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Household Expectations and Dissent Among Policymakers*

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Abstract

This paper studies the impact of dissent in the ECB's Governing Council on uncertainty surrounding households' inflation expectations. We conduct a randomized controlled trial using the Bundesbank Online Panel Households. Participants are provided with alternative information treatments concerning the vote in the Council, e.g. unanimity and dissent, and are asked to submit probabilistic inflation expectations. The results show that the vote is informative. Households revise their subjective inflation forecast after receiving information about the vote. Dissenting votes cause a wider individual distribution of future inflation. Hence, dissent increases households' uncertainty about inflation. This effect is statistically significant once we allow for the interaction between the treatments and individual characteristics of respondents. The results are robust with respect to alternative measures of forecast uncertainty and hold for different model specifications. Our findings suggest that providing information about dissenting votes without additional information about the nature of dissent is detrimental to coordinating household expectations.

Keywords: central bank communication, disagreement, inflation expectations, randomized controlled trial, survey

JEL classification: E52, E43, E32

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1 Introduction

In recent years, central banks such as the Federal Reserve (Fed) or the European Central Bank (ECB) provide an array of information to the public. This involves press releases about monetary policy decisions, regular post-meeting press conferences, projections about future macroeconomic variables, speeches by senior central bankers and analytic reports about economic developments. Central banks acknowledged the adjustment of public expectations as a key transmission channel of monetary policy and try to manage these expectations. The provision of information by the central bank is seen as a stabilization and coordination device for private expectations. This aim became all the more relevant when many advanced economies hit the effective lower bound on nominal interest rates. When the conventional short-term interest rate was no longer available in order to implement further stimulus, central banks engaged in forward guidance to increase inflation expectations. Recently, central banks broadened their communication efforts and not just address investors and professional central bank watchers, but also ordinary households.[1]

One important piece of information is the vote in the decision making body of the central bank. In case of the ECB, this is the Governing Council (GovC). While the Fed and the Bank of England (BoE) are very transparent about the vote in their committees and publish the formal vote together with the post-meeting press release, the ECB remains opaque. The press release and the ECB president's Introductory Statement to the press conference remain silent of the vote. When asked by journalists, the ECB president only communicates a thin assessment of his or her reading of the GovC's majority using codewords such as "consensus" or "overwhelming support" to communicate the fact that some members dissented. The ECB does not reveal information about the direction of dissent or name of the dissenting member(s). At the same time, disagreement among members of the GovC is often headline news in the media.

In this paper, we study the effect of the vote in the GovC on the inflation expectations of households. For that purpose, we use a randomized controlled trial (RCT) design, which mimics the information provision during ECB press conferences. The RCT is implemented using the Bundesbank Online Panel Households (BOP-HH), a monthly household survey conducted by the Deutsche Bundesbank among more than 3,000 households. The design of the Bundesbank survey resembles the Survey of Consumer Expectations run by the Federal Reserve Bank of New York (Armantier et al., 2013, Armantier et al., 2017).

[1] See Haldane et al. (2019) and Ehrmann and Wabisch (2022) for analyses of central bank communication with a broader audience as opposed to a small group of experts.

Survey participants receive information about a policy decision. In a first stage, each participant is asked to submit her minimum and maximum inflation forecast. In a second step, we provide three information treatments and request participants to submit their probabilistic inflation projections. Each participant assigns probabilities to alternative inflation bins. Besides a control group, which receives no additional information, one group receives the information that the ECB decision was unanimous. Another group receives the information that there was dissent in the GovC. A fourth group learns that the decision was unanimous despite different views in the council. We use the method introduced in Engelberg, Manski and Williams (2009) and Manski (2018) to infer the first and second moments of each participant's individual distribution of future inflation. This set-up allows us to derive the *causal* effect of unanimity and dissent, respectively, on the mean inflation forecast and the second moments such as the interquartile range or the standard deviation of individual distributions about future inflation. We are mostly interested in the effect on second moments, which are reflecting individual uncertainty about the inflation outlook.

We obtain three key findings. First, information about the vote among policymakers is informative. Households receiving information about the vote revise their first-stage inflation forecasts more strongly relative to the control group which receives no information about the vote. Second, dissent in the GovC has a significant effect on the individual uncertainty about future inflation. When receiving information about dissent, households revise their inflation projections even more strongly than households receiving information about a unanimous vote. Households receiving information about dissent have a wider distribution of future inflation as reflected in the interquartile range or the standard deviation of their probabilistic forecast. This effect is insignificant for our baseline model but become strongly significant once we allow the treatments to interact with respondents' characteristics such as age or years of education. Thus, dissent increases households' uncertainty about future inflation. Our third finding is that unanimity does not reduce uncertainty. The effect of a unanimous decision on households' inflation uncertainty is either insignificant or, in most cases, positive.

Our results remain unchanged if we make different assumptions about the shape of individual probability distributions in the first stage of the survey. While in the baseline model we assume an isosceles triangle spanned between the minimum and maximum inflation expectation, we also allow for asymmetric distributions in our robustness section. Specifically, we impose the skewness from a question earlier in the survey, which is routinely asked by the Bundesbank, or the average skewness

from the control group.
Our results shed light on the role of the vote in GovC for the ability of the ECB to manage household expectations. Communicating a unanimous decision does not reduce the uncertainty of households around the inflation path. Dissent also undermines the coordination of inflation expectations.
In our survey, we deal with the inflation expectations of households. Though households might not be as well informed about the details of monetary policy as experts, they are aware of rifts in the GovC. This is particularly true for households in Germany, where the disagreement between the president of the Bundesbank, who is a member of the GovC, and the ECB president was headline news for more than a decade.[2]
The increase in individual inflation uncertainty caused by the dissent among policymakers has real economic consequences: as all survey participants face the same interest rate, differences in individual distributions of expected inflation translate into different subjective distributions of real interest rates. The literature shows that consumers with a higher degree of idiosyncratic inflation uncertainty have a a lower attitude towards spending on durable goods (Binder, 2017; Coibion, Georgarakos, Gorodnichenko, Kenny and Weber, 2021).
RCTs have been used widely in the recent literature on information provision experiments, e.g. Coibion, Georgarakos, Gorodnichenko, Kenny and Weber (2021), Coibion, Georgarakos, Gorodnichenko and Weber (2021), Coibion, Gorodnichenko and Weber (2021), Hoffmann et al. (2022) and many others.[3] In particular, researchers use RCT designs in order to understand the impact of policy communication on expectations. Coibion, Gorodnichenko and Weber (2021) use data from the Nielsen Homescan Panel and provide participants with eight different information treatments, each of which contains a specific piece of information about monetary policy. The authors establish that policy communication has a significant effect on expectations and also on households' willingness to spend. In contrast to this paper, the authors focus on the first moments of the probability distributions of inflation only.
Over the past decade, central banks have increasingly used forward guidance as a tool to influence household expectations. Coibion, Georgarakos, Gorodnichenko and

[2]Here are a few examples for Germany: the German weekly *Der Spiegel* titled "The rebellion of the Bundesbank". The *Süddeutsche Zeitung* wrote about the "frosty" relationship between ECB president Trichet and Bundesbank president Weber. The *Hamburger Abendblatt* titled "Showdown between Draghi and Weidmann?". *BILD* writes about an "Open dispute in the ECB council". A headline in the *FAZ* reads "Dispute is getting worse: ECB suspects 'euro foes' in the Bundesbank".

[3]Coibion et al. (2020) stress the role of policy communication for inflation expectations and underline the importance of household expectations.

Weber (2021) estimate the causal effect of forward guidance on inflation expectations submitted by households covered in the Nielsen Homescan Panel. Participants are randomly provided with alternative information treatments. The paper finds that the pass-through of forward guidance to real interest rates is limited. Coibion, Georgarakos, Gorodnichenko, Kenny and Weber (2021) study the effect of uncertainty on household spending. The authors confront participants with exogenous variation in individual uncertainty and ask participants to submit their spending intentions. As a key result, they find that higher uncertainty reduces spending.

This paper also adds to the literature on central bank communication and inflation expectations of households and firms. The cross-country evidence suggests that central bank transparency is not very effective. Lustenberger and Rossi (2020) cannot establish firm evidence of an effect of central bank communication on forecast accuracy and forecast dispersion of professional forecasters. Likewise, Jain and Sutherland (2020) show that central bank projections does not cause a smaller dispersion of private-sector forecasts.

Lamla and Vinogradov (2019) conduct a survey among UK households before and after decisions of the Bank of England. This design allows a clean identification of the effects of central bank communication. The authors show that announcements have small effects on the first moments of macroeconomic variables. However, the effects of central bank announcements differ in the cross-section of households. Upon receiving the information from the central bank, better informed survey participants make smaller forecast errors. Lewis et al. (2020) use a daily survey of U.S. households from Gallup. They show that household are attentive to monetary policy decisions. Their economic confidence falls after a positive monetary policy surprise. However, this effect mostly stems from interest rate decisions. Changes in forward guidance are much less effective. As in Lamla and Vinogradov (2019), the authors find large cross-sectional differences in the effectiveness of policy communication. Conrad et al. (2022) support the notion of cross-sectional variation in the responses to policy. They use survey data from Germany and condition the effect of central bank information on idiosyncratic characteristics. In particular, the authors find that individual lifetime experiences affect the adjustment of expectations in light of new information. Kryvtsov and Petersen (2021) conduct a laboratory experiment, which allows a clean identification. Central bank communication has a stabilizing effect of forecasts. Again the authors find evidence for cross-sectional heterogeneity in the responsiveness of participants to policy communication.

De Fiore et al. (2021) trace the responses of households to decisions of the Fed's Federal Open Market Committee (FOMC) using the Survey of Consumer Expectations. Comparing responses before and after the policy announcements, the authors find little evidence of an effect of policy decisions on inflation expectations. Rast (2021) designs a survey among German households that elicits expectations before and after ECB announcements. He finds that households respond to the release of information about conventional monetary policy, i.e. about interest rates, but remain insensitive to information about forward guidance and asset purchase programs, respectively. Brouwer and de Haan (2021) conduct an RCT among Dutch households. Households which receive information about the central bank's actions, in particular the ECB choice of policy instruments, expect inflation to be closer to the ECB's inflation target.

