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Inflation Literacy, Inflation Expectations, and Trust in the Central Bank: A Survey Experiment

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Abstract

This paper studies the causal effect of inflation literacy on inflation expectations and trust in the central bank using a randomized control trial (RCT) on a representative sample of the German population. In an experiment with two steps, we first test the effect of non-numerical information about inflation and monetary policy, the literacy treatment. In the second step, we randomly treat respondents with quantitative information and measure whether those who previously received the literacy treatment, incorporate quantitative information differently into their inflation forecasts. We find that the literacy treatment improves respondents' knowledge about monetary policy and inflation and raises their trust in the central bank. It also causes a higher likelihood that respondents provide inflation predictions, but does not affect the level of expected inflation. Similarly, those who received the initial literacy treatment do not react differently to the quantitative information in terms of the level of their inflation forecasts, but they react more strongly to some treatments regarding their reported forecast uncertainty and trust in the central bank.

JEL-Codes: E520, E310, D840.

Keywords: inflation literacy, inflation expectations, trust in the central bank, survey experiment, randomized control trial (RCT).

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1 Introduction

Central banks are increasingly engaging in direct communication with the public to build trust and to guide and anchor inflation expectations in the population by explaining monetary policy decisions (Blinder et al., 2023). However, many consumers struggle with understanding the concept of inflation and how monetary policy works (Burke and Manz, 2014; van der Cruysen et al., 2015; Haldane et al., 2020). Given this context, would it be possible to improve public literacy about inflation and monetary policy by communicating simple and general information about these topics? And would improving consumers' inflation literacy affect their inflation forecasts and affect the way they incorporate quantitative information into their expectations?

We study these questions in a survey experiment with a representative sample of German consumers, who are randomly subjected to two consecutive information treatments: In the first step, half of the respondents are randomly selected to receive a 1-minute reading text with general information about inflation and monetary policy. In this *literacy* treatment, we briefly explain how inflation/deflation is measured and its relationship with personal consumption, savings, borrowing, and investment. The text is completed with a short introduction about the Eurosystem including both the Bundesbank and the ECB, the primary goal of the Eurosystem in general terms, and the main monetary policy instruments. Note that in this text, we only focus on explaining the basic economic intuition of inflation and monetary policy, but do not provide any numerical information about the level of inflation rates or the inflation target. We then ask all respondents some test questions to measure inflation and financial literacy as well as their point predictions on perceived and expected inflation and the inflation target of the ECB.

In the second step, we randomly split the population into five groups. One group acts as control group with no further information, while the other groups receive one of the following numerical information treatments on inflation: (1) the inflation target of the ECB, (2) the inflation target of the ECB and an additional text about the ECB's commitment to take into account the effect of climate change, (3) the current inflation rate for Germany, and (4) the current inflation rate for Germany and the Bundesbank's inflation projections over the next three years. Note that within each of the five treatment groups, some respondents received the initial *literacy* treatment, and some did not. We then use probabilistic questions to measure posterior perceived and expected inflation, as well as individual forecast uncertainty. Our survey is completed with questions on trust in the ECB and the Bundesbank. This two-step set-up allows us to evaluate, first, the causal effect of the *literacy* treatment on consumers' literacy, their prior inflation predictions and their trust in the central bank¹, and second, to investigate how consumers incorporate the quantitative information treatments into posterior inflation predictions,

¹Note that the pure effect of the *literacy* treatment on trust in the central bank is estimated only within the control group that did not receive further information in the second step.

forecast uncertainty as well as trust and whether there are interaction effects with the *literacy* treatment.

We ran the survey experiment on a representative internet-based panel of 4,000 German households during March 1-11, 2022 via *Bilendi & respondi*, one of the major institutions in data collection for market research in Europe. We also conducted a follow-up survey after three months, from June 14 to July 11, 2022, to assess the persistence of the treatments on literacy, inflation forecasts, and trust in the central bank. It should be noted that our study was conducted during a time of high and rising inflation in Germany², where attention to inflation in the public was arguably high, but forecast uncertainty was particularly large.

Even though our survey was conducted in a high inflation environment, the results for the control group indicate that consumers' understanding of inflation and monetary policy is generally lacking, in line with other studies ([van der Cruijsen et al., 2015](#); [Binder and Rodrigue, 2018](#); [Hayo and Neuenkirch, 2018](#)): Over 50% of the respondents in the control group were only able to answer two out of five basic multiple-choice questions correctly, covering topics such as the definition of inflation, inflation's impact on real consumption, monetary policy objectives and instruments, and the effects of monetary policy on inflation. Additionally, roughly one-third of respondents were unable to provide point predictions for perceived and expected inflation. Only around one-third of respondents were aware that the European Central Bank's (ECB) primary objective is to maintain price stability, and merely 20% of the survey participants in the control group correctly identified the ECB's inflation target at 2%.

