



**BERLIN SCHOOL OF ECONOMICS**  
*DISCUSSION PAPERS*

## **Discussion Paper #34**

March 2024

# **Better than Perceived? Correcting Misperceptions about Central Bank Inflation Forecasts**

Muhammed Bulutay

# Better than Perceived? Correcting Misperceptions about Central Bank Inflation Forecasts\*

Muhammed Bulutay<sup>1</sup>

<sup>1</sup>Faculty of Economics and Management, Technische Universität Berlin

March 11, 2024

[Click here for the latest version](#)

## Abstract

How do households perceive the forecasting performance of the central bank? Using two novel experiments embedded in the Bundesbank's Survey on Consumer Expectations (total  $N = 9500$ ), this article shows that the majority of German households underestimate the ECB's inflation forecasting accuracy. In particular, they believe that the ECB is overly optimistic. Communication that challenges these perceptions improves the anchoring of inflation expectations, reduces inflation uncertainty and discourages consumption of durable goods. Treated households also report higher trust in the ECB, perceive the ECB's inflation target as more credible, the ECB's communication as more honest, and the ECB's policy as more beneficial to them. Finally, the causal effect of central bank trust on inflation expectations is quantified using instruments to deal with endogeneity.

**Keywords** Inflation Expectations, Central Bank Trust, Inflation Forecasts, Central Bank Communication, Information Provision Experiments

**JEL Classification** C83 · D91 · E71

---

\*Corresponding author: m.bulutay@tu-berlin.de. I would like to thank Francesco Capozza, Felix Chopra, Peter Duersch, Frank Heinemann, Nicolas Jacquemet, Tobias Schmidt, Stefan Trautmann, Georg Weizsäcker, Johannes Wohlfart, and the participants of the workshops and conferences in Heidelberg, Barcelona, Bamberg, Berlin, Fürth, and Oxford for their insightful comments. The experiment has been approved by the Ethics Committee Faculty VII TU Berlin. Pre-registrations of the experiments reported here can be found in AsPredicted #107388 and #145978.

# 1 Introduction

Central banks publish their macroeconomic forecasts not only to inform the public about the future of the economy, but also to manage expectations. However, disagreements about the future persist between central banks and private agents. For central banks, disagreement is particularly troubling when it comes to future inflation, because inflation expectations can translate into inflation and deanchoring can hinder the transmission of monetary policy. For private agents, it is inefficient not to adopt the central bank’s inflation forecast because forming personal forecasts is costly in terms of time and resources.<sup>1</sup>

Could the inflation disagreement between central banks and private agents be explained by the latter underestimating the former’s forecasting ability and therefore relying on their own assessments? Recent research shows that the public pays more attention to inflation news when inflation is high and volatile (Weber et al., 2023; Pfäuti, 2023; Korenok et al., 2023). Thus, larger forecast errors may be overweighted when people try to think about forecast accuracy. If so, the public’s perception of the central bank’s accuracy may be biased toward an underestimation of accuracy. Central banks should correct such possible misperceptions in order to better influence inflation expectations. Public perception is also crucial for the independence of central banks (Ehrmann and Fratzscher, 2011).

This article uses two novel survey modules to (i) measure German households’ beliefs about the ECB’s inflation forecasting accuracy and (ii) test the causal effect of central bank communication on any misperceptions. These modules are integrated into the Deutsche Bundesbank’s Survey on Consumer Expectations in two waves in 2022 and 2023, when inflation was high and volatile. Both modules include pre-registered experiments that exogenously vary information sets and thus show the causal effect of information on private expectations.

The first experiment, conducted in September 2022, elicits beliefs about the overall accuracy of the ECB’s inflation forecasts up to the time of the survey. Participants are then randomly assigned to receive treatment-specific information. While all treatment groups (except the control group) are informed about the ECB’s most recent medium-term inflation forecast, some are also informed about the average accuracy of past inflation forecasts. Thanks to the random assignment, one can estimate the causal effect of being exposed to correct information about the ECB’s

---

<sup>1</sup>Furthermore, previous research shows that central banks have an information advantage over private agents, especially in times of high uncertainty (Gavin and Mandal, 2003; El-Shagi et al., 2016). See Binder and Sekkel (2023) for a review of the literature on central bank forecasts.

inflation forecast accuracy on variables measured later in the survey, such as inflation expectations, consumption plans, and trust in the ECB.

The results show that only 13% of German households believe that the ECB's forecasts are as accurate as they actually are. A larger share (21%) believes that the average absolute forecast error is larger than the largest forecast error ever made by the ECB. Cross-sectional correlations show that the underestimation of the ECB's forecasting accuracy is negatively related to self-reported trust in the ECB, even after controlling for a rich set of covariates, including education. Thus, these misperceptions cannot be explained by illiteracy or misunderstanding alone and seem to reflect trust in the ECB.

Information about the accuracy of past forecasts lowers inflation expectations, reduces uncertainty about future inflation, promotes trust in the ECB, and discourages the consumption of certain goods, such as major items (e.g., cars, furniture) and clothing. Using instrumental variable estimation to account for endogeneity, I identify the causal relationship between trust in the ECB and inflation expectations. This analysis shows that the information shifts inflation expectations through its effect on trust in the ECB. In terms of marginal effects, a one standard deviation increase in trust in the ECB reduces inflation expectations by 5.3% to 8.5% and inflation uncertainty by 2.4% to 7.1%.

The second experiment takes place one year after the first, in September 2023. This time, respondents are asked to report their short-term inflation expectations and to guess the ECB's one-year-ahead forecast for the same inflation. These two responses make it possible not only to document possible misperceptions, but also to identify the source and expected direction of the error. Later, respondents are provided with information on the current inflation rate in the euro area and/or the ECB's inflation forecast. After the information phase, the survey measures trust in the ECB, but in an indirect way. Instead of asking how much the respondent trusts the ECB on a scale of 0 to 10, as in the previous experiment and as is common in the literature, the question elicits the degree of agreement with six statements. These statements capture different facets of central banking related to trust, including the honesty of the ECB's communication, the credibility of the inflation target, the inclusiveness of monetary policy, and the adherence to the mandate. Thus, the question measures trust without actually using the term trust and with more granularity.<sup>2</sup>

---

<sup>2</sup>This approach also provides a way to harmonize the results in this literature, as it is not clear what is reported in response to "trust in the central bank" questions. Different studies also use different wording. While most studies ask respondents to indicate their trust in the central bank on a scale of 0 to 10 (Christelis et al., 2020), some mention specific characteristics such as "trust in the ability to achieve price stability" (Hoffmann et al., 2022) or trust in the central bank "to care about the economic well-being of all (citizens)" (D'Acunto et al., 2021).

A majority of respondents (62%) believe that the ECB’s inflation forecast will undershoot actual inflation, reflecting a belief in the ECB’s optimism. While 19% believe in the opposite deviation (i.e. pessimism), another 19% think that the ECB’s forecast will be exactly right. Cross-sectional correlations again show that these beliefs reflect trust in the ECB. Using self-reported trust in the ECB from an earlier question in the same wave of the survey, I show that those who believe the ECB is optimistic report 0.24 standard deviations less trust in the ECB. However, beliefs about pessimism are not significantly correlated with self-reported trust in the ECB. Thus, optimism in forecasts seems to be more dangerous for a central bank’s reputation than pessimism.

Information treatments change public opinion about the ECB. Respondents who receive information about the actual inflation forecast report higher trust in the ECB, as measured by the average agreement with the six statements. However, information about the current inflation rate does not significantly affect agreement with statements and even neutralizes the positive effect of information about the forecast.<sup>3</sup> Regarding the subscales, the results show that the positive effect of information on public opinion is strongest for the credibility of the inflation target. Respondents report stronger agreement with the statement that the ECB will ensure price stability within three years. In addition to credibility, information also improves the perceived honesty of the ECB’s communication, and better convinces respondents of the benefits of the ECB’s policy for their household.

This study contributes to the literature that examines the effects of macroeconomic information on households’ inflation expectations (Armantier et al., 2016; Cavallo et al., 2017; Binder and Rodrigue, 2018; Coibion et al., 2022; Kostyshyna and Petersen, 2024), consumption decisions (Roth and Wohlfart, 2020; Dräger et al., 2022; Coibion et al., 2023), and attitudes toward the central bank (Bholat et al., 2019; D’Acunto et al., 2021; Brouwer and de Haan, 2022; Dräger and Nghiem, 2023; Ehrmann et al., 2023; Méon and Hayo, 2023; Ash et al., 2024). In summary, trust in (the credibility of) the central bank turns out to be a very sticky variable in terms of the response to information interventions. In a closely related study, McMahon and Rholes (2024) conduct an online experiment and introduce exogenous variation in the forecast accuracy of a hypothetical central bank. They find that forecast accuracy systematically affects the credibility of a central bank. The results presented here complement the findings of this literature by demonstrating the benefits of informing the public about forecast accuracy and by highlighting the caveats of such

---

<sup>3</sup>At the time of the experiment, inflation was already below the ECB’s one-year-ahead inflation forecast of 6.3%. This information may have revealed significant forecast errors, albeit in the opposite direction of respondents’ initial beliefs.

a communication campaign. To the best of my knowledge, this is the first study to document beliefs about a central bank’s forecasts.