In contrast to this literature, which looks mostly on first moments of households' inflation expectations, we concentrate on second moments such as the interquartile range of the individual distributions of inflation projections. Using micro data from the ECB's Survey of Professional Forecasters, Fernandes (2021) is one of the few papers studying second moments. She shows that ECB communication about forecasts reduces individual forecast uncertainty.

Another strand of the literature studies the effect of dissenting votes and cacophonous communication of policy makers on market participants. Ehrmann and Fratzscher (2013) shed light on the role of dispersed communication by committee members. Their evidence suggests that speaking with one voice reduces the prediction errors of the public. The effect of formal dissent in the FOMC is studied by Madeira and Madeira (2019). Their findings show that the response of the stock market differs between unanimous policy decisions and decisions with dissent. Equity prices increase if a policy decision of the FOMC is unanimous and decrease if dissenting votes are cast.

Tillmann and Walter (2019) build an index of dissent between the presidents of the ECB and the Bundesbank, respectively, based on a textual analysis of their speeches. An increase in the dissent index causes an increase in risk premia and market uncertainty. Using the same data set, Tillmann and Walter (2022) find that a higher disagreement between the two presidents adversely affects the transmission of monetary policy surprises to long-term interest rates. Tillmann (2022) constructs an index of dissent for the ECB and shows that dissent weakens the transmission of monetary surprises on long-term interest rates.

The remainder of this paper is organized as follows: Section two provides some background on the vote in central bank decision making bodies. Section three uses an illustrative model to motivate the regression equation. Section four introduces the survey and section five presents the regression model. The results are discussed in section six with the robustness of the findings analyzed in section seven. Section eight draws conclusions.

2 Dissent in monetary policy committees

In this paper, we concentrate on dissent in the ECB's GovC. On a meeting day of the GovC, the ECB publishes a press release at 13:45 CET, which contains the latest policy decision. At 14:30 CET, the ECB president opens the press conference. After reading the Introductory Statement, which summarizes the Council's assessment of the economic situation and the policy change, both the ECB president and the vice-president are available for questions from journalists. The press conference is very informative: Ehrmann and Fratzscher (2009) find that information revealed during the ECB press conferences has a larger impact on asset prices than information revealed through the policy announcement. Information from the Q&A part of the press conference is particularly informative during volatile periods.

In the Q&A part, journalists often ask whether the policy decision was unanimous. Normally, the president responds by giving his or her assessment of the support the policy enjoys in the GovC. The president does not, however, reveal the name of the dissenter(s), nor the direction of dissent. Thus, the public can learn about the vote from information given to the press. Often the president gives a straightforward answer such as on July 06, 2006:

> Question: "Was the decision unanimous today?"
>
> Trichet: "Yes, very much."

In many other instances, the president reflects on the decision being supported "overwhelmingly" (e.g. August 03, 2006) or was taken "by consensus" (e.g. June 05, 2008).[4] These characterizations imply that some members voted against the policy proposal. In addition, the president sometimes uses a sharper formulation, e.g. on September 06, 2012, when the exchange with a journalist reads as follows:

> Question: "My question regards the vote today. Was it unanimous and, if not, what does it mean?"
>
> Draghi: "Well, it was not unanimous. There was one dissenting view. We do not disclose the details of our work. It is up to you to guess."

[4]The quotes from the press conferences are taken from the transcripts, which are available on the ECB's website at https://www.ecb.europa.eu/press/pressconf/html/index.en.html.

In our survey experiment introduced below, we provide participants with information treatments that mimic the information about unanimity and dissent giving in the press conference. In some press conferences, the ECB president stresses the unanimous vote but at the same time acknowledges different opinions among GovC members, e.g. in the following quote from February 05, 2009:

> Trichet: “We were unanimous in taking our decision, which does not mean that we all have the same view.”

Consistently, we allow for another treatment in our RCT which we label ”unanimity despite different views”.

Tillmann (2022) studies the transcripts of the ECB press conferences and constructs a binary index of dissent from the president’s answers to journalists. In the 123 meetings considered in the analysis, he finds 25 meetings with at least one dissenting member. The frequency of dissent in the GovC is lower than for the Federal Open Market Committee (FOMC), the policy-making body of the Fed. Using the data set compiled by Thornton and Wheelock (2014), Tillmann (2022) reports a share of at least one dissenting vote of 40% for the 202 meetings between February 1994 and September 2018. For the BoE’s Monetary Policy Committee, Riboni and Ruge-Murcia (2014) calculate a frequency of dissent of 63%. For the Swedish Riksbank, the authors find a dissenting vote in 38% of all policy meetings. Ruge-Murcia and Riboni (2017) study the decision making procedure at the bank of Israel and find a probability of at least one dissenting member of 31% between 2011 and 2015.

Thus, compared to other central banks dissent in the GovC is relatively infrequent. This diagnosis reflects the nature of policy making at the ECB as being highly consensual. In fact, ECB president Draghi argued that ”Given the peculiar nature of the ECB, one of my objectives is that we have as much consensus as possible.”[5] Consequently, Blinder (2007) characterizes the GovC as a ”genuinely-collegial committee”. The relatively low frequency of dissent also implies that dissent is particularly noteworthy. While Blinder (2007) argues that there is ”no (or negligible) public disagreement” among members of the GovC. However, the fierce disagreement between the presidents of the Bundesbank and the ECB in the decade after the 2008 financial crises indicates that the nature of the committee might have changed over time.

Gerlach-Kristen (2004), Gerlach-Kristen and Meade (2010), Horvath et al. (2012), Neuenkirch (2013) and Riboni and Ruge-Murcia (2014) provide evidence for different central banks which is consistent with the notion that the vote in the decision

[5] See https://www.ecb.europa.eu/press/key/date/2012/html/sp120224.en.html.

making committee helps the public forecast future policy. This implies that dissent is an important piece of information that observers take into account when forming expectations.

3 An illustrative model

This section provides an illustrative model of a household receiving a noisy public signal about a future fundamental θ. The model is meant to provide a simple framework to derive the regression equation and interpret the estimated coefficients. In the model, agents forecast a fundamental θ. In our application, we ask survey participants for the expected future inflation rate. Each household i forms expectations $E_i(\theta)$ and wants to minimize the forecast error variance.

Let us assume that each household has a prior about θ, which is unbiased, yet noisy. We could think of this as the individual inflation forecast before the central bank meeting. The prior is $x_i = \theta + \varepsilon_i$, where ε_i is i.i.d.-normal noise with zero mean and a variance σ_ε^2. The noise is uncorrelated across households. The precision of the prior is defined as $e \equiv 1/\sigma_\varepsilon^2$.

Each household receives a public signal, $y = \theta + \eta$, which is also unbiased, yet noisy. We could think of the policy announcement or the Introductory Statement to the press conference on the meeting day of the ECB as a public signal about θ. Thus, a non-unanimous policy decision is an example of a noisy signal. Dissent increases the noise incorporated in the signal. The noise, η, is normally distributed with zero mean and variance σ_η^2. As before, we define the precision as the inverse of the variance, i.e. $u \equiv 1/\sigma_\eta^2$.

In this framework, the expected fundamental is

$$E_i(\theta) = \frac{ex_i + uy}{e+u} = \theta + \frac{e\varepsilon_i + u\eta}{e+u}. \tag{1}$$

The optimal expectation is a weighted average of the prior and the public signal, where the weights are the precisions of the two pieces of information. The model implies that both the prior and the signal affect expectations as long as each is not infinitely noisy. Reorganizing this equation gives

$$E_i(\theta) - x_i = \frac{u}{e+u}(y + x_i). \tag{2}$$

By how much the household updates its prior is a function of the distance between the public signal and the individual prior. This equation is the basis for our regression specification introduced below. The revision of expectations is larger if u is

higher, i.e. when the public signal is more informative.
As mentioned before, one way to interpret dissent in this model is in terms of a fall in the precision u of the public signal. However, there is an alternative interpretation. If households interpret dissent as a sign that all arguments were brought to the table and a more thoughtful decision has been made, dissent could be consistent with a higher precision of the public signal.

4 The survey

We study the impact of the vote in the GovC on inflation expectations in a Randomized Controlled Trial (RCT). For that purpose, we contributed two questions to wave 19 (July 2021) of the BOP-HH. This survey is conducted regularly since 2019 as an online panel of several thousand households in Germany.[6]

4.1 Design of the RCT

The RCT is conducted in two stages. In the first stage, the pre-treatment stage, households are prompted to submit their minimum and maximum inflation expectation. In the treatment stage, participants are randomly assigned to four groups: a control group and three treatment groups. In the following, we explain the survey design in detail.

Pre-treatment stage. We provide participants with the following information:

> "Assume that the European Central Bank (ECB) is aiming for an annual inflation rate of 2% over the medium term. Please also assume that the inflation rate is 1% in 2021. The ECB Governing Council decides to keep the policy rate at 0%."

Participants could click on two information boxes in order to acquire additional information about the meaning of "Governing Council" and the "policy rate". We then ask the following question:

> "In your opinion, how high will the inflation rate be at least over the next one to two years? And at most?".

[6]Details about the survey are available at https://www.bundesbank.de/en/bundesbank/research/survey-on-consumer-expectations. The survey is conducted in German. Here, we use the translation available on the Bundesbank website.

Table 1: Groups

$T = 1$	control group
$T = 2$	unanimity (*una*)
$T = 3$	dissent (*dis*)
$T = 4$	unanimity despite different views (*unadis*)

Figure (2) shows a screen shot of the survey question. The answers provide us with the minimum and maximum expected inflation rate for each participant.