Our experiment shows that the provision of general information about inflation and monetary policy in the *literacy* treatment increases the average inflation literacy score by 20%. The effect is sizable and highly statistically significant, and remains significant in the follow-up survey after three months. Moreover, those who received the *literacy* treatment are significantly more likely to provide predictions on perceived and expected inflation, but we find no effect on the *level* of perceived and expected inflation quantitatively. This suggests that general information about inflation and monetary policy makes consumers more confident in their ability to predict inflation, but does not affect the level of predictions. In contrast to the results in [Burke and Manz \(2014\)](#), [van der Cruijsen et al. \(2015\)](#), [Rumler and Valderrama \(2020\)](#) or [Bholat et al. \(2019\)](#), we thus do not find that experimentally induced literacy causes more accurate inflation predictions. Moreover, respondents in the *literacy* treatment express significantly higher trust in the central bank, in line with the evidence in [Haldane and McMahon \(2018\)](#) and [Bholat et al. \(2019\)](#). Overall, consumers thus gain from receiving the general information in terms of their confidence in making inflation forecasts and their trust in the central bank. These results are not statistically heterogeneous across a range of socio-demographic character-

²CPI inflation in Germany was 4.9% in January 2022 (the latest available inflation figure during our first wave), and it increased to 7.3% in March 2022, and 7.6% in June 2022.

istics, but prior informedness matters: The *literacy* treatment has a significantly stronger effect on literacy scores for respondents who report being less informed about inflation or monetary policy prior to the treatments. Similarly, those with less prior information about inflation are significantly more likely to estimate current or future inflation after receiving the *literacy treatment* than those with more prior information.

Does higher inflation literacy enable consumers to better incorporate quantitative information into their inflation forecasts? We find that consumers update their inflation predictions towards information about recent and projected inflation rates, regardless of whether they received the *literacy* treatment beforehand. However, respondents, who were not in the *literacy* treatment group, also update towards the treatment stating the ECB’s inflation target, while respondents in the *literacy* treatment only update towards this information if it additionally mentions the ECB’s new strategy to take climate change concerns into account. Even though the *literacy* treatment only talks about the ECB’s target of maintaining price stability in non-numerical terms, it thus seems that stating the 2% target is only sufficiently relevant information for respondents’ formation of inflation predictions for respondents who did not receive the general information beforehand. By contrast, it seems that the information about climate change concerns for the ECB’s strategy is deemed relevant new information by respondents in the *literacy* treatment, but is ignored by the others.

Moreover, the *literacy* treatment interacts with the quantitative information treatments in terms of their effect on the uncertainty of inflation predictions and on trust in the central bank. On average, respondents in the *literacy* treatment report higher uncertainty on posterior expected inflation, in line with the evidence in [Rumler and Valderrama \(2020\)](#). This could imply that they are better able to realize the high uncertainty of the current inflation regime. Additionally, those who received both the *literacy* treatment and the information on either the ECB inflation target or the current inflation rate report lower uncertainty. Similarly, consumers in the *literacy* treatment on average report higher trust in both the ECB and the Bundesbank, but this effect is reduced if they receive additional information about the target or about current inflation. This implies that respondents who receive the *literacy* treatment are better able to understand that current inflation in the beginning of 2022 was far from target, which had implications for their trust in the monetary policy institutions.

The construction of our experiment allows us to join several strands of the literature and test whether the findings in each also hold when they are combined in a joint experiment: First, in several surveys better knowledge about inflation and monetary policy is shown to correlate with higher trust in the central bank and with more accurate inflation forecasts, but the direction of causality cannot be identified in these studies ([Hayo and Neuenkirch, 2014](#); [van der Crujsen et al., 2015](#); [Afrouzi et al., 2015](#); [Mellina and Schmidt, 2018](#); [Haldane et al., 2020](#); [Rumler and Valderrama, 2020](#); [Stanislawska and Paloviita, 2021](#); [Brouwer and de Haan, 2022b](#); [Christelis et al., 2020](#)). For instance, [van der Crui-](#)

jsen et al. (2015) show in a Dutch consumers survey that better knowledge about the ECB monetary policy objectives correlates with more accurate inflation expectations. Rumler and Valderrama (2020) present correlational evidence that Austrian households, who are more inflation literate, give more accurate inflation expectations, but are also less certain when making inflation predictions. Brouwer and de Haan (2022b) find that financial literacy is positively correlated with trust in the ECB and Christelis et al. (2020) demonstrate that trust in the ECB correlates negatively with consumers’ inflation expectations.³ In addition, Hommes et al. (2023) conduct household surveys in France, Netherlands, and Italy, and find a positive association between macroeconomic policy literacy, emphasizing comprehension of monetary and fiscal policies, and support for the independence of the central bank.

Second, Burke and Manz (2014) show in an incentivized lab experiment that more literate consumers make better use of information for their inflation forecasts and provide more accurate forecasts, but their treatments are not designed to *generate* literacy. Haldane and McMahon (2018) as well as Bholat et al. (2019) conduct survey experiments to measure the causal effect of the simpler “Visual Summary” by the Bank of England, which summarizes its policy statement as part of its “layered communication” strategy. Both studies find that the easier content improves respondents’ comprehension about monetary policy both subjectively and objectively, raises trust in the central bank and improves the accuracy of inflation expectations.⁴ Furthermore, Ehrmann et al. (2023) use survey experiments with information treatments related to the new aspects of the ECB’s strategy after its recent strategy review. The authors report stronger effects on the ECB’s credibility from information that includes additional explanations about the rationale of the new monetary policy changes, especially among those who are less financially literate. We test whether general, non-numerical information about inflation and monetary policy has similar effects and evaluate whether general information enables respondents to incorporate quantitative information differently.

Third, several survey experiments find that providing consumers or firm managers with quantitative information on current or projected inflation or on the inflation target causes them to adjust their forecasts towards this information, but these studies typically do not account for inflation literacy (Coibion et al., 2018; Binder and Rodrigue, 2018; Coibion et al., 2022; Dräger et al., 2023; Brouwer and de Haan, 2022a). Brouwer and de Haan (2022a) also study whether information treatments affect trust in the central bank in addition to an effect on inflation forecasts and find in their set-up that information

³Hayo and Méon (2022) test whether information about past inflation or about the inflation target affects consumers’ trust in the ECB, but find this effect only for the small group without preference for any political party.