Second, my results contribute to the literature that investigates the implications of trust in central banks for monetary policy. Using dynamic general equilibrium models, the previous literature shows that trust in central banks matters for the transmission of monetary policy through its influence on expectations and risk attitudes (Bursian and Faia, 2018; Hommes and Lustenhouwer, 2019; Haldane et al., 2020). Besides these models, several studies use household surveys to show the causal effect of central bank trust on inflation expectations through instrumental variable estimation (Mellina and Schmidt, 2018; Christelis et al., 2020). Using a similar analysis, I find a very similar quantitative relationship between trust and inflation expectations. Monetary authorities can use these measures to assess the importance of trust for inflation expectations.

Finally, the results presented here are related to the growing literature that intervenes in misperceptions about economic facts. Recent evidence includes misperceptions about outside options in the labor market (Jäger et al., 2022), public debt (Roth et al., 2022), returns to active investment (Haaland and Naess, 2023), or the gender wage gap (Settele, 2022). These studies typically show that large segments of society are uninformed or misinformed. Information interventions show that correcting these misperceptions on seemingly niche topics has a significant return in terms of beliefs, decisions, and policy demand.

## 2 First Experiment

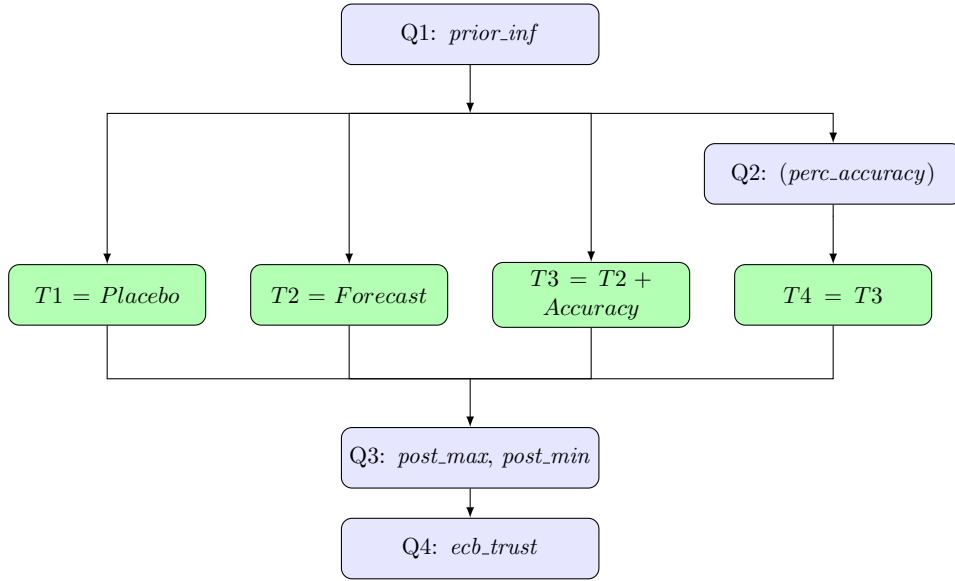
This section describes an information provision experiment that aims to generate exogenous variation in information sets. The experiment is implemented in the September 2022 wave of the Bundesbank Online Panel - Households (BOP-HH) survey. This survey, which has been running monthly since 2019, elicits the perceptions and expectations of about 2000-6000 households in Germany on variables such as inflation, house prices, and income, as well as consumption plans, policy preferences, and so on. Table C.1 in the appendix summarizes the demographic profile of the sample.

### 2.1 Design and Implementation

#### 2.1.1 Design

The experiment consists of four stages. These stages are shown in Figure 1. In the first stage, inflation expectations in the euro area for the calendar year 2024 are

**Figure 1:** Flow of the first experiment



*Notes:* The graph shows the timeline of the first experiment. The blue boxes show the questions with their labels. The green boxes show the information treatments with their labels.

elicited by the following question:

*”What do you think the rate of inflation or deflation in the euro area will roughly be in 2024?”*

If the respondent expects deflation, they enter a negative value. Answers to this question are coded as *prior\_inf*.<sup>4</sup> After this stage, respondents answer a series of questions about their income and house prices in the core of the survey. At the end of these questions, respondents enter the second stage to receive information. They are randomly assigned to one of four treatment conditions. These treatments are referred to as T1, T2, T3, and T4. There is a higher probability of assignment (30%) for T2 and T4 because they are the main treatments.

The first group (T1) serves as an active control group. Respondents are given a placebo information, which is the population growth rate in Germany (2% between 2010-21). This serves as a remedy for numerical anchoring bias, as the information in the other groups is numerically similar.

The remaining groups receive a text with information about the ECB’s inflation forecast. All start with an introductory text explaining the frequency of the forecasts and their relevance for the Governing Council’s decision-making process. In addition, the groups receive treatment-specific information.

---

<sup>4</sup>The original German texts, along with all other experimental material, can be found in the Appendix A.

The second group (T2) is informed of the ECB’s inflation forecast for 2024, as announced in the September 2022 press release, with the following text

*”This September, the ECB projected a decline in annual euro area inflation to 2.3% by the end of 2024”.*

The last two groups (T3 and T4) are also informed of the ECB’s inflation forecast, but the same text includes the following additional information:

*”The ECB’s projections for the euro area inflation rate deviated by less than one percentage point on average from the actual inflation rates in the period from 2001 (when the projections began) to 2021.”*

So there is no difference between T3 and T4 in terms of the information provided. The difference is in the implementation. Respondents in T4 are asked to indicate their beliefs about past forecast accuracy immediately before being shown the true answer, while respondents in T3 are only shown the information. The following question is used to elicit beliefs about past forecast accuracy:

*”By how much do you think the ECB’s projections deviated on average from the actual inflation rates in the period from 2001 (when the projections began) to 2021? Please give your best estimate.”*

The options provide four ranges between ”0-1 percentage point (pp)”, ”1-2 pp”, ”2-3 pp”, and ”3 pp or more”.<sup>5</sup> Responses are coded with *perc\_inaccuracy*.

Immediately after reading the treatment-specific information in the second stage, respondents are again asked to form expectations about the euro area inflation rate in 2024. The question asks

*”What are the minimum and maximum values you think the inflation rate or deflation rate could have in the euro area in 2024?”*

The answers are coded with *post\_min* and *post\_max* and used to infer two key moments. The difference  $post\_max - post\_min$  is used as a proxy for the variance of expectations (i.e., inflation uncertainty) and is coded as *inf\_unc*. The midpoint of *post\_max* and *post\_min* is used as a proxy for the point expectation and is coded as *post\_inf*.<sup>6</sup>

---

<sup>5</sup>The choice of ranges is motivated by two factors. First, households typically round their responses to whole numbers, especially when they are very uncertain (Binder, 2017). The closest whole numbers to the correct answer are 0 and 1, hence ”0-1 pp”. There are four ranges to ensure that respondents do not heuristically choose the middle range.

<sup>6</sup>Although the midpoint is at best a noisy proxy for the point expectation, this assumption has no downside for treatment effect analyses as long as the measurement error is orthogonal to the treatment assignment.



The final stage of the module elicits respondents' trust in institutions on a scale of 0-10, where 0 indicates "no trust at all" and 10 indicates "absolute trust". I elicit trust in five institutions. These are the ECB, the Federal Government, the Court of Justice of the European Union (CJEU), the Bundesbank, and media enterprises (presented in random order and coded *name\_trust*). Such a formulation reduces the experimental demand effect through obfuscation. In addition, two of the institutions (the CJEU and media enterprises) will serve as instruments in an instrumental variable estimation (see section 2.2.3).

### 2.1.2 Procedures and Data Selection

A total of 5527 respondents participated in the September 2022 wave of the survey. Invitations are sent between 15-29 September 2022, shortly after the release of the ECB's inflation forecasts on 8 and 9 September. Euro area inflation stood at 9.1% in August 2022 and has not yet peaked.