Treatment stage. We repeat the information about the inflation target, the current inflation rate and the policy decision from the pre-treatment stage. We then randomly assign each participant to one of four alternative groups, three of which correspond to a specific information treatment. After receiving the information treatment, participants are asked the following probabilistic question:

> "In your opinion, how likely is it that the rate of inflation will change as follows over the next one to two years? Note: The aim of this question is to determine how likely you think it is that something specific will happen in the future. You can rate the likelihood on a scale from 0 to 100, with 0 meaning that an event is completely unlikely and 100 meaning that you are absolutely certain it will happen. Use values between the two extremes to moderate the strength of your opinion. Please note that your answers to the categories have to add up to 100."

Participants are offered ten bins ranging from a deflation rate of 12% or higher to an inflation rate of 12% or higher. The width of the outer bins is four percentage points, while the width of the inner bins is two percentage points. The number of bins and the varying width of bins is identical to the Survey of Consumer Expectations run by the Federal Reserve Bank of New York. From these answers, we obtain the individual probability distribution of future inflation es explained below.

We randomly allocate participants into groups and provide the treatments (T) given in Table (1).[7] The first group ($T = 1$) corresponds to our control group. We do not provide any additional information to participants in this group. Survey participants in the first treatment group ($T = 2$) receive the following information:

> "The ECB President informs the media that this was a unanimous decision."

[7] Screenshots of these survey questions are available in Figures (3) to (6).

As discussed before, this treatment corresponds to the information provided during several press conferences in the past. In the regression model below, we index this treatment by *una*.
The second treatment group ($T = 3$) receives the following information:

> "The ECB President informs the media that this was a majority decision, i.e. there were dissenting votes."

This is the treatment we are most interested in. In the regression model below, we index this treatment by *dis*.
Finally, the last group ($T = 4$) receives the following information:

> "The ECB President informs the media that this was a unanimous decision despite different opinions."

In the regression model below, we index this treatment by *unadis*. We include this specific treatment for two reasons. First, as mentioned before, we find ECB press conferences during which the president classifies a decision as unanimous and at the same time mentions different opinions of GovC members. Second, it could be argued that unanimity despite different views is particularly informative as this implies that the full range of arguments has been put forward during the meeting. As a consequence, household could interpret such a decision as particularly thoughtful and, hence, informative for inflation expectations.
In our robustness analysis, we also draw on survey question CM004, which is routinely asked by the Bundesbank. In this question, participants are asked:

> In your opinion, how likely is it that the rate of inflation will change as follows over the next twelve months?

Participants are offered the identical set of bins that we use in our questions from the treatment stage and are asked to allocate 100 points across the bins. This question is very similar to our question from the treatment stage. There are two main differences, though: the first difference is that the horizon of the inflation forecast is specified as one year, while in our question the horizon is "the next one to two years". The second difference is that in question CM004, participants are not provided with information about the inflation target, the current inflation rate and the current policy rate.
2927 participants completed the survey. Survey participants also provide socio-demographic information about gender, age, household income, their employment status, the years of schooling and much more. We use this information as control variables in our regression model.

4.2 Inferring individual probability distributions

In order to estimate the effect of dissent on individual inflation uncertainty, we first need to fit distributions to the respondents' answers. We fit a triangular distribution to the answers from the pre-treatment stage. Figure (1) shows that the triangular distribution is defined by its lower limit a, upper limit b and mode c. We set a and b to the minimum and maximum expectation elicited from the survey. Because we do not know c, we assume the triangular distributions to be symmetric. This implies that the mean, median and mode of the triangular distribution equal $\frac{a+b}{2}$. Below, we show that the results are robust with respect to assuming a symmetric distribution at the pre-treatment stage.

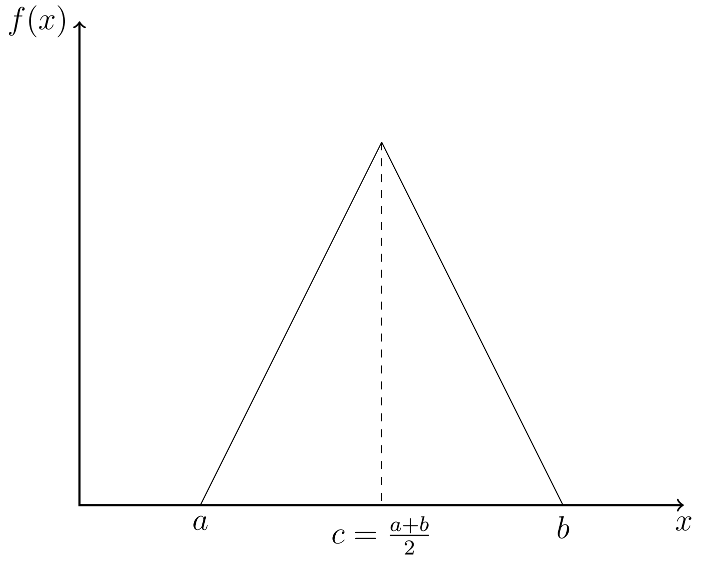
In order to fit distributions to the histograms of the answers from the treatment stage, we follow the method used in the Survey of Consumer Expectation from the Federal Reserve Bank of New York. This approach in turn is based on Engelberg, Manski and Williams (2009). The distribution of respondents who use two bins is assumed to be a symmetric triangular distribution. Either the upper limit a or the lower limit b is set to the outer limit of the bin in which the forecaster places more than 50% probability mass. The remaining parameters must be fitted by taking the height and center of the triangle into account. For example, if a respondent puts 10% probability in the interval [0%, 2%] and 90% in the interval [2%, 4%], the upper limit b of the distribution is fixed to 4. a is fitted to 1.42. Because the distribution is symmetric, c equals $\frac{a+b}{2} = 2.71$. Note that this procedure can only be applied to respondents using two adjacent bins.

If a forecaster places weights in more than two bins, a generalized β distribution is fitted. This distribution is not necessarily symmetric. The bins, moreover, do not have to be adjacent. For a more detailed description of the method, see Armantier et al. (2017). We deviate from this method by fitting symmetric triangles to histograms with only one bin instead of fitting a uniform distribution. This is in line with Engelberg, Manski and Williams (2009) and consistent with our method used in the pre-treatment step. The parameters a and b of the triangular distribution are then set to the limits of the interval. Once we fitted these distributions to the individual responses, we can compute the mean, the standard deviation and the interquartile range, which we use as dependent variables in our regression model.

5 Empirical model

We follow the literature (e.g. Coibion, Georgarakos, Gorodnichenko and Weber, 2021; Coibion, Georgarakos, Gorodnichenko, Kenny and Weber, 2021) and test the

Figure 1: Probability density function of a symmetric triangular distribution



Notes: The lower (upper) limits are denoted by a (b). The mode is given by c.

updating of information in light of a noisy public signal using the following regression for respondent i

$$x_i^{post} = c + \alpha x_i^{pre} + \sum_{T=2}^{4} \beta_T I_i^{(T)} + \sum_{T=2}^{4} \gamma_T \left(I_i^{(T)} \times x_i^{pre} \right) + \omega_i, \qquad (3)$$

where x_i^{post} is the individual expectation in the treatment stage, x_i^{pre} denotes expectations from the pre-treatment stage, I_i^T is an indicator variable equal to one if respondent i receives treatment T and zero otherwise. x_i^{pre} and x_i^{post}, respectively, denote the interquartile range, the standard deviation or the mean of the individual distribution. The control group ($T = 1$) is our reference category such that we include three treatments. The error term is ω_i. The coefficients are denoted α, β and γ. We will also estimate a specification with an additional vector of respondent-specific control variables and a specification where we interact the level effect of the treatments with specific control variables.

α can be interpreted as the weight the control group attaches to prior information. Because the control group is not provided with any new information, we expect α to be close to one. For a given T, $\alpha + \gamma_T$ is the weight attached to prior information. The coefficient γ_T should be more negative for more informative treatments. If the treatment is informative, the respondent should place less weight on x_i^{pre} and more weight on the treatment. The "level effects" (Coibion, Georgarakos, Gorodnichenko and Weber, 2021) β_T can be positive or negative.

We expect $T = 3$ to be particularly informative. If the respondent receives information on dissent in the Governing Council, she should most strongly revise her expectations. Hence, we expect γ_{dis} to be the most negative of the three γ coefficients. Furthermore, the level effect β_{dis} should be positive and the largest of the three β coefficients. We follow Coibion, Georgarakos, Gorodnichenko and Weber (2021) and Coibion, Georgarakos, Gorodnichenko, Kenny and Weber (2021) and estimate the equation using robust Huber regressions.

6 Results

We first present results for the uncertainty of forecasters measured as either the interquartile range or the standard deviation of the individual probabilistic forecasts. As dissent in the GovC should primarily affect the second moments of forecasts, these results are our baseline findings. In the second step, we report the results for the mean of the individual probabilistic forecasts. That is, we assess whether dissent effects first moments as well.

In each case, we report our results for two alternative corrections of outliers. In the first correction, we drop responses that put 100% probability on either of the outer bins in the treatment stage, i.e. more than 12% inflation or deflation, and responses of inflation or deflation of more than 100% in the pre-treatment stage.

Further, we noticed there are participants whose responses are inconsistent. There are some respondents in the control group who have expectations from the pre-treatment stage that are very different from those from the treatment stage. This may be due to general difficulties with the density forecasts in the treatment stage or by simply confusing inflation and deflation. Inconsistent answers could bias our results. Therefore, we additionally exclude respondents in our second correction whose change in the interquartile range between the pre-treatment and the treatment stage is larger than the 95th percentile of all changes. The first (second) outlier correction leaves us with 2,520 (2,338) respondents.

We also report our findings with and without a large set of respondent-specific control variables. As the allocation of respondents into groups is random, the group-specific coefficients should not by systematically affected by respondent-specific characteristics. However, adding control variables to our regression specification should reduce the standard errors of the estimates.