⁴D’Acunto et al. (2021) conduct a survey experiment in the U.S. and find that under-presented groups, such as women and Black survey participants, become more trustful in the Fed when they see information about a diverse policymaker.

about monetary policy instruments affects inflation expectations, but not trust in the ECB.

The remainder of the paper is organized as follows. Section 2 presents the survey experiment and data, Section 3 presents the causal effects of the *literacy* treatment, Section 4 discusses the interaction between the *literacy* treatment and further information treatments, and Section 5 concludes.

2 Survey experimental design and data

We conducted the survey on an internet-based panel of 4,000 German consumers during March 1-11, 2022 via *Bilendi & respondi*. This is a representative sample of the German population with respect to age, gender, income, and region. After 3 months, from June 14 to July 11, 2022, we ran a follow-up survey, where we were able to reach 2,851 of the respondents from the first wave. Following Binder (2020), in both survey waves, respondents are only allowed to take the survey if they responded affirmatively to the following question:

We care about the quality of our data. In order for us to get the most accurate measures of your knowledge and opinions, it is important that you thoughtfully provide your best answers to each question in this survey. Do you commit to thoughtfully provide your best answers to each question in this survey?

In the first wave, after a set of questions designed to elicit consumers' demographic characteristics, the survey sample is randomly split, and 50% of respondents receive a 1-minute reading text containing general and non-numerical information on inflation and monetary policy (step 1 of the experiment). This is the *literacy* treatment.⁵

Inflation is the percentage increase in the general price level. This means that 1 Euro buys less than it did 12 months ago. By contrast, a fall in general prices is called “deflation”. Inflation is usually measured using the index of consumer prices and comparing prices today with prices 12 months ago. The index of consumer prices measures prices of a basket of selected goods and services, such as rent, energy, food and drink, transport, health, education and durable goods like furniture, computers or household appliances.

High inflation has economic costs, for instance reducing the purchasing power of those with fixed incomes or savings. However, people with debt, for instance households with a mortgage, also benefit from inflation, since inflation reduces the value of their debt. Low and stable inflation is regarded as optimal for the economic development, since low inflation encourages investment, while keeping down

⁵The text for the *literacy* treatment was written by the authors. In writing it, we aimed to use as little technical language as possible, while still explaining the (complex) macroeconomic effects of inflation. We also took care not to include any quantitative statements, such as the percentage inflation target, in the treatment text.

the economic costs of inflation. Deflation is detrimental for economic development because with prices falling, there is an incentive to not consume or invest today, but rather wait to see if prices will fall further. This can cause a recession with rising unemployment.

Since Germany is part of the Euro area, its monetary policy is decided by the Eurosystem, consisting of the European Central Bank and the national central banks like the Bundesbank. The Eurosystem is responsible for keeping prices stable throughout the Euro area over the medium term. This means that average inflation over a period of 1-3 years should be low and stable. The Eurosystem can achieve this by setting interest rates and/or by buying securities from banks.

The median time respondents spent reading this information was 57 seconds. Furthermore, 10% of respondents spent less than 15 seconds on the text, 25% spent less than 30 seconds, 75% spent less than 90 seconds, and 90% spent less than 145 seconds reading the information. We evaluate the heterogeneity of our results with respect to time spent reading the *literacy* treatment in section 3.4.

Next, we ask all respondents some test questions about inflation, monetary policy, and financial literacy. Most of these questions are taken and slightly modified from [Burke and Manz \(2014\)](#) and [Lusardi and Mitchell \(2011\)](#). We construct an index of inflation literacy for each consumer as the sum of the number of correct answers on five questions about (1) the definition of inflation, (2) inflation and real consumption, (3) objectives of monetary policy, (4) monetary policy instruments, (5) macroeconomic policy and inflation. Following [Lusardi and Mitchell \(2011\)](#), we construct an index of financial literacy as the number of correct answers on three questions on: (1) inflation and real consumption, (2) interest rate compounding, and (3) risk diversification.

We then ask respondents about their point predictions regarding inflation over the previous 12 months, as well as inflation expectations in the next 12 months and in the next 3 years, and the annual inflation target of the ECB over the medium run. These point predictions are evaluated with respect to the causal effect of the *literacy* treatment in step 1, and serve as prior expectations for the additional information treatments in the second step.

In step 2 of the experiment, we randomly split the sample again, this time into five groups. One group acts as control group and does not receive any further information. The other four groups receive four different information treatments, all of which are numerical and relate to inflation. Within each treatment group in step 2, some respondents received the *literacy* treatment in step 1 and some did not. The intention of the second round of information treatments is to study whether respondents who received the general information in the first step, incorporate additional quantitative information into their forecasts differently than those in the control group of step 1.

Each treatment group receives one of the following information:

- Treatment 1 shows the inflation target of the ECB (*ECB target*):⁶

Since its strategy review enacted in July 2021, the European Central Bank (ECB) is committed to setting its monetary policy to ensure that inflation stabilizes at its 2% target in the medium term. This target is symmetric, meaning that the ECB considers negative and positive deviations from this target as equally undesirable.

- Treatment 2 shows the inflation target of the ECB and the ECB's commitment to taking account for the effect of climate change on the stability of the financial system (*ECB targetplus*):⁷

Since its strategy review enacted in July 2021, the European Central Bank (ECB) is committed to setting its monetary policy to ensure that inflation stabilizes at its 2% target in the medium term. This target is symmetric, meaning that the ECB considers negative and positive deviations from this target as equally undesirable.

In addition, the ECB is now committed to accounting for the effect of climate change on the stability of the financial system.

