_{i,t:t+12 t}$	$\bar{\pi}_{i,t:t+12 t}$	$\sigma_{i,t:t+12 t}^H$	$infl_exp$	$unemp_exp$
<i>traditional</i>	-0.59*** (0.20)	-0.61*** (0.19)	-0.39** (0.20)	-0.50*** (0.17)	-0.37*** (0.14)	-0.01 (0.03)	-0.01 (0.03)
<i>social</i>	0.21 (0.30)	0.22 (0.28)	0.18 (0.23)	0.36* (0.21)	0.73*** (0.22)	0.01 (0.05)	0.03 (0.05)
<i>ecb</i>	0.07 (0.27)	0.22 (0.23)	-0.06 (0.20)	-0.10 (0.18)	0.13 (0.18)	-0.05 (0.04)	0.04 (0.04)
<i>other</i>	0.10 (0.16)	0.03 (0.15)	0.14 (0.16)	-0.06 (0.14)	-0.13 (0.11)	-0.02 (0.03)	0.07** (0.03)
$\bar{\pi}_{i,2019}^I$	0.77 (1.20)	0.61 (1.09)	0.75 (0.81)	0.40 (0.26)	-0.76*** (0.14)	0.41*** (0.14)	
$\bar{u}_{i,2019}^I$							0.10*** (0.03)
$\pi_{i,t-12:t t}^R$				0.80*** (0.05)			
Constant	3.28* (1.79)	3.11* (1.63)	3.45*** (1.31)	3.07*** (0.79)	5.09*** (0.78)		
Observations	1,108	1,108	1,972	1,092	1,995	1,970	1,971
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
λ	6.00	6.00	5.20	1.50	0.40	4.40	2.60
\bar{R}^2	0.07	0.10	0.02	0.47	0.05	-	-
% corr. pred.	-	-	-	-	-	60.41	49.67
$\Delta P(y=1 X)$	-	-	-	-	-	13.47	12.80

Notes: Columns (1)–(5) present OLS estimates from regressions of households' quantitative expectations on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Column (4) includes the residual from Column (1), $\pi_{i,t-12:t|t}^R$, as an additional covariate. Columns (6)–(7) present average marginal effects for an increase (=1) in the respective dependent variable from ordered probit regressions of households' qualitative expectations on information channels, lifetime experience, and socioeconomic controls. Heteroskedasticity-consistent standard errors are reported in parentheses. The estimation sample includes only western Germans. Columns (1) and (2) include individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. Columns (3), (6), and (7) include those with $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (4) is based on individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$ and $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (5) includes all individuals. In the second-to-last row, we report the fraction of correct predictions for each qualitative expectation. In the last row, we report the difference in the predicted probability of stating an increase (=1) in the respective dependent variable when comparing an individual with experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

Table A.6

Regressions of expectations on information channels and lifetime experience: employing eastern and western German inflation rates.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\pi_{i,t-12:t t}$	$ e_{i,t-12:t t} $	$\pi_{i,t:t+12 t}$	$\pi_{i,t:t+12 t}$	$\sigma_{i,t:t+12 t}^H$	<i>infl_exp</i>	<i>unemp_exp</i>
<i>traditional</i>	-0.50*** (0.18)	-0.53*** (0.17)	-0.51*** (0.18)	-0.53*** (0.16)	-0.37*** (0.13)	-0.02 (0.03)	-0.02 (0.03)
<i>social</i>	0.11 (0.27)	0.11 (0.25)	0.27 (0.22)	0.30* (0.18)	0.57*** (0.20)	0.01 (0.04)	0.05 (0.04)
<i>ecb</i>	0.06 (0.25)	0.18 (0.21)	0.01 (0.19)	-0.09 (0.16)	0.10 (0.17)	-0.06 (0.04)	0.05 (0.04)
<i>other</i>	-0.03 (0.14)	-0.11 (0.13)	0.06 (0.14)	-0.11 (0.14)	-0.11 (0.11)	-0.02 (0.03)	0.07** (0.03)
$\bar{\pi}_{i,t,2019}^H$	-0.15 (0.16)	-0.13 (0.14)	1.00 (0.95)	0.28 (0.32)	-0.75*** (0.15)	0.56*** (0.21)	
$\bar{u}_{i,t,2019}^H$							0.11*** (0.02)
$\pi_{i,t-12:t t}^R$				0.74*** (0.06)			
Constant	4.53*** (1.08)	4.50*** (0.96)	3.54** (1.43)	4.19*** (0.88)	4.92*** (0.73)		
Observations	1,309	1,309	2,307	1,289	2,317	2,305	2,306
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
λ	0.00	0.00	6.00	2.20	0.70	6.00	2.70
\bar{R}^2	0.07	0.09	0.03	0.41	0.04	–	–
% corr. pred.	–	–	–	–	–	61.95	49.96
$\Delta P(y = 1 X)$	–	–	–	–	–	11.92	13.27