Using pre-registered exclusion criteria (see AsPredicted #107388), I drop respondents who chose not to answer (N=63) or chose the "Do not know" option (N=300) to at least one question in the module (except *perc\_inaccuracy* question). I also exclude respondents who expect the maximum inflation rate to be the same as the minimum (N=198). Finally, 185 respondents who spent more than 2 hours in stages (2)-(3) or less than 3 seconds in the information provision stage are excluded from the sample to ensure data quality. This leaves 4863 respondents for the analysis. Inflation expectations are further winsorized at the 5th/95th percentiles to reduce the impact of outliers.<sup>7</sup>

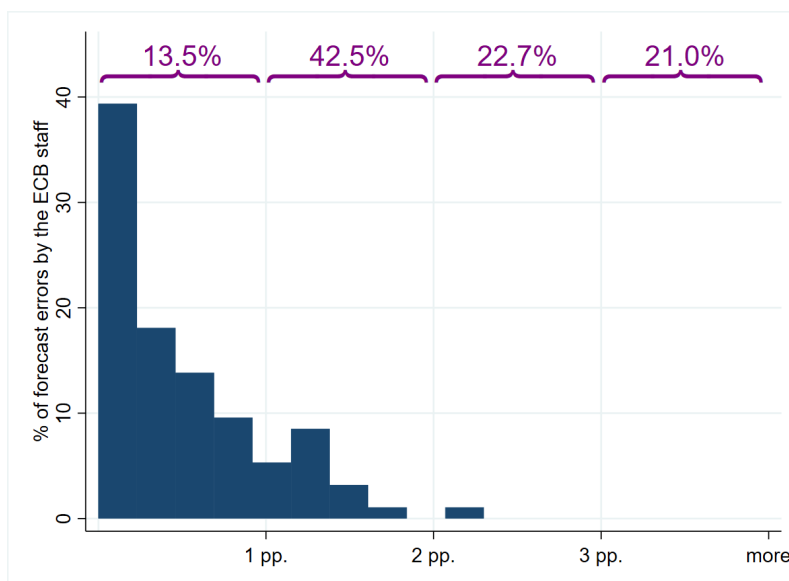
## 2.2 Results

This section presents the results of the first experiment. Two predictions are pre-registered:

1. Correcting misperceptions about the ECB's forecast accuracy increases trust in the ECB.
2. Trust mediates the impact of information on inflation expectations.

The Appendix B presents a simple model framework that can be used to organize these predictions.

**Figure 2:** Distribution of absolute forecast errors by the ECB staff (bars) vs. share of respondents who believe the average absolute forecast error lies within the covered range (percentages)



*Notes:* The bars show the distribution of forecast errors, as measured by the absolute difference between the ECB staff forecasts (i.e. excluding the Eurosystem forecasts) and realizations. The number above braces refers to the proportion of respondents in T4 group who believe that the average absolute forecasts error is within the range covered by the brace ( $N = 1440$ ). The last brace covers  $> 3$ . Data for forecasts cover the period from March 2001 to September 2021. Source: Author's calculation based on Eurostat data.

### 2.2.1 Perceived vs. Objective Forecast Accuracy

The *perc.inaccuracy* data from the fourth treatment can be used to document the extent of misperception in the entire sample, since the question is asked before treatment assignment. Figure 2 compares *perc.inaccuracy* with actual data, as shown by the distribution of absolute forecast errors over all forecasts. On the one hand, only 13.5% of respondents think that the average absolute forecast error is in the range "0-1 pp", while 77 of the calculated absolute errors out of 94 inflation forecasts are actually in this range. On the other hand, at least 21% of the sample believe that the average absolute forecast error is larger than the maximum error made by the ECB over this period (2.3 pp). Taken together, these facts suggest that German households significantly underestimate the ECB's forecast accuracy.

Could it be that the responses to *perc.inaccuracy* are due to misunderstanding or noise? Three observations suggest that this is not the case. First, only 3 respondents choose the "do not know" option in response to this question, significantly fewer than the usual number in the survey for the other questions. Second, the distribution of *perc.inaccuracy* is asymmetric, which is difficult to reconcile with random responses. Third, the correlation between responses to *perc.inaccuracy* and *ecb\_trust* is strong

<sup>7</sup>To illustrate, there are 65 respondents (1.3% of the final sample) who expect deflation or an inflation rate above 40% pre-information.

even after controlling for demographic covariates including education (see Table C.2 in the Appendix). Taken together, confusion does not appear to be the main source of variation in *perc\_inaccuracy*.

### 2.2.2 Treatment Effects on Inflation Expectations

How does correcting misperceptions with information affect the subjective distribution of inflation expectations? To measure the treatment effects on the revision of point expectations, I run the following regression:

$$\underbrace{post\_inf_i - prior\_inf_i}_{revision_i} = \beta_0 + \beta_1 \times (2\% - prior\_inf_i) + \sum_{j=2}^4 \beta_j \times treat_{j,i} \times (2.3\% - prior\_inf_i) + \varepsilon_i \quad (1)$$

where the revision in inflation expectations is explained by the difference between the signal (2% in T1, 2.3% in others) and the prior and its interaction with the treatment. The regressors  $treat_{j,i}$  are dummy variables that take the value one if the observation is in treatment  $j$ . This specification follows from the Bayesian updating framework, where the posterior belief is the weighted average of the prior and the signal:

$$post = \omega \times signal + (1 - \omega) \times prior.$$

With respect to the equation (1),  $\omega_j = \beta_1 + \beta_j$ . Thus, the parameters  $\beta_j$  measure treatment-specific learning rates, while  $\beta_0$  and  $\beta_1$  reflect mismeasurement due to different question formats, experimenter demand, anchoring, etc. The main tests are  $H_0 : \hat{\beta}_4 - \hat{\beta}_2 = 0$  and  $H_0 : \hat{\beta}_3 - \hat{\beta}_2 = 0$ .

To test the effect of the treatments on inflation uncertainty, I estimate the following regression:

$$inf\_unc_i = \alpha_1 + \sum_{j=2}^4 \alpha_j \times treat_{j,i} + \varepsilon_i \quad (2)$$

where inflation uncertainty is explained by the treatment indicators. Similarly, the main tests are  $H_0 : \hat{\alpha}_4 - \hat{\alpha}_2 = 0$  and  $H_0 : \hat{\alpha}_3 - \hat{\alpha}_2 = 0$ .

Table 1 reports the regression estimates. Three results emerge. First, respondents in all treatment conditions learn from the information they are given and express lower uncertainty relative to the control condition. Second, T4 works better than T2 in terms of leading to more revision (t-stat= 1.74,  $p$ -value= 0.082) and decreasing uncertainty across treatments (t-stat= -3.46,  $p$ -value= 0.001). Third, T3 does not significantly affect either the revision of inflation expectations or inflation un-

certainty compared to T2. Thus, the forecast accuracy information is only effective when the misperceptions are "explicitly" revealed.<sup>8</sup>

**Table 1:** Treatment effects on learning and uncertainty

	(1) <i>revision</i> ( $\beta_j$ )	(2) <i>inf_unc</i> ( $\alpha_j$ )
T2 (= <i>Forecast</i> )	0.219*** (0.019)	-1.152*** (0.148)
T3 (= <i>T2 + Accuracy</i> )	0.209*** (0.022)	-1.293*** (0.158)
T4 (= <i>T3 + Question</i> )	0.253*** (0.019)	-1.567*** (0.145)
$\beta_1, \alpha_1$	0.352*** (0.017)	6.418*** (0.119)
$\beta_0$	1.706*** (0.067)	– (–)
$N$	4863	4863
$R^2$	0.35	0.03

*Notes:* Regression results based on equations (1) and (2) are reported in columns (1) and (2), respectively. Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

### 2.2.3 Information, Trust, and Inflation Expectations

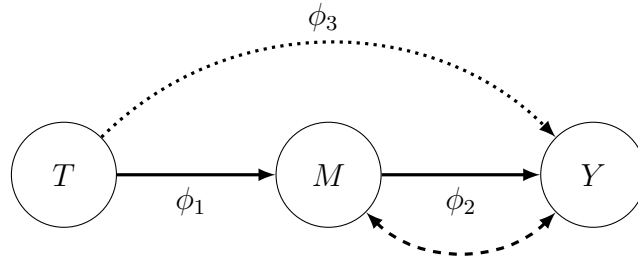
In this section, I examine the effect of information treatments on trust in the ECB and the quantitative relationship between trust and inflation expectations. Figure 3 illustrates the proposed causal chain between these three variables using a directed acyclic graph, which amounts to a mediation framework. Causal identification of the parameters  $\phi_1$  and  $\phi_2$  shown in Figure 3 with the standard mediation analysis of Baron and Kenny (1986) is problematic in the presence of confounders and endogeneity (Bullock et al., 2010; Imai et al., 2011; Acharya et al., 2016). Instrumental variables (IVs) can be used to identify the causal effects (Imai et al., 2011). The following two-stage least squares (2SLS) estimation can be used to estimate  $\phi_1$ ,  $\phi_2$ , and  $\phi_3$ :

$$M_i = \zeta + \phi_1 T + \rho Z_i + \mathbf{X}\mathbf{B} + \epsilon_{i2}, \quad (3)$$

$$Y_i = \psi + \phi_3 T + \phi_2 \widehat{M}_i + \mathbf{X}\mathbf{B} + \epsilon_{i1} \quad (4)$$

<sup>8</sup>These results are robust to the inclusion of demographic control variables and to non-winsorization of the data (see Table C.4 in the Appendix).