- Treatment 3 shows the inflation rate in Germany in January 2022, that was the most recent available inflation rate at the time of the first wave of our survey (*current Inf.*):⁸

The inflation rate in Germany, measured as the year-on-year change in the consumer price index, was measured at +4.9% in January 2022. Since 1994, inflation rates across German federal states have been very close to each other.

- Treatment 4 shows the inflation rate in Germany in January 2022 as well as the Bundesbank inflation projections in the next three years (*current plus forecast Inf.*):⁹

The inflation rate in Germany, measured as the year-on-year change in the consumer price index, was measured at +4.9% in January 2022. The Bundesbank inflation projections, published in December 2021, forecast average inflation in Germany at 3.6% in 2022, 2.2% in 2023 and 2.2% in 2024.

⁶This text originates from the ECB's monetary policy strategy statement released on July 8, 2021 (paragraphs 5 & 8). For more information, see https://www.ecb.europa.eu/home/search/review/html/ecb.strategyreview_monpol_strategy_statement.en.html.

⁷This text originates from the ECB's monetary policy strategy statement released on July 8, 2021 (paragraphs 5, 8 & 10). For more information, see https://www.ecb.europa.eu/home/search/review/html/ecb.strategyreview_monpol_strategy_statement.en.html. We add the statement about climate change to test whether this new aspect of the ECB's revised strategy has additional impact on respondents' posterior inflation predictions or their trust in the central bank, see also Ehrmann et al. (2023).

⁸The value of the January 2022 inflation rate was obtained from the German Statistical Office Destatis.

⁹The value of the January 2022 inflation rate was obtained from the German Statistical Office Destatis. The Bundesbank inflation projections were obtained from the Bundesbank Monthly Report in December 2021.

We then ask all respondents again about their predictions about inflation perceptions and expectations, but avoid asking the same questions twice. Instead, we follow the design of the New York Fed Survey of Consumer Expectations: We elicit a full probability distribution of expectations by asking respondents assign probabilities to ten different bins of inflation/deflation rates as follows: [-12% or less], [-12%; -8%], [-8%; -4%], [-4%; -2%], [-2%; 0%], [0%; 2%], [2%; 4%], [4%; 8%], [8%; 12%], and [12% or more]. Following [Coibion et al. \(2022\)](#), we construct the weighted average and standard deviation of inflation perceptions and expectations for each respondent by using the midpoints of each bin and use the values of -14% and 14% when respondents allocate weights to the bins [-12% or less] and [12% or more], respectively. These expectations are the posterior predictions and are compared to prior point forecasts. Finally, we ask respondents about their level of trust in the ECB as well as the Bundesbank on a scale from 0 to 10.

In the follow-up survey, we do not include any information treatments, but simply re-sample respondents' inflation predictions and trust in the ECB as well as the Bundesbank and repeat the test questions about inflation and monetary policy to measure whether the treatments have longer-lasting effects. The exact survey questions are provided in the Appendix.

Table A1 in the Appendix shows that sample sizes across treatments and control groups are very similar in both waves.¹⁰ Table A2 also shows that the distribution of demographic characteristics is almost identical across the *literacy* and control group 1 in both survey waves, as confirmed by balance tests for equality of means between the groups. We also observe that both survey waves exhibit very similar demographic distributions, with the only notable difference being that the respondents in the follow-up survey are slightly older than those in the first wave. We are thus not worried about attrition between the two survey waves. Tables A3 and A4 show the distribution of demographic characteristics across control group 2 and the treatment groups in step 2 of our experiment in wave 1 and wave 2, respectively. Again, the mean characteristics are very close across the groups and balance tests confirm the statistical equality of means in most cases. However, we observe that respondents in the *ECB target* treatment group in the first wave had (marginally) significantly lower education than those in control group 2, were significantly less likely to be male and reported lower income. Since all of these characteristics are known to be correlated with inflation predictions (see, for instance, [Bryan and Venkatu, 2001](#), [Pfajfar and Santoro, 2009](#), and [D'Acunto et al., 2023](#)), we thus have to interpret the treatment effects on this group with a grain of salt. However, we control for these effects to some extent through the inclusion of demographic control variables in all regressions. We also observe some significant differences with respect to employment status in other treatment groups, but since many of these are only marginally significant and there is no clear *a*

¹⁰Note that survey wave 2 did not contain any experiment, the treatment and control groups refer to the groups that participants were in when they participated in wave 1.

priori indication how employment status might correlate with inflation predictions, we are less worried about this.

Tables A5-A8 and Figures A1-A3 show summary statistics and distributions of inflation literacy, inflation predictions, and trust in the central bank within the control group from the first survey wave. On average, respondents who did not receive the *literacy* treatment answered 2 out of 5 test questions about inflation and monetary policy correctly and were able to answer 2 out of 3 financial literacy questions correctly. Regarding the inflation literacy test questions, the lowest share (27%) correctly answered a question about the relationship between monetary policy rates and inflation, while the highest share (77%) was able to correctly identify the definition of inflation. Only 52% answered the question about the ECB’s inflation target. The median perception of the ECB target is correct at 2%, but the distribution is skewed to the right, with a mean estimate of the target being 4.25%. Trust in both the ECB and the Bundesbank are relatively low in the control group, with mean scores at 4.11 and 4.39, respectively.

In our regression analysis, we control for a wide range of demographic characteristics, including age, education, gender, income, employment status, being a home owner, household size, and region. Our results generally remain unchanged if we exclude these demographic controls and are available upon request. To control for outliers in inflation predictions, we estimate Huber robust regressions that endogenously weight outliers. We further truncate the upper and lower 2% of the inflation predictions to exclude any extreme values.