6.1 The effect on the uncertainty of forecasters

In our baseline model, we employ the interquartile range of the individual probabilistic distribution for each forecaster i as our dependent variable x_i^{post}. x_i^{pre} is the corresponding interquartile range from the pre-treatment stage. The estimated coefficients are reported in Table (2). We obtain an estimated α which is positive and relatively close to one. All four estimates of α are larger than 0.8. Hence, respondents in the control group put a large weight on their prior. For our research question, the estimated β and γ coefficients are most relevant. The estimated β_{una} is significantly positive across all four specifications. Hence, respondents subject to the unanimity-treatment have more uncertain inflation expectations given their expectations from the pre-treatment stage than the control group. When receiving information about dissent, our second treatment, respondents formulate an even more uncertain inflation outlook as the estimated β_{dis} is positive and larger than β_{una}. Hence, dissent in the GovC raises the uncertainty of households about future inflation. This is one key result of this paper, which is in line with our conjecture discussed before. In the baseline specification, the difference between the estimated β_{una} and β_{dis} lacks statistical significance. Below, we let the treatments interact with personal characteristics such as age or years of education. Allowing for this interaction allows us to reject the hypothesis $\beta_{una} = \beta_{dis}$ at high levels of significance. It is important to emphasize that the estimated β_{una} is always significantly positive. Relative to the control group, the announcement of a unanimous decision raises uncertainty. Put differently, stressing the unanimous nature of the decision does not reduce uncertainty. In fact, uncertainty increases relative to the control group. The third treatment, unanimity despite different views among committee members, has no effect on inflation uncertainty as the estimated coefficient remains insignificant across all specifications.

The estimated γ coefficients show the impact of the information treatment on the dependent variable conditional on the extent of uncertainty in the pre-treatment stage. For all four specifications, the estimated γ_{una} and γ_{dis} are significantly negative. This means that individuals with a high degree of uncertainty in the pre-treatment stage relative to the control group are particularly sensitive to the provision of information. Put differently, the treatments are informative such that respondents put significantly less weight on their prior. The information about dissent in the GovC is more informative than information about a unanimous vote. We can reject the hypothesis $\gamma_{una} = \gamma_{dis}$ at high levels of significance. Upon receiving information about a unanimous vote despite opposing views among council members, survey respondents increase rather than reduce the weight attached to the distribution in the pre-treatment stage. Hence, this treatment is the least informative. We can conclude that dissenting votes in the GovC raise inflation uncertainty among households. The households subject to information about dissent put less weight on their interquartile range from the first-stage relative to the control group.

We also include a large set of control variables ranging from gender, age, income to the employment status and the years of education. It turns out that younger survey participants below the age of 44 are more uncertain about the evolution of inflation. Participants with a higher number of years of schooling submit a significantly wider distribution of inflation expectations. Hence, inflation uncertainty increases with education. Most of the other control variables remain insignificant.

In an alternative regression model, we use the standard deviation of individual forecast distributions as the dependent variable. The results are shown in Table (3). The results are very similar to the baseline findings in Table (2). Among the "level effects", the information about dissent in the GovC is most powerful: individual distributions of expected inflation are significantly wider compared to the control group as a result of the dissent-treatment. This effect remains stable across all four alternative specifications reported in the table. Again, the information about dissent is most informative across treatments. Agents receiving information about dissent revise their individual probability distribution more strongly compared to all other treatments. Hence, our key finding remains unchanged: dissent among policymakers causes a more uncertain inflation outlook. As expected, all findings remain unchanged if we include control variables.

6.2 Interacting the treatment

In this subsection, we let the treatment interact with subject-specific control variables such as age and years of education. The extended estimation equation reads

$$x_i^{post} = c + \alpha x_i^{pre} + \sum_{T=2}^{4} \beta_T I_i^{(T)} + \sum_{T=2}^{4} \gamma_T \left(I_i^{(T)} \times x_i^{pre} \right) + \sum_{T=2}^{4} \Delta_T \left(I_i^{(T)} \times C_i \right) + \Gamma \Psi_i + \omega_i, \tag{4}$$

where Ψ_i is a vector of controls with a vector of coefficients Γ. We let a subset C_i of the controls interact with the treatments with the coefficients collected in Δ. The subset consists of two control variables, the years of schooling and the age of the respondent. Because participants are not asked directly about the number of years of their education, but rather about their highest level of educational attainment and their level of vocational training or university degree, we need to calculate the years of education. We therefore follow the procedure of the German Socio-Economic

Panel conducted by the German Institute for Economic Research (DIW Berlin).[8]
We perform two estimations for each control variable with the interquartile range and the standard deviation as dependent variables. In order to exclude outliers, we consider only respondents whose change in the interquartile range is smaller than the 95th percentile.
Table 4 shows the results. As with the baseline estimates, estimated α is close to one and ranges from 0.8 to 0.825 for all specifications. Considering the level effects, the estimated β_{dis} are always largest. In specifications I and III, where we interact the level effects of the treatments with the age of the respondents, the estimated β_{una} is positive and significant, whereas in the estimates with years of education, columns II and IV, it is not significantly different from zero.
At the bottom of the table, we report the p-value for the null hypothesis that $\beta_{una} = \beta_{dis}$ or $\gamma_{una} = \gamma_{dis}$. In contrast to the baseline specification that excludes interaction terms, we can reject the null hypothesis of equal coefficients for the level effects and the slope effects and for all four columns. Hence, dissent causes a significantly higher inflation uncertainty relative to unanimity. The estimate of γ_{dis} is mostly negative. Except for one specification, this coefficient is also significantly different from γ_{una}. To sum up, the dissent treatment appears most informative and causes significantly higher forecast uncertainty.
We now look at the interaction with the age of the respondents. The interaction between disagreement is the only interaction term that enters with a significant coefficient. Thus, dissent among policymakers leads to a lower uncertainty for respondents under 45 years of age. No significant interaction coefficients can be found in the specification with the years of education.

6.3 The effect on the forecast mean

The results shown so far shed light on the causal effect of the vote in the GovC on the second moment of households' inflation expectations. We now ask whether the vote also changes the mean of the individual probability distributions. While we expected dissent to cause higher inflation uncertainty, we remain agnostic about the effect on first moments.
Table (5) shows the estimated coefficients. The estimated α coefficients are significantly positive. Thus, individuals in the control group put a large weight on their prior inflation expectation. When the ECB president disseminates information about dissenting votes, survey participants put significantly more weight on

[8] You can find this procedure here: https://www.diw.de/documents/dokumentenarchiv/17/diw_01.c.410636.de/pgen-v28.pdf

their prior mean as the estimated γ coefficients are positive. Information about unanimity or unanimity despite opposing views remains mostly insignificant. This is a major difference compared to the effect of the treatments on the second moments discussed in the previous section.
Another difference pertains to the "level effects" as reflected in the estimated β coefficients. Providing participants with information about dissent lowers the mean inflation forecast. This response is consistent with the notion that the economy is at the zero lower bound. Since the survey question is about conventional interest rate policy only and does not mention unconventional policy, survey participants could be tempted to think that dissenting votes are necessarily in favor of higher interest rates. If dissenting votes are considered a predictor of future policy, a lower rather than higher inflation rate can be justified.

7 Robustness

The baseline regression model compares second moments of individual distributions from the treatment-state to the distribution in the first stage. The first stage distribution, however, is based on the assumption of the inflation distribution being described by an isosceles triangle between the minimum and maximum future inflation rate. We now relax the assumption that the individual triangular distributions in the pre-treatment stage are symmetric. Thus, we allow for a skewed distributions. We replace the assumed isosceles triangle by two alternatives. The details of these computations are explained in the appendix.
First, we draw on a question on the individual probabilistic inflation forecast asked earlier in the sample (question CM004). This question is routinely included in each wave of the BOP-HH survey. We assume the individual prior distributions in our pre-treatment stage to have the same skewness as the distributions in question CM004. The key advantage of using answers to this question to infer the skewness of the distributions of inflation expectations is that the design of the answer categories is identical to our survey question: participants can allocate 100 points to ten bins of future inflation rates. The drawback is that the verbal framing of the question differs slightly from our question. Participants are not provided with information about current inflation and the recent policy decision and are asked to provide a probabilistic assessment of inflation over the next 12 months rather than over the next one to two years as in our survey questions. Hence, there are advantages and disadvantages of using answers to this question in order to infer the skewness of the prior distribution of expectations. We need to keep these limitations into account

when interpreting the results. As we interpret the coefficients relative to the control group, however, the slight difference in the framing of the questions should not matter much.

In the second alternative, we assume the prior distribution between the minimum and maximum to have the average skewness of the control group. The control group is not provided any new information in the treatment stage, such that the skewness of their prior and posterior distributions should not differ. The advantage of this approach is consistency: we use the skewness based on exactly the same survey design. The disadvantage is that we have to rely on average skewness rather than the skewness of the individual distribution.

7.1 The effect on the uncertainty of forecasters

Table (6) shows the results for the interquartile range when we impose the skewness from survey question CM004. Our key findings remain unchanged: the estimated β_{dis} is significantly positive across all four specifications and is larger than β_{una} or β_{unadis}. Participants face a higher uncertainty about future inflation when receiving information about dissent in the committee. Moreover, participants put less weight on their prior distribution as the information about dissent is highly informative. Receiving information about dissent reduces the impact of the prior distribution much more than receiving information about a unanimous vote. For the standard deviation of the individual inflation distribution, see Table (7), the results also remain unchanged. Again, the "level effect" of dissent is positive and highly statistically significant. The "slope effect", i.e. the estimated γ coefficients, are significantly negative for participants provided with information about dissenting votes.

We now turn to the second alternative to model the prior distribution based on the mean skewness of the control group. Table (8) contains the estimated coefficients when the interquartile range is used as a dependent variable. Information about dissent raises participants' inflation uncertainty. This treatment is more effective than the provision of information about a unanimous vote. Again we find that participants put less weight on their prior distribution when receiving information about dissent compared to information about unanimity. These findings also prevail when we replace the dependent variable by the standard deviation of individual distributions as shown in Table (9).