Notes: Columns (1)–(5) present OLS estimates from regressions of households' quantitative expectations on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Column (4) includes the residual from Column (1), $\pi_{i,t-12:t|t}^R$, as an additional covariate. Columns (6)–(7) present average marginal effects for an increase (=1) in the respective dependent variable from ordered probit regressions of households' qualitative expectations on information channels, lifetime experience, and socioeconomic controls. Heteroskedasticity-consistent standard errors are reported in parentheses. The estimation sample in Columns (1) and (2) includes individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. Columns (3), (6), and (7) include those with $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (4) is based on individuals with $-12 \leq \pi_{i,t-12:t|t} \leq 12$ and $-12 \leq \pi_{i,t:t+12|t} \leq 12$. Column (5) includes all individuals. In the second-to-last row, we report the fraction of correct predictions for each qualitative expectation. In the last row, we report the difference in the predicted probability of stating an increase (=1) in the respective dependent variable when comparing a western German individual with experience at the 95th percentile with a western German individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

Table A.7
Regressions of expectations on information channels and lifetime experience: robustness checks.

	(1)	(2)	(3)	(4)	(5)	(6)
	$\pi_{i,t:t+12 t}^H$	$\pi_{i,t:t+12 t}^H$	ERPS _{<i>i,t:t+12 t</i>}	$\sigma_{i,t:t+12 t}^H$	<i>infl_exp</i> ^{imp}	<i>infl_exp</i>
<i>traditional</i>	-0.46** (0.21)	-0.41* (0.25)	-0.05** (0.03)	-0.33** (0.13)	0.01 (0.04)	-0.03 (0.03)
<i>social</i>	0.24 (0.26)	-0.42 (0.28)	0.10** (0.04)	0.54*** (0.20)	0.05 (0.05)	0.01 (0.04)
<i>ecb</i>	-0.04 (0.22)	-0.09 (0.23)	0.00 (0.03)	0.10 (0.17)	-0.03 (0.05)	-0.06 (0.04)
<i>other</i>	0.06 (0.14)	-0.03 (0.17)	-0.01 (0.02)	-0.10 (0.11)	-0.02 (0.04)	-0.02 (0.03)
$\bar{\pi}_{i,2019}^H$	0.25 (0.16)	0.09 (0.19)	-0.15*** (0.02)		0.07** (0.04)	1.44*** (0.56)
<i>vol</i> _{<i>i,2019</i>} ^H				-51.76*** (9.03)		
$\pi_{i,t-12:t t}^R$		0.54*** (0.06)				
Constant	3.25*** (0.99)	3.93*** (1.10)	1.01*** (0.14)	16.61*** (2.32)		
Observations	2,317	1,264	2,317	2,317	1,289	2,305
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Cohort dummies	No	No	No	No	No	Yes
λ	0.00	0.00	0.20	4.10	0.00	4.50
\bar{R}^2	0.03	0.21	0.04	0.05	-	-
% corr. pred.	-	-	-	-	44.14	61.87
$\Delta P(y = 1 X)$	-	-	-	-	8.45	41.18

Notes: Columns (1)–(4) present OLS estimates from regressions of households’ quantitative expectations on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Columns (1)–(2) present the estimates for the histogram means. Column (2) includes the residual from Table 3 Column (1) as an additional regressor. In Column (3), we use the ‘expected ranked probability score’ of Krüger and Pavlova (2020) as an alternative measure of inflation uncertainty. In Column (4), we replace inflation experience with volatility experience. Volatility experience is defined as the optimally-weighted average over annual standard deviations of monthly year-on-year inflation rates. Columns (5)–(6) present average marginal effects for an increase (=1) in expected inflation from ordered Probit regressions of households’ qualitative expectations on information channels, lifetime inflation, and socioeconomic controls. In Column (5), we construct a qualitative measure of expected inflation changes based on the difference $\pi_{i,t:t+12|t} - \pi_{i,t-12:t|t}$. In Column (6), we use the qualitative measure from the survey questionnaire and add dummy variables for age cohorts. Heteroskedasticity-consistent standard errors are reported in parentheses. The estimation sample in Columns (1), (3), and (4) includes all individuals. Column (2) is restricted to those with $-12 \leq \pi_{i,t-12:t|t} \leq 12$. Column (5) focuses on those with $-12 \leq \pi_{i,t-12:t|t} \leq 12$ and $-12 \leq \pi_{i,t:t+12|t} \leq 12$, while Column (6) includes those with $-12 \leq \pi_{i,t:t+12|t} \leq 12$. In the second-to-last row, we report the fraction of correct predictions for each qualitative expectation. In the last row, we report the difference in the predicted probability of stating an increase (=1) in the respective dependent variable when comparing an individual with experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.
 **Indicate significance at the 5% critical level.
 ***Indicate significance at the 1% critical level.