Throughout the survey, we allow respondents to choose the option of “do not know” to mitigate the issue of forcing them to give arbitrary answers when asking about inflation predictions. We find that about a third of the respondents choose the “do not know” answer for questions about inflation perceptions and expectations. Surprisingly, nearly half of the respondents said they do not know the ECB’s inflation target, and among those who provided numerical predictions, only 37% answered correctly at 2%. This means that just about 20% of the surveyed population knows the inflation target of the ECB. In order to evaluate the treatment effects on a consistent sample, we only include respondents who provided both prior and posterior inflation predictions across all horizons when evaluating the effect of the *literacy* treatment and the further quantitative treatments on inflation predictions and prediction uncertainty.

3 The effect of providing general information about inflation and monetary policy

We estimate the causal effect of providing general knowledge about inflation and monetary policy on economic literacy and inflation predictions using the following equation:

$$Y_i = \alpha + \beta literacy_i + \gamma X_i + \epsilon_i, \quad (1)$$

where $literacy_i$ is a dummy variable indicating whether consumer i received a 1-minute reading text about inflation and monetary policy; Y_i is the outcome of interest, measured right after providing the *literacy* treatment, including inflation literacy, financial literacy, inflation point predictions (extensive and intensive margin), and trust in the ECB or the Bundesbank and X_i is a vector of control variables including age, education, gender, income, employment status, being a home owner, household size, and region. β is our coefficient of interest.

We estimate the treatment effects on the ordinal variables measuring literacy scores and trust in the central banks with OLS and robust standard errors. The likelihood of providing inflation projections (extensive margin) is estimated with probit models. In order to endogenously weight the outliers in the inflation prediction variables, we estimate the effect of the *literacy* treatment on the level of inflation projections (intensive margin) with Huber robust regressions.

3.1 The effect on inflation literacy

Table 1 shows the treatment effect on the index of inflation literacy, measured as the number of correct answers to five questions about (1) the definition of inflation, (2) inflation and real consumption, (3) objectives of monetary policy, (4) monetary policy instruments, (5) macroeconomic policy and inflation. The table also presents the treatment effect on the index of financial literacy, measured as in [Lusardi and Mitchell \(2011\)](#). Here, we estimate the treatment effect on the usual financial literacy index including three questions about inflation, interest rate compounding and risk diversification (column (2)) and the effect on an index excluding the question about inflation (column (3)).

We find that the *literacy* treatment significantly improves inflation literacy. Compared with the control group, receiving the general, non-numerical text on inflation and monetary policy corresponds to a 20% increase in the average score in the test questions about inflation and monetary policy in the first wave survey. The *literacy* treatment also statistically significantly improves the average score in the financial literacy test questions, but the magnitude of the effect is relatively small, corresponding to an increase of about 5% in the average grade of the financial literacy test. Moreover, the *literacy* treatment affects only the answers in the question about inflation included in the standard financial literacy measure (column 3). These results suggest that the provided information has the intended effect in helping respondents to understand the basic intuition regarding inflation and monetary policy. The significant effects of the treatment on inflation literacy also imply that respondents in the treated group paid attention to the information text they were provided with.

In the second wave, we repeat the test questions measuring inflation literacy. We find that the *literacy* treatment still significantly raises inflation literacy after three months, though the magnitude of the effect is reduced by about 40% compared with the first wave.

Table A11 in the Appendix shows that the *literacy* treatment significantly affects the probability of correctly answering each of the questions included in the inflation literacy index in the first wave, whereas the effect becomes insignificant on the questions about monetary policy instruments (Q4) and about macroeconomic policy and inflation (Q5) in the second wave.

Table 1: Effect of Economic Literacy on Economic Literacy Test Results

	Immediate			3 months later
	(1) Inflation literacy	(2) Financial literacy (1)	(3) Financial literacy (2)	(4) Inflation literacy
literacy	0.38*** (0.04)	0.087*** (0.03)	0.034 (0.02)	0.15*** (0.05)
R ²	0.157	0.094	0.119	0.140
N observations	4000	4000	4000	2851

Note: The index financial literacy (1) uses all three financial literacy questions, the index financial literacy (2) excludes the question about inflation and includes only two questions about interest rate compounding and risk diversification. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.2 The effect on inflation predictions

Table 2 shows the treatment effect on inflation point predictions, including inflation perceptions (π^p), inflation expectations in the next 12 months ($\pi^{e,1y}$) and in the next 3 years ($\pi^{e,3y}$), as well as respondents' guess about the inflation target of the ECB ($\pi^{ECB,target}$). These questions were asked *prior to* the second round of quantitative information treatments about inflation.

As about 30% and nearly 50% of respondents did not provide estimates of inflation perceptions, expectations and the ECB inflation target, respectively, we study both the extensive and intensive margins of the *literacy* treatment. The former measures the treatment effect on the probability of providing predictions, while the latter shows the treatment effect on the quantitative level of inflation predictions, provided that a prediction was made.

Table 2 shows that those who received the *literacy* treatment are about 5 percentage points more likely to answer these questions and the treatment effects are statistically significant at the 1% level. This suggests that the general information we provided made respondents more confident in providing numerical point predictions about current and

future inflation, or in providing a guess about the ECB’s inflation target, even though the information in the *literacy* treatment contained no numerical information about current or future inflation or the inflation target.