We can conclude that the key results of this paper remain robust with respect to the modeling of the pre-treatment stage. For individual skewness from survey question CM004 or for average skewness from the control group, dissenting votes raise inflation uncertainty.

7.2 The effect on the mean of forecasts

Table (10) shows the results for the mean inflation forecast when we use the skewness from question CM004, while Table (11) reports the coefficients when the average skewness of the control group is used. In both cases, the estimated β_{dis} is significantly negative as in the baseline model discussed before. Participants forecast a lower mean inflation rate when receiving information about dissent. The coefficient on the interaction term with the mean of the prior distribution is positive - very much like in the baseline model. This implies that participants rely more heavily on the mean of their prior distribution when provided with information about dissenting votes. The effect of the other treatments remains mostly insignificant.

8 Conclusions

Over the pact decades, central bank have intensified their communication with professional market participants. Recently, central banks go beyond financial professionals and also try to reach private households. One element of the vast array of information provided by central banks is the vote on monetary policy. In the case of the ECB, the voting outcome is not officially announced. Rather, the ECB president characterizes her or his assessment of the views among committee members.

In this paper, we studied the impact of information about the vote in the GovC on inflation expectations. We run a survey with an RCT in order to elicit the causal effect of unanimity or dissent, respectively, on households' distributions of expected future inflation. Our first result suggests that the vote is very informative for households. Households revise their subjective distribution of inflation upon receiving information about the vote. A second results is that dissent raises households' uncertainty about inflation. We further find that unanimity does not reduce the uncertainty of households around the inflation path. Hence, the vote in the GovC is a significant determinant of inflation uncertainty. To the extent that individual inflation uncertainty translates into uncertainty about the real interest rate, higher inflation uncertainty has real economic consequences.

In light of these findings, the current way the ECB communicates diverging views in the GovC should be overhauled. Whether or not the ECB president mentions the vote in the GovC during the press conference and how she assesses the views of GovC members lies in the discretion of the president. This discretionary nature adds to the uncertainty about the vote. In addition, households and market participants have to wait for the release of the Monetary Policy Accounts three weeks after the meeting in order to get a glimpse of the potential reasons for dissenting views.

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Appendix: Skewness

In this appendix, we explain how we calculate the skewness and the percentiles when we drop the assumption that the individual triangular distributions in the pre-treatment stage are symmetric. To measure the skewness of the distributions in question CM004 and of the control group, we use Bowley's (1920) approach, which is given by

$$Skew_i = \frac{p75_i + p25_i - (2 \times p50_i)}{p75_i - p25_i}, \tag{5}$$

where $p25_i$, $p50_i$ and $p75_i$ are the 25th, 50th and 75th percentiles of the distribution of participant i, respectively.
In general, the symmetric or skewed triangular distribution is defined by its lower limit a, the upper limit b and the mode c. The cumulative distribution function can be expressed as

$$F(x) = \begin{cases} 0 & x \leq a \\ \frac{(x-a)^2}{(b-a)(c-a)} & a < x \leq c \\ 1 - \frac{(b-x)^2}{(b-a)(b-c)} & c < x < b \\ 1 & b \leq x. \end{cases} \tag{6}$$

Based on the individual values for a_i, b_i and c_i, the 25th, 50th and 75th percentiles of the individual distributions are given by

$$F_i(0.25) \equiv p25_i = a_i + 0.5\sqrt{(b_i - a_i)(c_i - a_i)}, \tag{7}$$

$$F_i(0.5) \equiv p50_i = \begin{cases} a_i + \sqrt{\frac{(b_i-a_i)(c_i-a_i)}{2}} & c \geq \frac{a_i+b_i}{2} \\ b_i - \sqrt{\frac{(b_i-a_i)(b_i-c_i)}{2}} & c \leq \frac{a_i+b_i}{2}, \end{cases} \tag{8}$$

and

$$F_i(0.75) \equiv p75_i = b_i - 0.5\sqrt{(b_i - a_i)(b_i - c_i)}. \tag{9}$$

Inserting (7), (8) and (9) in (5) yields

$$Skew_i = \frac{1}{N_i} \begin{cases} M_i - 2\left(a_i + \sqrt{\frac{(b_i-a_i)(c_i-a_i)}{2}}\right) & c_i \geq \frac{a_i+b_i}{2} \\ \\ M_i - 2\left(b_i - \sqrt{\frac{(b_i-a_i)(b_i-c_i)}{2}}\right) & c_i \leq \frac{a_i+b_i}{2} \end{cases} \tag{10}$$

with $M_i \equiv b - 0.5\sqrt{(b_i - a_i)(b_i - c_i)} + a_i + 0.5\sqrt{(b_i - a_i)(c_i - a_I)}$ and $N_i \equiv b_i - 0.5\sqrt{(b_i - a_i)(b_i - c_i)} - (a_i + 0.5\sqrt{(b_i - a_i)(c_i - a_i)})$.

According to (10), skewness now depends on a_i, b_i and c_i. Because solving for c_i is not straightforward, we minimize the squared deviation between $Skew_i$ and either the skewness from question CM004 or the average skewness of the control group, depending on the specification.
We solve

$$\min_{a_i<c_i<b_i} \left[S_i(a_i, b_i, c_i) - \tilde{S}_i\right]^2 \tag{11}$$

or

$$\min_{a_i<c_i<b_i} \left[S_i(a_i, b_i, c_i) - \tilde{S}_{control}\right]^2, \tag{12}$$

respectively, where $\tilde{S}_i$ denotes the skewness of respondent i's distribution based on question CM004. $\tilde{S}_{control}$ is the average skewness of the control group. Knowing the optimal value for c_i, the asymmetric distribution is defined and we can calculate the standard deviation and the interquartile range as well as the mean.

Appendix: Tables

Table 2: The effect on the interquartile range in the baseline model

	I	II	III	IV
α	0.812 [0.033***]	0.817 [0.033***]	0.815 [0.033***]	0.816 [0.032***]
β_{una}	0.163 [0.049***]	0.194 [0.048***]	0.168 [0.050***]	0.197 [0.047***]
β_{dis}	0.216 [0.052***]	0.238 [0.051***]	0.234 [0.054***]	0.266 [0.049***]
β_{unadis}	−0.146 [0.050***]	−0.050 [0.049]	−0.082 [0.054]	−0.022 [0.048]
γ_{una}	−0.309 [0.042***]	−0.374 [0.041***]	−0.315 [0.048***]	−0.382 [0.041***]
γ_{dis}	−0.401 [0.049***]	−0.445 [0.048***]	−0.407 [0.049***]	−0.494 [0.047***]
γ_{unadis}	0.296 [0.045***]	0.134 [0.044***]	0.291 [0.052***]	0.093 [0.045]
Female		−0.001 [0.028]		−0.003 [0.027]
Age under 25		0.362 [0.103***]		0.372 [0.102***]
Age 25-34		0.272 [0.076***]		0.255 [0.074***]
Age 35-44		0.171 [0.067**]		0.181 [0.065***]
Age 45-54		0.086 [0.064]		0.085 [0.062]
Age 55-64		0.051 [0.060]		0.058 [0.058]
Age 65-75		−0.035 [0.050]		−0.036 [0.048]
HHincome under 1500		−0.162 [0.077**]		−0.138 [0.076*]
HHincome 1500-3000		−0.070 [0.058]		−0.060 [0.056]
HHincome 3000-6000		−0.025 [0.025]		−0.016 [0.054]
HHincome over 6000		−0.056 [0.060]		−0.045 [0.057]
City under 5000		−0.107 [0.049**]		−0.103 [0.047**]
City 5000-20000		−0.020 [0.042]		−0.015 [0.040]
City 20000-100000		0.010 [0.041]		0.014 [0.040]
City 100000-500000		0.061 [0.047]		0.066 [0.045]
Employed		−0.046 [0.043]		−0.049 [0.042]
Years of education		0.027 [0.008***]		0.028 [0.009***]
HHsize		−0.000 [0.000]		−0.000 [0.000]
East Germany		0.004 [0.037]		0.004 [0.036]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior interquartile range. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***,** and * denote significance at 1%, 5% and 10% levels.

Table 3: The effect on the standard deviation in the baseline model

	I	II	III	IV
α	0.789 [0.033***]	0.790 [0.033***]	0.795 [0.033***]	0.806 [0.032***]
β_{una}	−0.002 [0.035]	−0.001 [0.034]	0.114 [0.034***]	0.140 [0.033***]
β_{dis}	0.122 [0.036***]	0.150 [0.036***]	0.150 [0.038***]	0.182 [0.035***]
β_{unadis}	−0.044 [0.035]	−0.024 [0.035]	−0.036 [0.038]	−0.006 [0.034]
γ_{una}	0.014 [0.042]	0.012 [0.042]	−0.312 [0.045***]	−0.389 [0.041***]
γ_{dis}	−0.320 [0.049***]	−0.395 [0.048***]	−0.390 [0.056***]	−0.481 [0.048***]
γ_{unadis}	0.127 [0.045***]	0.093 [0.044**]	0.115 [0.058**]	0.060 [0.046]
Female		−0.010 [0.020]		−0.007 [0.019]
Age under 25		0.243 [0.073***]		0.247 [0.071***]
Age 25-34		0.187 [0.073***]		0.180 [0.052***]
Age 35-44		0.110 [0.047**]		0.122 [0.046***]
Age 45-54		0.059 [0.045]		0.063 [0.044]
Age 55-64		0.040 [0.042]		0.044 [0.041]
Age 65-75		−0.020 [0.035]		−0.023 [0.034]
HHincome under 1500		−0.118 [0.054**]		−0.094 [0.053*]
HHincome 1500-3000		−0.054 [0.041]		−0.052 [0.039]
HHincome 3000-6000		−0.022 [0.039]		−0.012 [0.038]
HHincome over 6000		−0.044 [0.042]		−0.038 [0.040]
City under 5000		−0.080 [0.034**]		−0.072 [0.033**]
City 5000-20000		−0.019 [0.029]		−0.014 [0.028]
City 20000-100000		0.003 [0.029]		0.007 [0.028]
City 100000-500000		0.043 [0.033]		0.048 [0.032]
Employed		−0.037 [0.030]		−0.034 [0.030]
Years of education		0.018 [0.006***]		0.018 [0.006***]
HHsize		−0.000 [0.000]		−0.000 [0.000]
East Germany		0.003 [0.026]		0.008 [0.025]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior standard deviation. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 4: Interacting the treatments