Table A.8

Regressions of inflation updating on information channels and lifetime inflation: control variables shown.

	(1)	(2)	(3)
	WT+ST	<i>adj_infl_exp</i>	
	WT	WT	ST
<i>traditional</i>	-0.65 (2.38)	-2.90 (3.31)	1.44 (3.43)
<i>social</i>	-0.86 (3.73)	2.07 (5.45)	-2.15 (5.28)
<i>ecb</i>	-6.12* (3.13)	-4.85 (4.34)	-7.55* (4.46)
<i>other</i>	3.62 (2.43)	6.16* (3.64)	1.02 (3.28)
$\bar{\pi}_{t,2019}^H$	8.27*** (2.80)	8.19** (3.57)	9.55** (4.66)
<i>east1989</i>	3.66 (2.41)	-2.15 (2.99)	10.29*** (3.76)
<i>female</i>	0.07 (1.67)	0.10 (2.28)	0.22 (2.45)
<i>fullemploy</i>	0.84 (1.79)	1.05 (2.40)	1.57 (2.71)
<i>hhsz</i>	-0.27 (0.93)	0.42 (1.24)	-0.97 (1.41)
<i>homebuy</i>	-2.32 (2.15)	0.70 (2.93)	-5.31* (3.13)
$\ln(\text{income})$	-1.10 (2.02)	-2.67 (2.63)	0.33 (2.99)
<i>no_property</i>	-2.29 (1.87)	-0.38 (2.47)	-4.18 (2.86)
<i>yoe</i>	0.43* (0.24)	0.35 (0.33)	0.52 (0.35)
Observations	2,295	1,150	1,145
λ	0.10	0.00	0.40
% corr. pred.	46.14	50.26	42.79
$\Delta P(y = 1 X)$	8.84	9.06	9.05

Notes: This table presents average marginal effects for an increase (=1) in *adj_infl_exp* from ordered probit regressions of households' inflation updating on their sources of information about monetary policy, lifetime experience, and socioeconomic characteristics. Heteroskedasticity-consistent standard errors are reported in parentheses. The reported average marginal effects and standard errors are the estimated ones times 100. The estimation sample includes individuals with $-12 \leq \pi_{t,t+12|t} \leq 12$. In the second-to-last row, we report the fraction of correct predictions. In the last row, we report the difference in the predicted probability of stating an increase (=1) in *adj_infl_exp* when comparing an individual with inflation experience at the 95th percentile with an individual with experience at the 5th percentile.

*Indicate significance at the 10% critical level.