Table 2: Effect of the Literacy Treatment on Inflation Predictions

	Extensive Margin				Intensive Margin			
	(1) π^p	(2) $\pi^{e,1y}$	(3) $\pi^{e,3y}$	(4) $\pi^{ECB,target}$	(5) π^p	(6) $\pi^{e,1y}$	(7) $\pi^{e,3y}$	(8) $\pi^{ECB,target}$
literacy	0.06*** (0.01)	0.05*** (0.01)	0.05*** (0.01)	0.05*** (0.01)	-0.04 (0.06)	-0.1 (0.10)	-0.08 (0.11)	0.03 (0.05)
Pseudo R ²	0.063	0.057	0.064	0.080				
R ²					0.009	0.039	0.017	0.025
N observations	4000	4000	4000	4000	1846	1846	1846	1499

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. The extensive margin measures the treatment effect on the probability of providing inflation forecasts. The intensive margin measures the treatment effect on the size of inflation forecasts, provided that a forecast is made by respondents. This table reports the marginal effect from probit regressions (columns 1-4) and estimated coefficients from Huber robust regressions (columns 5-8). Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This is reflected also in our second finding on the intensive margin: Provided that a prediction was made, the *literacy* treatment has no significant effect on the level of respondents’ predictions. Overall, these results suggest that providing some economic intuition on inflation and monetary policy potentially helps respondents to better understand inflation questions, thereby raising their confidence in answering them (extensive margin), but does not affect the level of the point predictions relative to the control group (intensive margin).¹¹

In order to check whether the non-effect of the *literacy* treatment on the level of inflation predictions is driven by selection bias, we run balance tests comparing the control group against the *literacy* treatment group with respect to a large range of socio-demographic characteristics, including age, education, gender, income, employment status, being a home owner, household size, and region. We further check the balance tests of respondents’ attention to news on inflation and monetary policy. We define individuals

¹¹In Table A19 in the appendix, we show the effect of the *literacy* treatment on point inflation predictions after 3 months, but only for the control group from the second stage of our experiment, who did not receive any further information treatments in the second stage of our experiment. We do not find any significant effects of the *literacy* treatment on point predictions of inflation after three months, both regarding the intensive and extensive margins. However, this could be due to the substantially smaller sample size of this group.

who pay close attention to news about inflation or monetary policy as those who reported having seen this type of news more than 3 times in the last month.¹²

First, we compare the samples of respondents who provided inflation predictions in both groups (Table A9 in the appendix) and, second, we compare the samples of respondents who either did not provide inflation predictions, or whose predictions were truncated (A10 in the appendix). We find no significant differences between the samples in any of the socio-demographic characteristics or regarding respondents' attention to inflation news, suggesting that the composition of respondents providing or not providing inflation predictions between the control and the *literacy* group is approximately the same. This implies that the selection bias due to a higher likelihood of answering the inflation prediction questions in the *literacy* treatment is not large enough to drive the other results.

3.3 The effect on trust in the central bank

Next, we evaluate the causal impact of the *literacy* treatment on trust in the ECB and the German Bundesbank. Both questions were measured qualitatively on a scale between 0 and 10. Note that the trust questions were included at the end of our survey to allow measuring both the effect of the *literacy* treatment by itself, and its interaction with further information treatments. In order to identify the “pure” effect of the *literacy* treatment, in this section we analyze only the control group from the second stage of our experiment, who did not receive any further information treatments. This explains the lower number of observations.

The results are presented in Table 3. Controlling for the same demographic characteristics as before, we find that the *literacy* treatment improves trust in the Bundesbank by 0.4 units, which corresponds to an increase of about 9% in trust relative to those in control group 2 (see Table A8 in the appendix). However, trust in the ECB is not affected significantly, and there are no effects on trust three months after the treatment. Part of this may be due to measurement error in the relatively small sample. Table A12 in the appendix also suggests that the impact of the *literacy* treatment on trust may be driven by the sub-sample that provide point predictions on inflation after the *literacy* treatment. For this group, we find that the *literacy* treatment significantly raises trust in both the ECB and the Bundesbank, where the effects are larger than in the overall sample, but still only significant in the first wave.

¹²Before providing the information treatments, we ask respondents “How often have news about the following topics come to your attention in the last month? a) inflation rate, b) the monetary policy of the European Central Bank (ECB), c) interest rates in general, d) unemployment rate”. Respondents choose answer in [Never, Once, Between 2 and 3 times, Between 4 and 5 times, More than 5 times, Don't know]. Our surveys reveal that in the first wave, 57% of respondents reported paying close attention to news about inflation, while 28% reported paying close attention to monetary policy news. In the follow-up survey, these numbers increased to 68% and 37%, respectively, in line with the increased public discussion about inflation as inflation rates rose in mid-2022 due to the energy price shock in the wake of the attack on Ukraine.

Table 3: Effect of the Literacy Treatment on Trust in the Central Banks

	Immediate		3 months later	
	(1) ECB	(2) Bundesbank	(3) ECB	(4) Bundesbank
literacy	0.2 (0.18)	0.4** (0.18)	0.2 (0.23)	0.2 (0.23)
R ²	0.056	0.064	0.046	0.071
N observations	767	765	525	522

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. The sample consists of the control group in the second stage, who did not receive any further quantitative information treatments. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.4 Robustness and heterogeneity

In order to examine if the effects of the *literacy* treatment vary with attention to the treatment, we divide the treatment group into three subgroups based on the duration of time spent reading the treatment information: less than 15 seconds, 15-145 seconds, and more than 145 seconds, representing the 10th, 10th – 90th, and the 90th percentile of the distribution of the time spent reading the text. We re-estimate the main results of this section and show them in tables A13-A16 in the Appendix.¹³ We find that those who spent less than 15 seconds reading the information do not differ significantly from the control group in terms of inflation literacy scores, inflation predictions, and trust in the central bank. In fact, this group performs worse than the control group in terms of financial literacy and with respect to some test questions included in the inflation literacy index and gives higher estimates of medium-run inflation and the inflation target. This indicates that these were respondents who not only spent very little time on the treatment, but had little knowledge regarding the surveys topic in general. However, the groups who spent 15-145 seconds or more than 145 seconds reading the information show very similar treatment effects to each other and in comparison to the entire treatment group, indicating that the baseline results are driven by a large majority within the *literacy* treatment group.