	Interquartile range		Standard deviation	
	I	II	III	IV
α	0.825 [0.032***]	0.816 [0.032***]	0.801 [0.032***]	0.802 [0.032***]
β_{una}	0.187 [0.050***]	0.066 [0.260]	0.132 [0.035***]	0.043 [0.183]
β_{dis}	0.300 [0.052***]	0.606 [0.261***]	0.197 [0.036***]	0.430 [0.184**]
β_{unadis}	−0.042 [0.051]	0.109 [0.262]	−0.011 [0.036]	0.090 [0.185]
γ_{una}	−0.398 [0.041***]	−0.389 [0.040***]	−0.400 [0.041***]	−0.392 [0.041***]
γ_{dis}	−0.474 [0.047***]	−0.492 [0.047***]	−0.444 [0.048***]	−0.477 [0.048***]
γ_{unadis}	0.123 [0.045***]	0.095 [0.045**]	0.066 [0.046]	0.066 [0.046]
Age under 45 $\times una$	0.044 [0.087]		0.042 [0.061]	
Age under 45 $\times dis$	−0.207 [0.088**]		−0.135 [0.045**]	
Age under 45 $\times unadis$	0.090 [0.090]		0.012 [0.063]	
Years of education $\times una$		0.012 [0.022]		0.009 [0.016]
Years of education $\times dis$		−0.029 [0.022]		−0.022 [0.016]
Years of education $\times unadis$		−0.011 [0.022]		−0.009 [0.016]
$H_0 : \beta_{una} = \beta_{dis}$	$p = 0.025$	$p = 0.037$	$p = 0.062$	$p = 0.025$
$H_0 : \gamma_{una} = \gamma_{dis}$	$p = 0.075$	$p = 0.015$	$p = 0.309$	$p = 0.049$
Controls	✓	✓	✓	✓
# obs.	2,393	2,391	2,391	2,391

Notes: Dependent variable is the posterior interquartile range for specifications (I) and (II) and the posterior standard deviation for (III) and (IV). We drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For every specification, we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 5: The effect on the mean in the baseline model

	I	II	III	IV
α	0.642 [0.017***]	0.631 [0.017***]	0.726 [0.017***]	0.695 [0.017***]
β_{una}	−0.083 [0.094]	−0.082 [0.048]	−0.041 [0.093]	0.238 [0.094**]
β_{dis}	−0.480 [0.089***]	−0.460 [0.089***]	−0.272 [0.010***]	−0.295 [0.091***]
β_{unadis}	0.116 [0.091]	0.086 [0.049]	0.001 [0.090]	−0.075 [0.048]
γ_{una}	0.033 [0.022]	0.034 [0.021*]	0.014 [0.023]	−0.094 [0.023***]
γ_{dis}	0.166 [0.020***]	0.159 [0.020***]	0.084 [0.024***]	0.092 [0.022***]
γ_{unadis}	−0.012 [0.021]	−0.003 [0.020]	0.019 [0.022]	0.044 [0.020**]
Female		0.015 [0.044]		0.018 [0.042]
Age under 25		−0.377 [0.104**]		−0.454 [0.159***]
Age 25-34		−0.563 [0.118***]		−0.583 [0.115***]
Age 35-44		−0.267 [0.105**]		−0.264 [0.102**]
Age 45-54		−0.221 [0.100**]		−0.219 [0.097]
Age 55-64		−0.118 [0.094*]		−0.172 [0.091*]
Age 65-75		−0.065 [0.079]		−0.058 [0.075]
HHincome under 1500		0.103 [0.120]		0.054 [0.118]
HHincome 1500-3000		−0.092 [0.091]		−0.085 [0.087]
HHincome 3000-6000		−0.079 [0.087]		−0.092 [0.084]
HHincome over 6000		−0.094 [0.093]		−0.112 [0.090]
City under 5000		−0.012 [0.076]		0.026 [0.074]
City 5000-20000		0.060 [0.065]		0.076 [0.063]
City 20000-100000		0.056 [0.064]		0.064 [0.062]
City 100000-500000		0.051 [0.074]		0.070 [0.071]
Employed		0.070 [0.067]		0.073 [0.066]
Years of education		0.003 [0.014]		0.003 [0.013***]
HHsize		−0.000 [0.000]		−0.000 [0.000]
East Germany		0.134 [0.058**]		0.132 [0.056]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior mean expectation. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 6: The effect on the interquartile range with skewness from question CM004

	I	II	III	IV
α	0.628	0.791	0.788	0.796
	[0.040***]	[0.030***]	[0.031***]	[0.030***]
β_{una}	0.079	0.191	0.167	0.193
	[0.054]	[0.048***]	[0.050***]	[0.047***]
β_{dis}	0.163	0.270	0.264	0.294
	[0.057***]	[0.049***]	[0.048***]	[0.047***]
β_{unadis}	−0.133	0.021	−0.037	0.026
	[0.056**]	[0.049]	[0.050]	[0.048]
γ_{una}	−0.144	−0.358	−0.308	−0.363
	[0.051***]	[0.039***]	[0.045***]	[0.039***]
γ_{dis}	−0.294	−0.490	−0.477	−0.531
	[0.059***]	[0.040***]	[0.041***]	[0.040***]
γ_{unadis}	0.260	0.045	0.094	−0.001
	[0.057***]	[0.041]	[0.045**]	[0.042]
Female		−0.007		−0.008
		[0.028]		[0.027]
Age under 25		0.393		0.399
		[0.104***]		[0.102***]
Age 25-34		0.298		0.278
		[0.076***]		[0.074***]
Age 35-44		0.193		0.200
		[0.067***]		[0.066***]
Age 45-54		0.104		0.100
		[0.064]		[0.063]
Age 55-64		0.069		0.073
		[0.060]		[0.059]
Age 65-75		−0.026		−0.029
		[0.050]		[0.049]
HHincome under 1500		−0.164		−0.143
		[0.077**]		[0.076*]
HHincome 1500-3000		−0.068		−0.060
		[0.058]		[0.056]
HHincome 3000-6000		−0.025		−0.017
		[0.056]		[0.054]
HHincome over 6000		−0.054		−0.044
		[0.060]		[0.058]
City under 5000		−0.112		−0.110
		[0.049**]		[0.048**]
City 5000-20000		−0.019		−0.015
		[0.042]		[0.041]
City 20000-100000		0.007		0.011
		[0.041]		[0.040]
City 100000-500000		0.058		0.060
		[0.047]		[0.046]
Employed		−0.052		−0.054
		[0.043]		[0.042]
Years of education		0.030		0.031
		[0.009***]		[0.009***]
HHsize		−0.000		−0.000
		[0.000]		[0.000]
East Germany		0.007		0.007
		[0.037]		[0.036]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior interquartile range. We assume the prior distributions to have the same skewness as in question CM004. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 7: The effect on the standard deviation with skewness from question CM004

	I	II	III	IV
α	0.787	0.787	0.793	0.804
	[0.033***]	[0.032***]	[0.033***]	[0.032***]
β_{una}	−0.001	0.130	0.114	0.140
	[0.035]	[0.034***]	[0.034***]	[0.033***]
β_{dis}	0.130	0.160	0.234	0.188
	[0.037***]	[0.038***]	[0.054***]	[0.034***]
β_{unadis}	−0.040	−0.031	−0.082	−0.003
	[0.035]	[0.037]	[0.054]	[0.034]
γ_{una}	0.101	−0.311	−0.315	−0.385
	[0.042]	[0.044***]	[0.048***]	[0.041***]
γ_{dis}	−0.341	−0.417	−0.407	−0.494
	[0.047***]	[0.056***]	[0.049***]	[0.046***]
γ_{unadis}	0.114	0.080	0.102	0.050
	[0.044**]	[0.043*]	[0.056*]	[0.045]
Female		−0.006		−0.008
		[0.020]		[0.019]
Age under 25		0.246		0.250
		[0.073***]		[0.072***]
Age 25-34		0.194		0.183
		[0.053***]		[0.052***]
Age 35-44		0.116		0.124
		[0.047**]		[0.046***]
Age 45-54		0.065		0.064
		[0.045]		[0.044]
Age 55-64		0.041		0.045
		[0.042]		[0.041]
Age 65-75		−0.020		−0.022
		[0.035]		[0.034]
HHincome under 1500		−0.110		−0.093
		[0.054**]		[0.053*]
HHincome 1500-3000		−0.057		−0.052
		[0.041]		[0.039]
HHincome 3000-6000		−0.017		−0.011
		[0.039]		[0.034]
HHincome over 6000		−0.042		−0.038
		[0.042]		[0.040]
City under 5000		−0.076		−0.074
		[0.034**]		[0.033**]
City 5000-20000		−0.019		−0.014
		[0.029]		[0.028]
City 20000-100000		0.002		0.006
		[0.029]		[0.028]
City 100000-500000		0.044		0.047
		[0.033]		[0.032]
Employed		−0.032		−0.034
		[0.030]		[0.030]
Years of education		0.018		0.019
		[0.006***]		[0.006***]
HHsize		−0.000		−0.000
		[0.000]		[0.000]
East Germany		0.010		0.008
		[0.026]		[0.025]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior standard deviation. We assume the prior distributions to have the same skewness as in question CM004. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 8: The effect on the interquartile range with skewness from the control group