**Figure 3:** Directed acyclic graph showing the causal mechanisms



Notes:  $T$ : information (treatment),  $M$ : *ecb\_trust* (mediator), and  $Y$ : *post\_inf* or *inf\_unc* (outcome). Solid lines refer to the causal mechanisms of interest, the dotted line refers to the direct effect and the dashed line refers to the possible presence of post-treatment confounders.

where  $M$  is *ecb\_trust*,  $Z$  refers to the instruments, and  $\mathbf{X}$  is a vector of controls. The treatment dummy  $T$  takes the value one if the observation is from either T3 or T4, and zero if it is from T2. The outcome variables in the second stage ( $Y$ ) are either *post\_inf* or *inf\_unc*. I propose trust in two non-economic institutions as instruments for trust in the ECB. These institutions are the CJEU and media enterprises. The main identifying assumption is that trust in these institutions is related to trust in the ECB, while they are exogenous to *post\_inf* and *inf\_unc*.<sup>9</sup>

Table 2 shows the results. I begin by assessing the quality of the instruments. First, the first stage  $F$ -statistic of 2147 is well above the conventional threshold required for valid instruments. Second, both instruments are positively correlated with the mediator. Third, the test for overidentification of the instruments (the Hansen  $J$  statistic) does not reject the hypothesis of joint validity of the instruments. Overall, these diagnostics do not indicate a lack of validity of the instruments.

The results of the first stage show that exposing households to information about forecast accuracy (as was done in T3 and T4) increases trust in the ECB ( $\hat{\phi}_1 = 0.049$ ,  $t$ -stat = 2.12,  $p$ -value = 0.034). The results of the second stage show that trust in the ECB is negatively related to inflation expectations and uncertainty. A one standard deviation increase in trust is associated with a 0.56 percentage point decrease in *post\_inf* (95% CI [-0.68,-0.43]) and a 0.29 percentage point decrease in *inf\_unc* (95% CI [-0.44,-0.15]). However, the treatment indicator is only significant for *inf\_unc*, which indicates that the absence of direct effects on *post\_inf*.<sup>10</sup>

<sup>9</sup>In a similar analysis, Mellina and Schmidt (2018) use trust in three European institutions including the CJEU and three German institutions as instruments. Christelis et al. (2020) use trust in other people and the frequency of being cheated by a repair person in the past as instruments on trust in the central bank.

<sup>10</sup>These results are robust to excluding T3 from the sample and using only *cjeu\_trust* as the instrument (see Tables C.5 and C.6 in the Appendix).

**Table 2:** Causal Mechanisms with 2SLS

	(1)	(2)	(3)
Dep. var.:	<i>ecb_trust</i>	<i>post_inf</i>	<i>inf_unc</i>
<i>treatment</i> ( $T$ )	0.049** (0.023)	-0.035 (0.083)	-0.274*** (0.100)
<i>ecb_trust</i> ( $\widehat{M}$ )		-0.556*** (0.065)	-0.294*** (0.075)
<i>cjeu_trust</i> ( $Z_1$ )	0.572*** (0.014)		
<i>media_trust</i> ( $Z_2$ )	0.197*** (0.015)		
constant	0.111 (0.077)	4.034*** (0.275)	7.004*** (0.335)
$N$	3886	3886	3886
adjusted $R^2$	0.526	0.282	0.165
F-statistic	2147.27	87.037	50.866
J-statistic	-	0.575	0.341
p-value	-	0.448	0.559

*Notes:* The table reports the results of 2SLS regressions described in equations (3) and (4). Trust-related variables are standardized (mean zero, sd one). The p-value shows the results of the overidentification test of all instruments (based on Hansen's J-stat). The following control variables are included: age (discrete), female (binary), university graduate (binary), personal income below 1500 Euro (binary), single-person household (binary), born in the GDR before 1989 (binary), terms for the regions (binary), and prior inflation expectations (continuous). Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 2.2.4 Persistence, Consumption, and Attention

A natural question to ask is whether the information interventions have lasting effects on trust and translate into economic behavior. This section addresses such questions using the panel dimension of the survey.<sup>11</sup> In the month following the experiment (October 2022), the following variables are measured: (i) trust in the ECB, (ii) changes in attention to inflation news, and (iii) changes in consumption plans. Trust in the ECB is measured as before on a scale from 0 to 10. Changes in attention are measured by the following question:

<sup>11</sup>57% of respondents who participated in the experiment remain in the panel the following month (October 2022). This number drops abruptly to 27% in November 2022. The scope of this exercise is therefore limited to testing the effects that last four weeks.

*”Has your interest in inflation developments changed in recent weeks?”*

Respondents could indicate that they pay more, less or the same attention to inflation. Consumption plans are measured by the following question:

*”Are you likely to spend more or less on the following items over the next twelve months than in the last twelve months?”*

Respondents answer for nine different categories. I focus on consumption of durable goods, such as major purchases (e.g., cars, furniture) and clothing, and on savings.

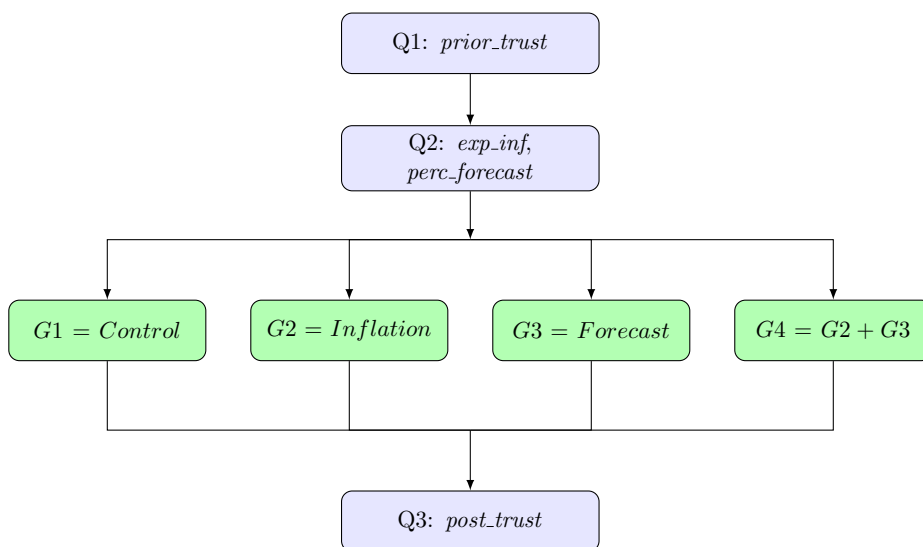
Table 3 shows the results of linear regressions. For *ecb\_trust*, the effects are already attenuated after one month. For the other outcome variables, T4 shows persistent effects. Respondents in this group are 2.5% less likely to report having paid less attention to inflation news in recent weeks ( $t$ -stat =  $-1.75$ ,  $p$ -value =  $0.081$ ), 3.1% less likely to report an increase in spending intentions for major purchases ( $t$ -stat =  $-1.69$ ,  $p$ -value =  $0.091$ ), and 2.7% less likely to report more spending on clothing and footwear ( $t$ -stat =  $-1.91$ ,  $p$ -value =  $0.056$ ). Relative to T2, information in T4 also reduces the probability of reporting an increase in consumption for major purchases by 3.7% ( $t$ -stat =  $-2.21$ ,  $p$ -value =  $0.027$ ). For savings plans and paying more attention to inflation news, none of the treatments have a significant coefficient. In summary, information about accuracy has discernible effects on some behaviors that persist for at least four weeks when delivered after a question, as was done in T4.

**Table 3:** Treatments effects on trust, attention, and consumption one month later

Dep. var.	(1)	(2)	(3)	(4)	(5)	(6)
	<i>ecb_trust</i>	Attention		Major	Spend more	
		More	Less		Clothing	Savings
T2 (= <i>Forecast</i> )	-0.093 (0.138)	0.025 (0.027)	-0.026* (0.014)	0.006 (0.019)	-0.007 (0.015)	-0.003 (0.016)
T3 (= T2 + <i>Accuracy</i> )	-0.002 (0.144)	0.007 (0.029)	-0.002 (0.017)	-0.019 (0.020)	-0.005 (0.016)	-0.002 (0.018)
T4 (= T3 + <i>Question</i> )	-0.190 (0.137)	0.011 (0.027)	-0.025* (0.014)	-0.031* (0.018)	-0.027* (0.014)	0.004 (0.016)
constant	4.275*** (0.298)	0.390*** (0.059)	0.107*** (0.029)	0.243*** (0.043)	0.171*** (0.035)	0.239*** (0.040)
<i>N</i>	2772	2794	2794	2738	2738	2738
<i>R</i> <sup>2</sup>	0.03	0.00	0.01	0.02	0.02	0.03

*Notes:* The table reports OLS regressions on six outcome variables measured in the October wave of the survey (one month after the experiment). The following control variables are included: age (discrete), female (binary), university graduate (binary), personal income below 1500 Euro (binary), single-person household (binary), born in the GDR before 1989 (binary), and terms for regions (binary). Regressions where the dependent variable is consumption plan also control for expected changes in income (continuous). Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Figure 4:** Flow of the second experiment



*Notes:* The graph shows the timeline of the second experiment. The blue boxes show the questions with their labels. The green boxes show the information treatments with their labels.