Finally, we investigate whether the *literacy* treatment effects differ across gender, education, age, region as well as attention to news about inflation and monetary policy of the ECB. Since individuals who are male, highly educated, middle-aged, living in West Germany, or pay more attention to inflation and monetary policy news typically provide more accurate inflation predictions and, thus, are more likely to be familiar with the

¹³We also split the sample after the first and third quartile, where the lowest quartile spent less than 30 seconds on the *literacy* treatment text and the highest quartile more than 90 seconds. The results are qualitatively similar and available on request.

treatment information¹⁴, we hypothesize that the treatment may have weaker effects on these groups. Regarding potential heterogeneity in treatment effects across age groups, we further hypothesize that the young may be better at recalling and processing the news we provided compared with the older respondents.

We estimate the effect of the *literacy* treatment on the literacy score, inflation predictions and trust in the central banks across these characteristics and present the results graphically in Figures A4 -A9 in the Appendix. The graphs show estimated marginal effects across the heterogeneous groups with 90% confidence bands. The estimates indicate that the *literacy* treatment has no heterogeneous effects across gender, age, education, and region in the sense that the estimates across these groups are not statistically different. In some cases, however, we find that estimates are only significantly different from zero in one of the groups. For instance, the *literacy* treatment significantly raises the literacy score in the second wave only for female and younger respondents, those without a college degree and those living in West Germany. Similarly, it significantly raises the likelihood of providing predictions for inflation one and three years ahead only for those without a college degree, in the youngest age group and those living in West Germany, while the effect on trust in the central bank was significant only for those with a college degree and for respondents from West Germany.

While the *literacy* treatment seems to affect respondents similarly across these demographic characteristics, we do find that attention to news on inflation or monetary policy prior to the treatment matters: The *literacy* treatment has a significantly stronger effect on knowledge about inflation and monetary policy on respondents who report being *less* informed about these topics. Similarly, those with less prior information about inflation are significantly more likely to estimate current or future inflation and also predict current inflation to be lower after the *literacy* treatment compared to the control group. While the effect of the *literacy* treatment on trust in the central banks does not differ significantly between groups with less or more prior information, we do find that its effect on trust in the ECB and the Bundesbank is significantly different from zero only for those with less prior attention to monetary policy. Overall, it thus seems that the *literacy* treatment was particularly effective for respondents with low prior knowledge about inflation or monetary policy.

¹⁴This is shown in the large literature about socio-demographic variation in the accuracy of consumers' inflation expectations across many different time periods and countries, see for instance Bryan and Venkatu (2001), Pfajfar and Santoro (2009), Hayo and Neuenkirch (2018), and D'Acunto et al. (2023). Furthermore, Davoli and Hou (2021) find that residents of West Germany exhibit a significantly higher level of financial literacy compared to their counterparts in East Germany.

4 Interaction of the *literacy* treatment with further numerical information treatments about inflation

After evaluating the effect of the general information provided in the *literacy* treatment on prior expectations, we next turn to investigating how the *literacy* treatment interacts with further numerical information treatments on posterior expectations. The intention is to study whether respondents, who received the general information, update their inflation forecasts differently to additional quantitative information. We study this within the concept of Bayesian updating of expectations (following Coibion et al., 2019, Coibion et al., 2022, and Coibion et al., 2023):

$$belief^{post} = G \times information + (1 - G) \times belief^{prior} \quad (2)$$

Under Bayesian updating, agents' posterior beliefs are updated following the signal included in the information, where the coefficient G measures how informative the signal is relative to agents' prior belief. In our econometric set-up, this is measured by interacting consumers' prior inflation expectations, measured before the quantitative treatments in step 1 of the experiment, with the treatment-dummies from step 2. Moreover, we evaluate whether updating to the quantitative treatments differs between those who received the *literacy* treatment in step 1 and those who did not by adding triple interactions. This results in the following estimation equation:

$$\begin{aligned} \pi_i^{post} = & \alpha + \beta_0 literacy_i + \xi \times \pi_i^{prior} + \sum_{j=1}^4 \beta_j quan.info_{j,i} \\ & + \sum_{j=1}^4 \eta_j quan.info_{j,i} \times literacy_i + \gamma_0 literacy_i \times \pi_i^{prior} + \sum_{j=1}^4 \gamma_j quan.info_{j,i} \times \pi_i^{prior} \\ & + \sum_{j=1}^4 \lambda_j quan.info_{j,i} \times literacy_i \times \pi_i^{prior} + \zeta X_i + \epsilon_i, \end{aligned} \quad (3)$$

where $literacy_i$ is the dummy variable indicating whether consumer i received a 1-minute reading text about inflation and monetary policy; $quan.info_{j,i}$ indicates whether consumer i received one of the four quantitative information treatments: (1) the inflation target of the ECB (*ECB target*), (2) the inflation target of the ECB and an additional text about the ECB's commitment to take into account the effect of climate change (*ECB targetplus*), (3) the current inflation rate (*current inf.*), (4) the current inflation rate and the Bundesbank's inflation projections over the next three years (*current plus forecast inf.*), evaluated relative to a control group who did not receive any further information. π_i^{prior} and π_i^{post} are prior and posterior inflation predictions with corresponding time hori-

zons (inflation perceptions and expectations 12 months and three years ahead), measured before and after the quantitative information treatments, respectively. X_i includes the same set of control variables used in equation 1.