**Indicate significance at the 5% critical level.

***Indicate significance at the 1% critical level.

References

- Andre, P., Pizzinelli, C., Roth, C., Wohlfart, J., 2019. Subjective models of the macroeconomy: Evidence from experts and a representative sample. CESifo Working Paper 7850.
- Bachmann, R., Berg, T.O., Sims, E.R., 2015. Inflation expectations and readiness to spend: Cross-sectional evidence. *Am. Econ. J. Econ. Policy* 7 (1), 1–35.
- Bilbiie, F.O., 2018. Neo-Fisherian Policies and Liquidity Traps. CEPR Discussion Paper 13334.
- Binder, C., 2017. Fed speak on main street: Central bank communication and household expectations. *J. Macroecon.* 52, 238–251.
- Binder, C., 2018. Panel conditioning in the survey of consumer expectations. Mimeo.
- Bruine de Bruin, W., van der Klaauw, W., Downs, J.S., Fischhoff, B., Topa, G., Amantier, O., 2010. Expectations of inflation: The role of demographic variables, expectation formation, and financial literacy. *J. Consum. Aff.* 44 (2), 381–402.
- Bundesbank, 2019. The relevance of surveys of expectations for the Deutsche Bundesbank. *Monthly Report* 12/19.
- Candia, B., Coibion, O., Gorodnichenko, Y., 2020. Communication and the beliefs of economic agents. NBER Working Paper 27800.
- Coibion, O., Georganakos, D., Gorodnichenko, Y., van Rooij, M., 2019a. How does consumption respond to news about inflation? Field evidence from a randomized control trial. NBER Working Paper 26106.
- Coibion, O., Georganakos, D., Gorodnichenko, Y., Weber, M., 2020. Forward guidance and household expectations. NBER Working Paper 26778.
- Coibion, O., Gorodnichenko, Y., Weber, M., 2019b. Monetary policy communications and their effects on household inflation expectations. NBER Working Paper 25482.
- Conrad, C., Hartmann, M., 2019. On the determinants of long-run inflation uncertainty: Evidence from a panel of 17 developed economies. *Eur. J. Political Econ.* 56, 233–250.
- D'Acunto, F., Hoang, D., Paloviita, M., Weber, M., 2019a. Human frictions in the transmission of economic policy. KIT Working Paper 128.
- D'Acunto, F., Hoang, D., Paloviita, M., Weber, M., 2020a. Effective policy communication: Targets versus instruments. BFI Working Paper No 2020-148.
- D'Acunto, F., Hoang, D., Weber, M., 2020b. Managing households' expectations with unconventional policies. NBER Working Paper 27399.
- D'Acunto, F., Malmendier, U., Ospina, J., Weber, M., 2019b. Exposure to daily price changes and inflation expectations. NBER Working Paper 26237.
- D'Acunto, F., Malmendier, U., Weber, M., 2020c. Gender roles and the gender expectations gap. NBER Working Paper 26837.
- Dräger, L., Nghiem, G., 2020. Are consumers' spending decisions in line with an Euler equation? *Rev. Econ. Stat.* 103 (3), 580–596.
- Eminidou, S., Zachariadis, M., Andreou, E., 2020. Inflation expectations and monetary policy surprises. *Scand. J. Econ.* 122 (1), 306–339.
- Enders, Z., Hünnekes, F., Müller, G.J., 2019. Monetary policy announcements and expectations: Evidence from German firms. *J. Monet. Econ.* 108, 45–63.
- Glas, A., 2020. Five dimensions of the uncertainty–disagreement linkage. *Int. J. Forecast.* 36 (2), 607–627.
- Goldfayn-Frank, O., Wohlfart, J., 2020. Expectation formation in a new environment: Evidence from the German reunification. *J. Monet. Econ.* 115, 301–320.
- Jonung, L., 1981. Perceived and expected rates of inflation in Sweden. *Am. Econ. Rev.* 71 (5), 961–968.
- Krueger, A.B., Blinder, A., 2004. What does the public know about economic policy, and how does it know it? *Brook. Pap. Econ. Activ.* 327–397.
- Krüger, F., Pavlova, L., 2020. Quantifying subjective uncertainty in survey expectations. Working Papers of the Priority Programme 1859 “Experience and Expectation. Historical Foundations of Economic Behaviour”, No 14..
- Kumar, S., Afrouzi, H., Coibion, O., Gorodnichenko, Y., 2015. Inflation targeting does not anchor inflation expectations: Evidence from firms in New Zealand. *Brook. Pap. Econ. Activ.* 151–223.
- Lagarde, C., 2020. Hearing at the committee on economic and monetary affairs of the European Parliament.
- Lamla, M.J., Lein, S.M., 2014. The role of media for consumers' inflation expectation formation. *J. Econ. Behav. Organ.* 106, 62–77.
- Lamla, M.J., Vinogradov, D.V., 2019. Central bank announcements: Big news for little people? *J. Monet. Econ.* 108, 21–38.
- Malmendier, U., Nagel, S., 2011. Depression babies: Do macroeconomic experiences affect risk taking? *Q. J. Econ.* 126 (1), 373–416.
- Malmendier, U., Nagel, S., 2016. Learning from inflation experiences. *Q. J. Econ.* 131 (1), 53–87.
- Mertens, K., Lewis, D.J., Makridakis, C., 2020. Do monetary policy announcements shift household expectations?. CEPR Discussion Paper 14360.
- SOEP-IS Group, 2017. SOEP-IS 2015.1-PGEN: Person-related status and generated variables. SOEP Survey Papers 462: Series D - Variable Descriptions and Coding, DIW Berlin/SOEP, Berlin.
- Uribe, M., 2021. The neo-Fisher effect: Econometric evidence from empirical and optimizing models. *Am. Econ. J. Macroecon.* Forthcoming.
- van der Cruysen, C., Jansen, D.-J., de Haan, J., 2015. How much does the public know about the ECB's monetary policy? Evidence from a survey of Dutch households. *Int. J. Cent. Bank.* 11 (4), 169–218.
- Vellekoop, N., Wiederholt, M., 2019. Inflation expectations and choices of households. Mimeo.