### 3 Second Experiment

This section presents a second complementary experiment implemented in BOP-HH Wave 45 (September 2023). There are two main design changes. The first is that households' quantitative beliefs about short-term inflation and beliefs about the ECB's short-term inflation forecast are elicited. From the answers to these questions, it is possible to infer the expected forecast error and its direction. Second, post-information trust in the ECB is measured indirectly via a questionnaire and without using the term trust in any part of the question. This approach allows for more granularity and provides information on the effects of such information treatments.

#### 3.1 Design and Implementation

##### 3.1.1 Design

The experiment consists of four stages. These stages are shown in Figure 4. In the first stage, trust in the ECB is measured on a scale from 0 to 10, using the same question as in stage (4) of the first experiment. This is coded as *prior\_trust*. In the second stage, respondents are asked to indicate their expectation for inflation in the euro area in the calendar year and their belief in the ECB's forecast for the same calendar year one year ahead. The following question is used:

*"What do you think the inflation rate in the euro area will be in 2023 overall, i.e. between December 2022 and December 2023? And what*



*inflation rate do you think the ECB forecasted in its projections for 2023 back in December 2022?”*

The answers are coded with *exp\_inflation* and *perc\_forecast*.

After this question, respondents move to the third stage where they receive information. They are randomly assigned to one of four groups. The first group (G1) is a pure control group that receives no information.<sup>12</sup> The group G2 receives the most recent annual inflation rate as information, along with the following text:

*”You will now be shown up-to-date information on the inflation rate in the euro area. According to the latest statistics, the inflation rate in the euro area between July 2022 and July 2023 was 5.3%.”*

The group G3 receives the ECB’s one-year ahead inflation forecast for calendar year 2023 with the following text:

*”You will now be shown up-to-date information on the inflation rate in the euro area. In December 2022, the ECB forecasted that the inflation rate in the euro area would be 6.3% by December 2023.”*

The group G4 receives both sets of information.

After receiving the information, respondents indicate their level of agreement (on a scale of 1-7) with six statements. These statements are shown in Table 4. They are designed to capture different facets of trust in the ECB.<sup>13</sup> The average agreement across items is used as a measure of trust in the ECB and is coded as *post\_trust*.

**Table 4:** Statements used to indirectly measure trust in the ECB

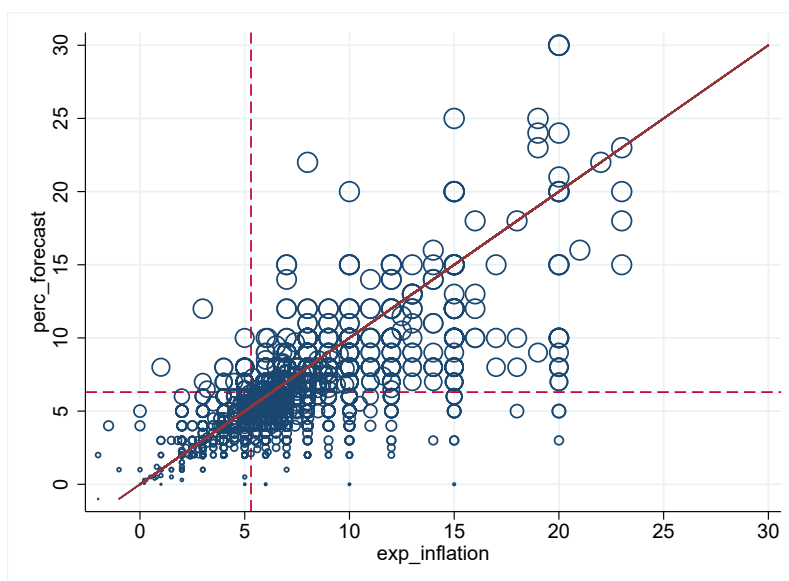
No	Statement	Label
(a)	The ECB will ensure price stability in the euro area over the next three years.	<i>credibility</i>
(b)	The ECB looks after the economic well-being of everyone in the euro area.	<i>inclusivity</i>
(c)	The ECB acts within the limits of its remit.	<i>legitimacy</i>
(d)	The ECB communicates with the public in a transparent and honest manner.	<i>honesty</i>
(e)	The ECB has sufficient expertise to understand general economic developments.	<i>expertise</i>
(f)	The ECB makes decisions that benefit people like me.	<i>interest</i>

*Notes:* Presented in random order. Scale of answers is 1 (completely disagree) to 7 (completely agree).

<sup>12</sup>Because the information and the beliefs elicited after the information are on a different scale, there is no need to account for the numerical anchoring bias.

<sup>13</sup>These items are drawn and adapted from a variety of studies in the literature. For example, statement (a) is used by [Ehrmann et al. \(2023\)](#) as a measure of the ECB’s credibility. A combination of statements (b) and (f) is used by [D’Acunto et al. \(2021\)](#) to infer trust in the Fed. Similarly, [Krill et al. \(2016\)](#) use a 17-item questionnaire to measure trust in and credibility of the Bank of Israel.

**Figure 5:** Expected inflation and perceived inflation forecast



*Notes:* Circle size indicates frequency of observations. Two observations where *perc\_forecast* was greater than 30% are removed from the graph for visual illustration.

### 3.1.2 Procedures and Data Selection

In total, 3999 respondents participated September 2023 Wave of the BOP-HH. Using pre-registered exclusion criteria (see AsPredicted #145978), I drop respondents who stated either "No answer" or "Don't know" to one of the three questions before treatments.. Respondents who do not know the ECB or who expects inflation (deflation) to be above 25% or below -5% are also excluded. This leaves 3643 respondents for the analysis and amounts to an exclusion rate of less than 10%. Demographic variables do not vary much across the initial and the final samples (see Table C.7). Exclusion is also balanced across treatments.

## 3.2 Results

This section presents the results of the second experiment. Three directional predictions are pre-registered:

1. Most households believe that the ECB forecast will undershoot actual inflation.
2. This belief (of optimism) is associated with lower trust in the ECB.
3. Information interventions have a positive impact on trust in the ECB.

### 3.2.1 Expected Inflation and Perceived Forecast

Figure 5 shows respondents' one-quarter ahead inflation expectations and their beliefs of the ECB's one-year ahead inflation forecast. The dashed lines show the

inflation rate in July 2023 (5.3%) and the ECB’s actual one-year ahead inflation forecast (6.3%). The solid line has a slope of 45 degrees.

A majority of respondents believe that the ECB’s forecast will be below actual inflation ( $N = 2255$ , 62%). This reflects the belief that the ECB’s inflation forecast is undershooting and therefore too optimistic. While some believe that the ECB will overshoot inflation ( $N = 689$ , 19%), there are also many who believe that the ECB is right on target ( $N = 699$ , 19%). Among those who think the ECB will undershoot, 82% perceive the forecast to be below what it actually is ( $perc\_forecast < 6.3\%$ ) and 78% expect inflation to be higher than the current rate ( $exp\_inflation > 5.3\%$ ).

**Table 5:** Perceived direction of the ECB’s forecast error and self-reported trust in the ECB

Dep. var.:	(1)	(2)
	<i>prior_trust</i>	
<i>ecb_optimistic</i>	-0.243*** (0.043)	-0.236*** (0.042)
<i>ecb_pessimistic</i>	0.095* (0.052)	0.082 (0.051)
constant	0.133*** (0.038)	0.044 (0.087)
Controls included	No	Yes
$N$	3643	3643
$R^2$	0.02	0.06

*Notes:* The dependent variable (*prior\_trust*) is standardized to have a mean of zero and a standard deviation of one. The following control variables are included to the regression (2): age (discrete), female (binary), university graduate (binary), personal income below 1500 Euro (binary), single-person household (binary), born in the GDR before 1989 (binary), and terms for regions (binary). Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Could respondents’ beliefs about the direction of the forecast error be an indicator of (lack of) trust? Correlational evidence supports this insight. Table 5 shows the results of linear regressions in which *prior\_trust* is explained by dummy variables that take the value one if a respondent believes that the ECB will undershoot (*ecb\_optimistic*) or overshoot (*ecb\_pessimistic*) inflation. The reference group believes that the ECB is exactly right. The results show an asymmetric relationship. While beliefs that the central bank will undershoot inflation are negatively related to self-reported trust in the ECB, beliefs about overshooting inflation are not. Thus, the perception of optimistic forecasts hurts the ECB more.

### 3.2.2 Effects of Information Treatments

How do the information treatments affect public opinion about the ECB? Table 6 shows the results of linear regressions explaining either the average agreement across six statements (i.e., *post\_trust*) or individual responses to each of the six statements with treatment dummies.<sup>14</sup> A positive coefficient reflects an improvement in the public's perception of the institution. All regressions control for *prior\_trust* and the initial deviations of *perc\_forecast* and *exp\_inflation* from 6.3% and 5.3%, respectively.