	I	II	III	IV
α	0.812 [0.033***]	0.817 [0.033***]	0.815 [0.033***]	0.817 [0.032***]
β_{una}	0.163 [0.049***]	0.194 [0.048***]	0.168 [0.050***]	0.198 [0.047***]
β_{dis}	0.216 [0.052***]	0.238 [0.051***]	0.234 [0.054***]	0.267 [0.049***]
β_{unadis}	−0.146 [0.056***]	−0.050 [0.049]	−0.082 [0.054]	−0.022 [0.048]
γ_{una}	−0.309 [0.042***]	−0.373 [0.041***]	−0.315 [0.048***]	−0.382 [0.041***]
γ_{dis}	−0.401 [0.049***]	−0.445 [0.048***]	−0.434 [0.056***]	−0.494 [0.047***]
γ_{unadis}	0.296 [0.045***]	0.136 [0.044]	0.184 [0.058**]	0.093 [0.045**]
Female		−0.001 [0.028]		−0.003 [0.027]
Age under 25		0.362 [0.104***]		0.372 [0.102***]
Age 25-34		0.271 [0.076***]		0.255 [0.074***]
Age 35-44		0.171 [0.067***]		0.181 [0.066***]
Age 45-54		0.086 [0.064]		0.085 [0.062]
Age 55-64		0.051 [0.060]		0.058 [0.058]
Age 65-75		−0.035 [0.050]		−0.036 [0.048]
HHincome under 1500		−0.162 [0.077**]		−0.138 [0.076*]
HHincome 1500-3000		−0.070 [0.058]		−0.060 [0.056]
HHincome 3000-6000		−0.025 [0.056]		−0.016 [0.054]
HHincome over 6000		−0.056 [0.060]		−0.045 [0.057]
City under 5000		−0.107 [0.049**]		−0.103 [0.048**]
City 5000-20000		−0.020 [0.042]		−0.015 [0.040]
City 20000-100000		0.010 [0.041]		0.014 [0.040]
City 100000-500000		0.061 [0.047]		0.066 [0.046]
Employed		−0.016 [0.043]		−0.049 [0.042]
Years of education		0.027 [0.009***]		0.028 [0.009***]
HHsize		−0.000 [0.000]		−0.000 [0.000]
East Germany		0.004 [0.037]		0.004 [0.036]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior interquartile range. We assume the prior distributions to have the average skewness of our control group. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 9: The effect on the standard deviation with skewness from the control group

	I	II	III	IV
α	0.789	0.790	0.795	0.806
	[0.033***]	[0.033***]	[0.033***]	[0.032***]
β_{una}	−0.002	−0.001	0.114	0.140
	[0.035]	[0.034***]	[0.034***]	[0.033***]
β_{dis}	0.122	0.149	0.149	0.182
	[0.036***]	[0.036***]	[0.038***]	[0.035***]
β_{unadis}	−0.044	−0.024	−0.036	−0.006
	[0.035]	[0.035]	[0.038]	[0.034]
γ_{una}	0.139	0.125	−0.312	−0.389
	[0.042]	[0.042]	[0.045***]	[0.041***]
γ_{dis}	−0.320	−0.400	−0.391	−0.480
	[0.049***]	[0.048***]	[0.056***]	[0.034***]
γ_{unadis}	0.127	0.093	0.115	0.060
	[0.045**]	[0.044*]	[0.058*]	[0.046]
Female		−0.010		−0.007
		[0.020]		[0.019]
Age under 25		0.243		0.247
		[0.073***]		[0.071***]
Age 25-34		0.186		0.180
		[0.054***]		[0.052***]
Age 35-44		0.110		0.122
		[0.047**]		[0.046***]
Age 45-54		0.059		0.063
		[0.045]		[0.044]
Age 55-64		0.040		0.044
		[0.042]		[0.041]
Age 65-75		−0.020		−0.023
		[0.035]		[0.034]
HHincome under 1500		−0.118		−0.094
		[0.054**]		[0.053*]
HHincome 1500-3000		−0.054		−0.052
		[0.041]		[0.039]
HHincome 3000-6000		−0.022		−0.012
		[0.039]		[0.038]
HHincome over 6000		−0.044		−0.038
		[0.042]		[0.040]
City under 5000		−0.080		−0.072
		[0.034**]		[0.033**]
City 5000-20000		−0.019		−0.014
		[0.029]		[0.028]
City 20000-100000		0.003		0.007
		[0.029]		[0.028]
City 100000-500000		0.044		0.048
		[0.033]		[0.032]
Employed		−0.037		−0.034
		[0.030]		[0.030]
Years of education		0.018		0.018
		[0.006***]		[0.006***]
HHsize		−0.000		0.000
		[0.000]		[0.000]
East Germany		0.003		0.008
		[0.026]		[0.025]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior standard deviation. We assume the prior distributions to have the average skewness of our control group. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 10: The effect on the mean with skewness from question CM004

	I	II	III	IV
α	0.710	0.655	0.749	0.733
	[0.016***]	[0.013***]	[0.016***]	[0.016***]
β_{una}	0.090	−0.047	−0.052	−0.106
	[0.093]	[0.085]	[0.092]	[0.094**]
β_{dis}	−0.336	−0.443	−0.259	−0.257
	[0.088***]	[0.083***]	[0.010***]	[0.096***]
β_{unadis}	0.373	0.205	−0.005	−0.065
	[0.090***]	[0.081**]	[0.088]	[0.084]
γ_{una}	−0.032	0.020	0.018	0.038
	[0.022]	[0.018]	[0.023]	[0.023*]
γ_{dis}	0.116	0.156	0.086	0.082
	[0.020***]	[0.017***]	[0.025***]	[0.025***]
γ_{unadis}	−0.113	−0.053	0.021	0.040
	[0.021***]	[0.017***]	[0.022]	[0.019**]
Female		0.015		−0.003
		[0.044]		[0.042]
Age under 25		−0.412		−0.459
		[0.162**]		[0.156***]
Age 25-34		−0.566		−0.568
		[0.118***]		[0.113***]
Age 35-44		−0.280		−0.260
		[0.104**]		[0.101**]
Age 45-54		−0.252		−0.260
		[0.100**]		[0.096***]
Age 55-64		−0.210		−0.217
		[0.094**]		[0.090**]
Age 65-75		−0.113		−0.101
		[0.079]		[0.075]
HHincome under 1500		0.065		−0.042
		[0.120]		[0.116]
HHincome 1500-3000		−0.086		−0.094
		[0.090]		[0.086]
HHincome 3000-6000		−0.087		−0.128
		[0.087]		[0.083]
HHincome over 6000		−0.098		−0.149
		[0.093]		[0.088*]
City under 5000		0.010		0.034
		[0.076]		[0.073]
City 5000-20000		0.086		0.109
		[0.065]		[0.062*]
City 20000-100000		0.071		0.079
		[0.064]		[0.061]
City 100000-500000		0.072		0.079
		[0.073]		[0.070]
Employed		0.052		0.063
		[0.067]		[0.065]
Years of education		0.008		0.101
		[0.014]		[0.013]
HHsize		−0.000		−0.000
		[0.000]		[0.000]
East Germany		0.132		0.130
		[0.058**]		[0.056**]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior mean expectation. We assume the prior distributions to have the same skewness as in question CM004. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***, ** and * denote significance at the 1%, 5% and 10% level.

Table 11: The effect on the mean with skewness from the control group

	I	II	III	IV
α	0.642 [0.017***]	0.632 [0.017***]	0.726 [0.017***]	0.694 [0.017***]
β_{una}	−0.082 [0.094]	−0.079 [0.091]	−0.046 [0.093]	0.227 [0.094**]
β_{dis}	−0.481 [0.089***]	−0.460 [0.089***]	−0.274 [0.010***]	−0.303 [0.091***]
β_{unadis}	0.111 [0.091]	0.081 [0.087]	−0.001 [0.090]	−0.083 [0.086]
γ_{una}	0.032 [0.022]	0.033 [0.021]	0.015 [0.023]	−0.090 [0.023*]
γ_{dis}	0.116 [0.020***]	0.160 [0.020***]	0.085 [0.024***]	0.096 [0.022***]
γ_{unadis}	−0.100 [0.021]	−0.001 [0.020]	0.021 [0.022]	0.047 [0.020**]
Female		0.015 [0.044]		0.018 [0.042]
Age under 25		−0.375 [0.162**]		−0.451 [0.159***]
Age 25-34		−0.561 [0.118***]		−0.580 [0.115***]
Age 35-44		−0.266 [0.104**]		−0.263 [0.102**]
Age 45-54		−0.220 [0.100**]		−0.219 [0.098***]
Age 55-64		−0.177 [0.094*]		−0.171 [0.091*]
Age 65-75		−0.064 [0.078]		−0.059 [0.075]
HHincome under 1500		0.103 [0.120]		0.054 [0.118]
HHincome 1500-3000		−0.093 [0.091]		−0.085 [0.086]
HHincome 3000-6000		−0.080 [0.087]		−0.092 [0.084]
HHincome over 6000		−0.094 [0.093]		−0.112 [0.090]
City under 5000		−0.012 [0.076]		0.025 [0.074]
City 5000-20000		0.060 [0.065]		0.077 [0.063]
City 20000-100000		0.056 [0.064]		0.064 [0.062]
City 100000-500000		0.050 [0.074]		0.070 [0.071]
Employed		0.070 [0.067]		0.073 [0.066]
Years of education		0.003 [0.014]		0.003 [0.013]
HHsize		−0.000 [0.000]		−0.000 [0.000]
East Germany		0.134 [0.058**]		0.132 [0.056**]
# obs.	2,520	2,518	2,388	2,391

Notes: Dependent variable is the posterior mean expectation. We assume the prior distributions to have the average skewness of our control group. For specifications (I) and (II) we drop responses that put 100% probability on the outer bins (more than 12% inflation/deflation) and responses of more than 100% deflation and inflation for the min and max expectations. For (III) and (IV) we additionally exclude respondents whose change in the interquartile range is larger than the 95th percentile. The estimates are based on Huber robust regressions and also include a constant. ***,** and * denote significance at the 1%, 5% and 10% level.