**Table 6:** Effects of information treatments on the public's perception of the ECB

Dep. var.:	(1) <i>post_trust</i>	(2) <i>credibility</i>	(3) <i>inclusivity</i>	(4) <i>legitimacy</i>	(5) <i>honesty</i>	(6) <i>expertise</i>	(7) <i>interest</i>
G2 (= <i>Inflation</i> )	0.041 (0.030)	0.045 (0.036)	0.028 (0.035)	0.028 (0.036)	0.052 (0.035)	0.020 (0.036)	0.047 (0.035)
G3 (= <i>Forecast</i> )	0.081*** (0.030)	0.106*** (0.037)	0.065* (0.035)	0.048 (0.036)	0.074** (0.035)	0.049 (0.037)	0.072** (0.035)
G4 (= G2 + G3)	0.035 (0.030)	0.060* (0.036)	0.046 (0.035)	0.001 (0.036)	0.046 (0.035)	-0.003 (0.036)	0.039 (0.035)
constant	-0.010 (0.023)	-0.009 (0.028)	-0.011 (0.026)	-0.001 (0.028)	-0.014 (0.027)	-0.007 (0.028)	-0.012 (0.027)
<i>N</i>	3629	3629	3629	3629	3629	3629	3629
<i>R</i> <sup>2</sup>	0.59	0.41	0.44	0.40	0.43	0.41	0.46

*Notes:* Results of linear regressions in which agreement on six statements is explained by treatment dummies. All regressions control for *prior\_trust* and the initial deviations of *perc\_forecast* and *exp\_inflation* from 6.3% and 5.3%, respectively. The dependent variables are standardized to have a mean of zero and a standard deviation of one. Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

The results show that informing respondents about the ECB's inflation forecast, as in the G3 group, has a positive effect on trust in the ECB. The breakdown by statement shows a similar result. The main effect of the information in G3 is on the credibility of the ECB's inflation target credibility (t-stat= 2.87,  $p$ -value= 0.004). Treated respondents are also more likely to agree with the statement about the ECB's honesty (t-stat= 2.09,  $p$ -value= 0.037), to perceive more personal benefits from monetary policy (t-stat= 2.04,  $p$ -value= 0.042), and to view the ECB's policy as more inclusive in the euro area (t-stat= 1.85,  $p$ -value= 0.065). In contrast, current inflation information does not significantly affect public opinion in any category. Interestingly, adding current inflation information to inflation forecast information, as in G4, neutralizes the positive effect of the latter.

<sup>14</sup>14 respondents who choose not to answer at least one of the statements are excluded from this analysis.

## 4 Conclusion

Using two surveys of German households conducted over two years, this article shows that public perceptions of the ECB's forecast errors matter for monetary policy. The first survey documents that households significantly underestimate the ECB's forecast accuracy. The second survey shows that this underestimation reflects beliefs about overly optimistic forecasts. In both cases, information that challenges these perceptions has the intended effects on inflation expectations, uncertainty, consumption plans, and trust in the central bank.

The policy implications of these results are subject to several caveats. The first experiment demonstrates the importance of correcting misperceptions in a salient way, as one of the treatments did by asking a question before presenting the belief-challenging information. Second, these experiments were conducted under special circumstances, when inflation was high and volatile, and may not be replicable under the opposite conditions of low and stable inflation. Third, information may have countervailing effects when it is delivered in a bundle, as was one of the treatments in the second experiment. Information experiments provide an inexpensive way to study these caveats before implementing communication policies for the general population.

## References

- ACHARYA, A., M. BLACKWELL, AND M. SEN (2016): “Explaining causal findings without bias: Detecting and assessing direct effects,” *American Political Science Review*, 110, 512–529. Cited on page 11.
- ARMANTIER, O., S. NELSON, G. TOPA, W. VAN DER KLAUW, AND B. ZAFAR (2016): “The price is right: Updating inflation expectations in a randomized price information experiment,” *Review of Economics and Statistics*, 98, 503–523. Cited on page 4.
- ASH, E., H. MIKOSCH, A. PERAKIS, AND S. SARFERAZ (2024): “Seeing and hearing is believing: The role of audiovisual communication in shaping inflation expectations,” Working Paper no. 515, KOF Swiss Economic Institute. Cited on page 4.
- BARON, R. M. AND D. A. KENNY (1986): “The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations,” *Journal of Personality and Social Psychology*, 51, 1173–1182. Cited on page 11.
- BHOLAT, D., N. BROUGHTON, J. TER MEER, AND E. WALCZAK (2019): “Enhancing central bank communications using simple and relatable information,” *Journal of Monetary Economics*, 108, 1–15. Cited on page 4.
- BINDER, C. AND A. RODRIGUE (2018): “Household informedness and long-run inflation expectations: Experimental evidence,” *Southern Economic Journal*, 85, 580–598. Cited on page 4.
- BINDER, C. C. (2017): “Measuring uncertainty based on rounding: New method and application to inflation expectations,” *Journal of Monetary Economics*, 90, 1–12. Cited on page 7.
- BINDER, C. C. AND R. SEKKEL (2023): “Central bank forecasting: A survey,” *Journal of Economic Surveys*, 1–23. Cited on page 2.
- BROUWER, N. AND J. DE HAAN (2022): “The impact of providing information about the ECB’s instruments on inflation expectations and trust in the ECB: Experimental evidence,” *Journal of Macroeconomics*, 73, 103430. Cited on page 4.
- BULLOCK, J. G., D. P. GREEN, AND S. E. HA (2010): “Yes, but what’s the mechanism? (don’t expect an easy answer),” *Journal of Personality and Social Psychology*, 98, 550–558. Cited on page 11.

- BURSIAN, D. AND E. FAIA (2018): “Trust in the monetary authority,” *Journal of Monetary Economics*, 98, 66–79. Cited on page 5.
- CAVALLO, A., G. CRUCES, AND R. PEREZ-TRUGLIA (2017): “Inflation expectations, learning, and supermarket prices: Evidence from survey experiments,” *American Economic Journal: Macroeconomics*, 9, 1–35. Cited on page 4.
- CHRISTELIS, D., D. GEORGARAKOS, T. JAPPELLI, AND M. VAN ROOIJ (2020): “Trust in the central bank and inflation expectations,” *International Journal of Central Banking*, 16, 1–37. Cited on pages 3, 5, and 12.
- COIBION, O., D. GEORGARAKOS, Y. GORODNICHENKO, AND M. VAN ROOIJ (2023): “How does consumption respond to news about inflation? Field evidence from a randomized control trial,” *American Economic Journal: Macroeconomics*, 15, 109–152. Cited on page 4.
- COIBION, O., Y. GORODNICHENKO, AND M. WEBER (2022): “Monetary policy communications and their effects on household inflation expectations,” *Journal of Political Economy*, 130, 1537–1584. Cited on page 4.
- D’ACUNTO, F., A. FUSTER, AND M. WEBER (2021): “Diverse policy committees can reach underrepresented groups,” Working Paper no. 29275, National Bureau of Economic Research. Cited on pages 3, 4, and 16.
- DRÄGER, L., M. LAMLA, AND D. PFAJFAR (2022): “How to limit the spillover from the 2021 inflation surge to inflation expectations?” Working paper, Lüneburg. Cited on page 4.
- DRÄGER, L. AND G. NGHIEM (2023): “Inflation literacy, inflation expectations, and trust in the central bank: A Survey experiment,” Working Paper no. 10539, Center for Economic Studies & Ifo Institute. Cited on page 4.
- EHRMANN, M. AND M. FRATZSCHER (2011): “Politics and monetary policy,” *Review of Economics and Statistics*, 93, 941–960. Cited on page 2.
- EHRMANN, M., D. GEORGARAKOS, AND G. KENNY (2023): “Credibility gains from communicating with the public: Evidence from the ECB’s new monetary policy strategy,” Working Paper no. 2785, European Central Bank. Cited on pages 4 and 16.
- EL-SHAGI, M., S. GIESEN, AND A. JUNG (2016): “Revisiting the relative forecast performances of Fed staff and private forecasters: A dynamic approach,” *International Journal of Forecasting*, 32, 313–323. Cited on page 2.

- GAVIN, W. T. AND R. J. MANDAL (2003): “Evaluating FOMC forecasts,” *International Journal of Forecasting*, 19, 655–667. Cited on page 2.
- HAALAND, I. AND O.-A. E. NAESS (2023): “Misperceived Returns to Active Investing,” . Cited on page 5.
- HALDANE, A., A. MACAULAY, AND M. MCMAHON (2020): “The 3 E’s of central bank communication with the public,” Staff Working Paper no. 847, Bank of England. Cited on page 5.
- HOFFMANN, M., E. MOENCH, L. PAVLOVA, AND G. SCHULTEFRANKENFELD (2022): “Would households understand average inflation targeting?” *Journal of Monetary Economics*, 129, S52–S66. Cited on page 3.
- HOMMES, C. AND J. LUSTENHOUWER (2019): “Inflation targeting and liquidity traps under endogenous credibility,” *Journal of Monetary Economics*, 107, 48–62. Cited on page 5.
- IMAI, K., L. KEELE, D. TINGLEY, AND T. YAMAMOTO (2011): “Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies,” *American Political Science Review*, 105, 765–789. Cited on page 11.
- JÄGER, S., C. ROTH, N. ROUSSILLE, AND B. SCHOEFER (2022): “Worker beliefs about outside options,” Working paper no. 29623, National Bureau of Economic Research. Cited on page 5.
- KORENOK, O., D. MUNRO, AND J. CHEN (2023): “Inflation and attention thresholds,” *Review of Economics and Statistics*, 1–28. Cited on page 2.
- KOSTYSHYNA, O. AND L. PETERSEN (2024): “Communicating inflation uncertainty and household expectations,” Staff Working Paper no. 2023–63, Bank of Canada. Cited on page 4.
- KRIL, Z., D. LEISER, AND A. SPIVAK (2016): “What determines the credibility of the central bank of Israel in the public eye,” *International Journal of Central Banking*, 12, 67–93. Cited on page 16.
- MCMAHON, M. AND R. RHOLES (2024): “Building Central Bank Credibility: The Role of Forecast Performance,” Working paper. Cited on page 4.
- MELLINA, S. AND T. SCHMIDT (2018): “The role of central bank knowledge and trust for the public’s inflation expectations,” Discussion Paper no. 32/2018, Deutsche Bundesbank. Cited on pages 5 and 12.



- MÉON, P.-G. AND B. HAYO (2023): “Preaching to the agnostic: Inflation reporting can increase trust in the central bank but only among people with weak priors,” Working Paper no. 10636, Center for Economic Studies & Ifo Institute. Cited on page 4.
- PFÄUTI, O. (2023): “The inflation attention threshold and inflation surges,” *arXiv preprint arXiv:2308.09480*. Cited on page 2.
- ROTH, C., S. SETTELE, AND J. WOHLFART (2022): “Beliefs about public debt and the demand for government spending,” *Journal of Econometrics*, 231, 165–187. Cited on page 5.
- ROTH, C. AND J. WOHLFART (2020): “How do expectations about the macroeconomy affect personal expectations and behavior?” *Review of Economics and Statistics*, 102, 731–748. Cited on page 4.
- SETTELE, S. (2022): “How do beliefs about the gender wage gap affect the demand for public policy?” *American Economic Journal: Economic Policy*, 14, 475–508. Cited on page 5.
- WEBER, M., B. CANDIA, T. ROPELE, R. LLUBERAS, S. FRACHE, B. H. MEYER, S. KUMAR, Y. GORODNICHENKO, D. GEORGARAKOS, O. COIBION, ET AL. (2023): “Tell me something I don’t already know: Learning in low and high-inflation settings,” Working Paper no. 31485, National Bureau of Economic Research. Cited on page 2.

## A Experimental Materials

All the material used in the experiment (e.g., questions, treatment texts) can be found in the Bundesbank’s website both in German and in English:

<https://www.bundesbank.de/en/bundesbank/research/survey-on-consumer-expectations>

Waves 33 and 45 are relevant for the treatment texts and questions.

## B A Model of Belief Updating with Trust

This section presents a model of Bayesian belief updating that can be used to generate predictions in the first experiment. In the model, the quality of the so-called primary signal (i.e., information about the state) is unknown, but can be partially inferred from a secondary signal (i.e., information about the quality of the primary signal). I conceptualize the framework of the model based on the expectation formation process of a household, where the central bank’s inflation forecast is the signal.

### B.1 Model

Household  $i$  has the prior belief that future inflation  $\pi$  is normally distributed with mean  $\pi_0(i)$  and variance  $\sigma_0^2(i)$ . The central bank publishes its inflation forecast  $\pi_f$ , an unbiased but noisy signal of future inflation distributed as  $\mathcal{N}(\pi, \sigma_f^2)$ . The variance  $\sigma_f^2$  is referred to as the *forecast uncertainty*. For convenience,  $\sigma_0^2$  and  $\sigma_f^2$  are assumed to be orthogonal.

Using Bayes rule, I can express the posterior of the household for inflation with

$$\pi_1(i) = \pi_0(i) + \alpha(i)(\pi_f - \pi_0(i)), \quad (5)$$

where  $\alpha(i)$  is the weight household  $i$  gives to the inflation forecast. It equals

$$\alpha(i) = \begin{cases} \frac{\sigma_0^2(i)}{\sigma_0^2(i) + \sigma_f^2}, & \text{if } \{\pi_f, \sigma_f^2\} \in \Omega(i) \\ 0, & \text{otherwise} \end{cases} \quad (6)$$

where  $\Omega(i)$  is the information set of the household  $i$ . The variance of the posterior (hereafter referred to as the *posterior inflation uncertainty*) equals

$$\sigma_1^2(i) = \begin{cases} \frac{\sigma_0^2(i)\sigma_f^2}{\sigma_0^2(i) + \sigma_f^2}, & \text{if } \{\pi_f, \sigma_f^2\} \in \Omega(i) \\ \sigma_0^2(i), & \text{otherwise.} \end{cases} \quad (7)$$

The setup shown so far is a standard Bayesian updating model. From now on, I assume that the household does not know the forecast uncertainty, i.e.  $\{\sigma_f^2\}$  is not in  $\Omega(i)$ . He has the prior that the forecast uncertainty is normally distributed with mean  $\sigma_{f,0}^2(i)$ . To convey the quality of the inflation forecast  $\pi_f$ , the central bank can publish its past forecast performance as a secondary signal. Statistically, this corresponds to the variance of past forecast errors  $\sigma_h^2$ , where the subscript  $h$  refers to history. Past forecast errors are unbiased and normally distributed. Using this

setup, one can express the posterior about forecast uncertainty with:

$$\sigma_{f,1}^2(i) = \begin{cases} \sigma_{f,0}^2(i) + \omega(i)(\sigma_h^2 - \sigma_{f,0}^2(i)), & \text{if } \{\pi_f, \sigma_h^2\} \in \Omega(i) \\ \sigma_{f,0}^2(i), & \text{otherwise} \end{cases} \quad (8)$$

where  $\omega(i)$  is the weight  $i$  assigns to the past performance.

Trust is introduced into the model in a reduced-form manner through the household's belief on forecast uncertainty  $\sigma_{f,0}^2(i)$  (i.e. perceived performance). This belief can potentially deviate from the objective performance  $\sigma_h^2$ , as in

$$\kappa_0(i) \equiv \frac{\sigma_{f,0}^2(i)}{\sigma_h^2} = \frac{g(\tau_0(i))}{\sigma_h^2} \quad (9)$$

where  $\kappa_0(i)$  is a coefficient that reflects the magnitude and direction of these deviations prior to the central bank communication. If  $\kappa_0(i)$  is greater (smaller) than 1, then  $i$  underestimates (overestimates) the central bank's forecast performance. Trust in the central bank  $\tau_0(i) \in [0, 1]$  enters the framework through its relation to  $\kappa_0(i)$ . It is assumed that  $g' < 0$ , so that trust and underestimation are negatively related, *ceteris paribus*.

## B.2 Hypotheses

The model makes a number of predictions. The following predictions require that the public initially underestimates the central bank's performance ( $\kappa_0 > 1$ ). Let us call the central bank's decision to communicate past forecast performance "correcting misperceptions".

**Hypotheses 1:** Correcting misperceptions increases the weight that households place on the inflation forecast (i.e.  $\alpha(i)$ ).

**Hypotheses 2:** Correcting misperceptions reduces inflation uncertainty (i.e.  $\sigma_1^2(i)$ ).

These hypotheses can be verified by assuming  $\kappa_1 < \kappa_0$  that information reduces underestimation. Thus, the household notices that the signal is of higher quality. These simple predictions hold even in the absence of the concept of trust (i.e.,  $\tau_0 \perp \sigma_{f,0}^2$ ).

**Hypotheses 3:** Correcting misperceptions increases trust in the central bank (i.e.  $\tau_1 > \tau_0$ ).

This hypothesis is not based on the model, but finds its justification in the literature. Information interventions on factual misperceptions typically change people's attitudes towards the misperceived topic.

**Hypothesis 4:** Trust in the central bank mediates the effects of correcting misperceptions on inflation expectations.

The justification for this hypothesis is as follows. First, the third hypothesis must be corroborated (i.e.,  $\tau_1 > \tau_0$ ). Higher trust leads to a weaker underestimation by the public due to the assumption of  $g' < 0$ . This leads to the same effects in the first two hypotheses. Thus, there is a dual effect of communication policy to correct misperceptions when it also influences trust.

## C Supporting Material

### C.1 First Experiment

Table C.1: Demographic profile

	Pre-exclusion	Post-exclusion	Refreshers
Age	57.99 (15.10)	58.16 (15.03)	54.93 (15.27)
Female	0.410 (0.492)	0.387 (0.487)	0.456 (0.499)
University graduate	0.499 (0.500)	0.523 (0.500)	0.473 (0.500)
Personal income < 1500 euros	0.291 (0.454)	0.280 (0.449)	0.277 (0.448)
Single-person household	0.257 (0.437)	0.254 (0.436)	0.260 (0.439)
Born in the GDR before 1990	0.155 (0.362)	0.153 (0.360)	0.181 (0.385)
Northern Germany	0.168 (0.374)	0.170 (0.376)	0.150 (0.357)
Western Germany	0.258 (0.438)	0.258 (0.438)	0.231 (0.422)
Southern Germany	0.405 (0.491)	0.405 (0.491)	0.410 (0.492)
Eastern Germany	0.168 (0.374)	0.167 (0.373)	0.210 (0.407)
<i>N</i>	5527	4863	520

*Notes:* Descriptives for demographic variables are reported for the full and restricted (post-exclusion) samples. Standard deviations are reported in parentheses below means.