Appendix: Snapshots from the survey

Figure 2: Pre-Treatment stage

P1908 | 2021_019 | Inflation expectations [min, max] | inflexp1_[a-b]

Respondent group: all

Range of valid values: -100.0 to +100.0

Info box "ECB Governing Council": The Governing Council of the ECB is the institution's main decision-making body. It consists of the six members of the ECB's Executive Board as well as the governors of the national central banks of the 19 euro area Member States.

Info box "Policy rate": The policy rate is the rate of interest at which commercial banks can borrow money from the central bank or deposit it there. In the euro area, the European Central Bank (ECB) is responsible for setting the policy rate, by means of which it can steer economic conditions, inflation and the exchange rate, amongst other things.

The following questions ask again about your inflation expectations given different scenarios.

Assume that the European Central Bank (ECB) is aiming for an annual inflation rate of 2% over the medium term. Please also assume that the inflation rate is 1% in 2021. The ECB Governing Council (i) decides to keep the policy rate (i) at 0%.

Question: In your opinion, how high will the inflation rate be at least over the next one to two years? And at most?

Note: If you assume there will be deflation, please enter a negative value. Values may have one decimal place.

a At least `Input field` [percent]
b At most `Input field` [percent]

Notes: The graph shows a screen shot of the question asked in the pre-treatment stage. The full survey is available at https://www.bundesbank.de/resource/blob/763860/e6fb9fca831da8b44ed3c498b634cece/mL/questionnaire-19-data.pdf.

Figure 3: Treatment group $T = 1$ (control group)

P1909A | 2021_019 | Inflation expectations probabilistic – POST | inflexp_post_[a-j]

Respondent group: all

Input filter: drandom3 = 1

Info box "ECB Governing Council": The Governing Council of the ECB is the institution's main decision-making body. It consists of the six members of the ECB's Executive Board as well as the governors of the national central banks of the 19 euro area Member States.

Info box "Policy rate": The policy rate is the rate of interest at which commercial banks can borrow money from the central bank or deposit it there. In the euro area, the European Central Bank (ECB) is responsible for setting the policy rate, by means of which it can steer economic conditions, inflation and the exchange rate, amongst other things.

Continue to assume that the ECB is aiming for an annual inflation rate of 2% over the medium term. Please also assume that the inflation rate is 1% in 2021. The ECB Governing Council (i) decides to keep the policy rate (i) at 0%.

QUESTION: In your opinion, how likely is it that the rate of inflation will change as follows over the next one to two years?

Note: The aim of this question is to determine how likely you think it is that something specific will happen in the future. You can rate the likelihood on a scale from 0 to 100, with 0 meaning that an event is completely unlikely and 100 meaning that you are absolutely certain it will happen. Use values between the two extremes to moderate the strength of your opinion. Please note that your answers to the categories have to add up to 100.

a The rate of deflation (opposite of inflation) will be 12% or higher.
b The rate of deflation (opposite of inflation) will be between 8% and 12%.
c The rate of deflation (opposite of inflation) will be between 4% and 8%.
d The rate of deflation (opposite of inflation) will be between 2% and 4%.
e The rate of deflation (opposite of inflation) will be between 0% and 2%.
f The rate of inflation will be between 0% and 2%.
g The rate of inflation will be between 2% and 4%.
h The rate of inflation will be between 4% and 8%.
i The rate of inflation will be between 8% and 12%.
j The rate of inflation will be 12% or higher.

Notes: The graph shows a screen shot of the question asked from treatment group $T = 1$ (control group= in the treatment stage. The full survey is available at https://www.bundesbank.de/resource/blob/763860/e6fb9fca831da8b44ed3c498b634cece/mL/questionnaire-19-data.pdf.

Figure 4: Treatment group $T = 2$ (unanimity)

P1909B | 2021_019 | Inflation expectations probabilistic – POST | inflexp_post_[a-j]

Respondent group: all

Input filter: drandom3 = 2

Info box "ECB Governing Council": The Governing Council of the ECB is the institution's main decision-making body. It consists of the six members of the ECB's Executive Board as well as the governors of the national central banks of the 19 euro area Member States.

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Continue to assume that the ECB is aiming for an annual inflation rate of 2% over the medium term. Please also assume that the inflation rate is 1% in 2021. The ECB Governing Council (i) decides to keep the policy rate (i) at 0%. The ECB President informs the media that this was a unanimous decision.

QUESTION: In your opinion, how likely is it that the rate of inflation will change as follows over the next one to two years?

Note: The aim of this question is to determine how likely you think it is that something specific will happen in the future. You can rate the likelihood on a scale from 0 to 100, with 0 meaning that an event is completely unlikely and 100 meaning that you are absolutely certain it will happen. Use values between the two extremes to moderate the strength of your opinion. Please note that your answers to the categories have to add up to 100.

a The rate of deflation (opposite of inflation) will be 12% or higher.
b The rate of deflation (opposite of inflation) will be between 8% and 12%.
c The rate of deflation (opposite of inflation) will be between 4% and 8%.
d The rate of deflation (opposite of inflation) will be between 2% and 4%.
e The rate of deflation (opposite of inflation) will be between 0% and 2%.
f The rate of inflation will be between 0% and 2%.
g The rate of inflation will be between 2% and 4%.
h The rate of inflation will be between 4% and 8%.
i The rate of inflation will be between 8% and 12%.
j The rate of inflation will be 12% or higher.

Notes: The graph shows a screen shot of the question asked from treatment group $T = 2$ (unanimity) in the treatment stage. The full survey is available at https://www.bundesbank.de/resource/blob/763860/e6fb9fca831da8b44ed3c498b634cece/mL/questionnaire-19-data.pdf.

Figure 5: Treatment group $T = 3$ (dissent)

P1909C | 2021_019 | Inflation expectations probabilistic – POST | inflexp_post_[a-j]

Respondent group: all

Input filter: drandom3 = 3

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Continue to assume that the ECB is aiming for an annual inflation rate of 2% over the medium term. Please also assume that the inflation rate is 1% in 2021. The ECB Governing Council (i) decides to keep the policy rate (i) at 0%. The ECB President informs the media that this was a majority decision, i.e. there were dissenting votes.

QUESTION: In your opinion, how likely is it that the rate of inflation will change as follows over the next one to two years?

Note: The aim of this question is to determine how likely you think it is that something specific will happen in the future. You can rate the likelihood on a scale from 0 to 100, with 0 meaning that an event is completely unlikely and 100 meaning that you are absolutely certain it will happen. Use values between the two extremes to moderate the strength of your opinion. Please note that your answers to the categories have to add up to 100.

a The rate of deflation (opposite of inflation) will be 12% or higher.
b The rate of deflation (opposite of inflation) will be between 8% and 12%.
c The rate of deflation (opposite of inflation) will be between 4% and 8%.
d The rate of deflation (opposite of inflation) will be between 2% and 4%.
e The rate of deflation (opposite of inflation) will be between 0% and 2%.
f The rate of inflation will be between 0% and 2%.
g The rate of inflation will be between 2% and 4%.
h The rate of inflation will be between 4% and 8%.
i The rate of inflation will be between 8% and 12%.
j The rate of inflation will be 12% or higher.

Notes: The graph shows a screen shot of the question asked from treatment group $T = 3$ (dissent) in the treatment stage. The full survey is available at https://www.bundesbank.de/resource/blob/763860/e6fb9fca831da8b44ed3c498b634cece/mL/questionnaire-19-data.pdf.

Figure 6: Treatment group $T = 4$ (unanimity despite different opinions)

P1909D | 2021_019 | Inflation expectations probabilistic – POST | inflexp_post_[a-j]

Respondent group: all

Input filter: drandom3 = 4

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Info box "Policy rate": The policy rate is the rate of interest at which commercial banks can borrow money from the central bank or deposit it there. In the euro area, the European Central Bank (ECB) is responsible for setting the policy rate, by means of which it can steer economic conditions, inflation and the exchange rate, amongst other things.

Continue to assume that the ECB is aiming for an annual inflation rate of 2% over the medium term. Please also assume that the inflation rate is 1% in 2021. The ECB Governing Council (i) decides to keep the policy rate (i) at 0%. The ECB President informs the media that this was a unanimous decision despite opinions differing.

QUESTION: In your opinion, how likely is it that the rate of inflation will change as follows over the next one to two years?

Note: The aim of this question is to determine how likely you think it is that something specific will happen in the future. You can rate the likelihood on a scale from 0 to 100, with 0 meaning that an event is completely unlikely and 100 meaning that you are absolutely certain it will happen. Use values between the two extremes to moderate the strength of your opinion. Please note that your answers to the categories have to add up to 100.

a The rate of deflation (opposite of inflation) will be 12% or higher.
b The rate of deflation (opposite of inflation) will be between 8% and 12%.
c The rate of deflation (opposite of inflation) will be between 4% and 8%.
d The rate of deflation (opposite of inflation) will be between 2% and 4%.
e The rate of deflation (opposite of inflation) will be between 0% and 2%.
f The rate of inflation will be between 0% and 2%.
g The rate of inflation will be between 2% and 4%.
h The rate of inflation will be between 4% and 8%.
i The rate of inflation will be between 8% and 12%.
j The rate of inflation will be 12% or higher.

Notes: The graph shows a screen shot of the question asked from treatment group $T = 4$ (unanimity despite different opinions) in the treatment stage. The full survey is available at https://www.bundesbank.de/resource/blob/763860/e6fb9fca831da8b44ed3c498b634cece/mL/questionnaire-19-data.pdf.