**Table C.2:** Ordered logistic regression on the ECB perception

Dep. var.:	(1)	(2)
	<i>perc_inaccuracy</i>	
<i>ecb_trust</i>	-0.109*** (0.023)	-0.109*** (0.031)
Age	0.010*** (0.004)	0.010* (0.005)
Female	0.434*** (0.120)	0.381** (0.185)
University graduate	-0.323*** (0.118)	- (.)
Personal income < 1500 euros	0.294 (0.304)	0.247 (0.394)
Single-person household	-0.385 (0.321)	-0.420 (0.429)
Born in the GDR before 1990	0.362 (0.300)	0.269 (0.406)
Northern Germany	-0.057 (0.309)	-0.063 (0.415)
Western Germany	-0.121 (0.285)	-0.209 (0.384)
Southern Germany	-0.094 (0.275)	-0.008 (0.371)
<i>N</i>	1022	517
Pseudo $R^2$	0.0237	0.0186

*Notes:* The dependent variable *perc\_inaccuracy* quantifies the perceived value of average forecast errors. Trust in the ECB is measured post-treatment. Column (2) filters the data to university graduated sample. Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table C.3:** Demographic characteristics of respondents by the level of misperception

<i>perc_inaccuracy</i>	0-1 pp.	1-2 pp.	2-3 pp.	$\geq 3$ pp.
Age	56.17 (15.10)	58.21 (15.22)	59.58 (14.89)	61.66 (13.55)
Female	0.297 (0.458)	0.370 (0.483)	0.433 (0.496)	0.436 (0.497)
University degree	0.626 (0.485)	0.552 (0.498)	0.421 (0.494)	0.475 (0.500)
Personal income < 1500 euros	0.297 (0.458)	0.251 (0.434)	0.277 (0.448)	0.304 (0.461)
Single-person household	0.277 (0.449)	0.228 (0.420)	0.247 (0.432)	0.264 (0.442)
Born in the GDR before 1989	0.128 (0.335)	0.111 (0.314)	0.165 (0.371)	0.178 (0.383)
Northern Germany	0.221 (0.416)	0.137 (0.344)	0.159 (0.366)	0.185 (0.389)
Western Germany	0.200 (0.401)	0.309 (0.463)	0.216 (0.412)	0.231 (0.422)
Southern Germany	0.415 (0.494)	0.414 (0.493)	0.439 (0.497)	0.389 (0.488)
Eastern Germany	0.164 (0.371)	0.140 (0.347)	0.186 (0.390)	0.195 (0.397)
<i>N</i>	195	614	328	303

*Notes:* The table reports the mean demographic characteristic of respondents by response categories to the ECB perception question. Standard deviations are reported in parentheses below means.

**Table C.4:** Robustness regressions for reduced-form treatment effects:  
With controls and without winsorization

	(1) <i>revision</i>	(2) <i>revision</i>	(3) <i>inf_unc</i>	(4) <i>inf_unc</i>
$\beta_2$	0.266*** (0.067)	0.217*** (0.019)		
$\beta_3$	0.166** (0.083)	0.208*** (0.022)		
$\beta_4$	0.292*** (0.076)	0.250*** (0.019)		
$\alpha_2$			-1.170*** (0.369)	-1.081*** (0.141)
$\alpha_3$			-1.519*** (0.354)	-1.241*** (0.151)
$\alpha_4$			-2.023*** (0.325)	-1.447*** (0.137)
$\beta_1$	0.390*** (0.068)	0.344*** (0.017)		
$\beta_0$ or $\alpha_1$	2.201*** (0.223)	2.753*** (0.234)	7.378*** (0.255)	9.899*** (0.320)
Winsorized	No	Yes	No	Yes
Controls included	No	Yes	No	Yes
$N$	4863	4863	4863	4863
$R^2$	0.40	0.36	0.01	0.11

*Notes:* The table reports regression estimates from equations (1) and (2). Columns (1) and (3) use non-winsorized data, while columns (2) and (4) include control variables. The following control variables are included: age (discrete), female (binary), university graduate (binary), personal income below 1500 Euro (binary), single-person household (binary), born in the GDR before 1989 (binary), and terms for the regions (binary). Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table C.5:** Robustness regressions for the causal mechanisms: Only T4

	(1)	(2)	(3)
Dep. var.:	<i>ecb_trust</i>	<i>post_inf</i>	<i>inf_unc</i>
<i>treatment</i> ( $T$ )	0.051** (0.026)	-0.113 (0.093)	-0.390*** (0.110)
<i>ecb_trust</i> ( $\widehat{M}$ )		-0.596*** (0.073)	-0.321*** (0.085)
<i>cjeu_trust</i> ( $Z_1$ )	0.567*** (0.016)		
<i>media_trust</i> ( $Z_2$ )	0.208*** (0.017)		
constant	0.142 (0.087)	4.141*** (0.316)	6.867*** (0.375)
$N$	2905	2905	2905
adjusted $R^2$	0.534	0.283	0.169
F-stat	1631.93	67.938	41.180
J-stat	–	0.246	0.059
p-value	–	0.620	0.808

*Notes:* The table reports the results of 2SLS regressions where the *treatment* indicator takes a value of one only for T4. Trust-related variables are standardized. The following control variables are included: age (discrete), female (binary), university graduate (binary), personal income below 1500 Euro (binary), single-person household (binary), born in the GDR before 1989 (binary), terms for the regions (binary), and prior inflation expectations (continuous). Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



**Table C.6:** Robustness regressions for the causal mechanisms: Only *cjeu\_trust* as instrument

Dep. var.:	(1) <i>ecb_trust</i>	(2) <i>post_inf</i>	(3) <i>inf_unc</i>
<i>treatment</i> ( $T$ )	0.050** (0.024)	-0.035 (0.083)	-0.274*** (0.100)
<i>ecb_trust</i> ( $\widehat{M}$ )		-0.544*** (0.067)	-0.283*** (0.077)
<i>cjeu_trust</i> ( $Z_1$ )	0.670*** (0.011)		
constant	0.168** (0.079)	4.028*** (0.275)	6.999*** (0.336)
$N$	3886	3886	3886
adjusted $R^2$	0.498	0.283	0.165
F-statistic	3586.79	86.002	50.644

*Notes:* The table reports the results of 2SLS regressions with a single instrument (*cjeu\_trust*). Trust-related variables are standardized. The following control variables are included: age (discrete), female (binary), university graduate (binary), personal income below 1500 Euro (binary), single-person household (binary), born in the GDR before 1989 (binary), terms for the regions (binary), and prior inflation expectations (continuous). Robust standard errors are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## C.2 Second Experiment

**Table C.7:** Demographic profile

	Pre-exclusion	Post-exclusion	Refreshers
Age	56.87 (15.92)	56.86 (15.84)	49.94 (17.04)
Female	0.410 (0.492)	0.387 (0.487)	0.454 (0.498)
University graduate	0.506 (0.500)	0.518 (0.500)	0.550 (0.498)
Personal income < 1500 euros	0.301 (0.459)	0.290 (0.454)	0.285 (0.452)
Single-person household	0.266 (0.442)	0.263 (0.440)	0.247 (0.432)
Born in the GDR before 1990	0.152 (0.359)	0.151 (0.358)	0.155 (0.363)
Northern Germany	0.169 (0.374)	0.164 (0.370)	0.165 (0.372)
Western Germany	0.260 (0.439)	0.261 (0.439)	0.235 (0.424)
Southern Germany	0.406 (0.491)	0.410 (0.492)	0.420 (0.494)
Eastern Germany	0.166 (0.372)	0.165 (0.371)	0.179 (0.384)
<i>N</i>	3999	3643	502

*Notes:* Descriptives for demographic variables are reported for the full and restricted (post-exclusion) samples. Standard deviations are reported in parentheses below means.

**Table C.8:** Correlation matrix for different facets of public trust in the ECB

	<i>prior_trust</i>	<i>credibility</i>	<i>inclusivity</i>	<i>legitimacy</i>	<i>honesty</i>	<i>expertise</i>	<i>interest</i>
<i>prior_trust</i>	1.0000						
<i>credibility</i>	0.6176	1.0000					
<i>inclusivity</i>	0.6705	0.6563	1.0000				
<i>legitimacy</i>	0.6405	0.5798	0.5998	1.0000			
<i>honesty</i>	0.6505	0.6234	0.6975	0.6278	1.0000		
<i>expertise</i>	0.6222	0.5699	0.6035	0.6439	0.6017	1.0000	
<i>interest</i>	0.6673	0.6460	0.7099	0.5800	0.6933	0.5793	1.0000

*Notes:* The table reports correlations only for the control group G1.