Our coefficients of interest are γ_j and λ_j . Under no signal as in the control group, equation (2) would predict respondents to fully rely on their prior belief when forming posterior beliefs, implying $\xi = 1$. If the signals provide meaningful information, respondents would be expected to adjust their posterior belief towards the signal and, hence, rely less on the prior, implying $\gamma_j < 0$. Finally, λ_j measures any potential differences in the γ_j coefficients between the *literacy* treatment group and the control group in step 1.

In addition to the treatment effects on respondents' update of their inflation predictions, we further evaluate effects on posterior forecast uncertainty and respondents' trust in the central bank. Since we have no measures of prior forecast uncertainty or trust, here we estimate the following equations:

$$\begin{aligned} \sigma\pi_i^{post} = & \alpha + \xi \times \pi_i^{prior} + \beta_0 literacy_i + \sum_{j=1}^4 \beta_j quan.info_{j,i} \\ & + \sum_{j=1}^4 \eta_j quan.info_{j,i} \times literacy_i + \gamma X_i + \epsilon_i \end{aligned} \quad (4)$$

where $\sigma\pi_i^{post}$ is the uncertainty of inflation beliefs measured after the quantitative information treatments. We measure forecast uncertainty as the standard deviation of inflation predictions from the probabilistic questions for posterior expectations. When estimating (4), we control for π_i^{prior} , the level of prior inflation beliefs with the same time horizon as the uncertainty measure evaluated.

$$\begin{aligned} trust_i^{post} = & \alpha + \xi \times \pi_i^{3y,prior} + \beta_0 literacy_i + \sum_{j=1}^4 \beta_j quan.info_{j,i} \\ & + \sum_{j=1}^4 \eta_j quan.info_{j,i} \times literacy_i + \gamma X_i + \epsilon_i \end{aligned} \quad (5)$$

where $\pi_i^{3y,prior}$ refers to prior point estimates of expected inflation three years ahead.¹⁵ For both equations 4 and 5, the coefficients β_j measure the average effect of the *literacy* and the quantitative treatments, and the coefficients η_j estimate interaction effects between the *literacy* treatment and further quantitative information treatments.

We estimate equations (3) and (4) using Huber robust regressions to account for potential outliers, while we estimate equation (5) using OLS and robust standard errors.

¹⁵Our results remain unchanged if instead we control for inflation perceptions or inflation expectations in the next year. These results are available upon request.

4.1 Effects on updates of inflation predictions

In this subsection, we study the effect of the quantitative information treatments on the updates of posterior inflation predictions, accounting for interaction effects with the *literacy* treatment as in equation (3). The estimates are shown in Table A17 in the appendix. In order to visualize the results, we show binscatter plots for the relationship between prior and posterior inflation predictions across the treatment groups (separately for *literacy* treatment group and the control group from step 1) in Figure 1. All binscatter plots are weighted using the Huber weights from Table A17.

Figure 1a and 1b show the binscatter plots for inflation perceptions in the control group of step 1 and the *literacy* treatment group, respectively. In both, posterior predictions in the control group from step 2 (those who did not receive any quantitative treatment) co-move positively with prior predictions, but the slope is smaller than one. This is a common finding in similar RCT studies (see, e.g., Coibion et al., 2023) and could be due to the different question types used to measure prior and posterior expectations. From the binscatter plots in Figure 1a, we observe that respondents who received either the *ECB target*, the *current plus forecast inf.* or (to a lesser extent) the *current inf.* treatment, adjusted their expectations less towards the prior and more towards the signal. For those who were treated with the *literacy* treatment, Figure 1b shows similar effects of the *current plus forecast inf.* and *current inf.* treatments. However, the slope does not differ from the control group in the *ECB target* treatment, suggesting that this was not an informative signal for respondents who learned about the inflation target in general, non-numerical terms before. Instead, the *ECB targetplus* treatment emerges as an informative signal. Since the *literacy* treatment did not mention climate change as a relevant factor for monetary policy, this aspect seems to be regarded as relevant information for inflation predictions by respondents in the *literacy* treatment, while it is disregarded by those in the control group.

To evaluate whether the average reliance on the prior differs significantly between those in the *literacy* treatment and those in control group 1 across the quantitative treatment groups, we show average marginal effects of prior beliefs on posterior beliefs with 90% confidence bands in Figure 2. In line with the evidence in Figure 1a and 1b, Figure 2a shows that respondents receiving the *current inf.* or the *current plus forecast inf.* treatment adjusted their posterior forecast significantly less towards their prior than those in control group 2, but this effect does not differ with respect to the previous *literacy* treatment. This suggests that numerical information about current or projected inflation is informative regardless of the general information provided in our *literacy* text. By contrast, the *ECB target* treatment reduces reliance on the prior only for those without the *literacy* treatment, while the additional information about the ECB’s intention to account for the effect of climate change in the *ECB targetplus* treatment is informative only for those who previously received the *literacy* treatment.

Figures 1c-1f as well as 2b-2c show similar patterns for inflation expectations one year and three years ahead. Interestingly, we observe that those in the *literacy* treatment rely somewhat less on their prior when forming posterior predictions three years ahead even when not receiving any further information (control group 2). Perhaps not surprisingly, the information about current inflation is less informative for posterior expectations three years ahead.

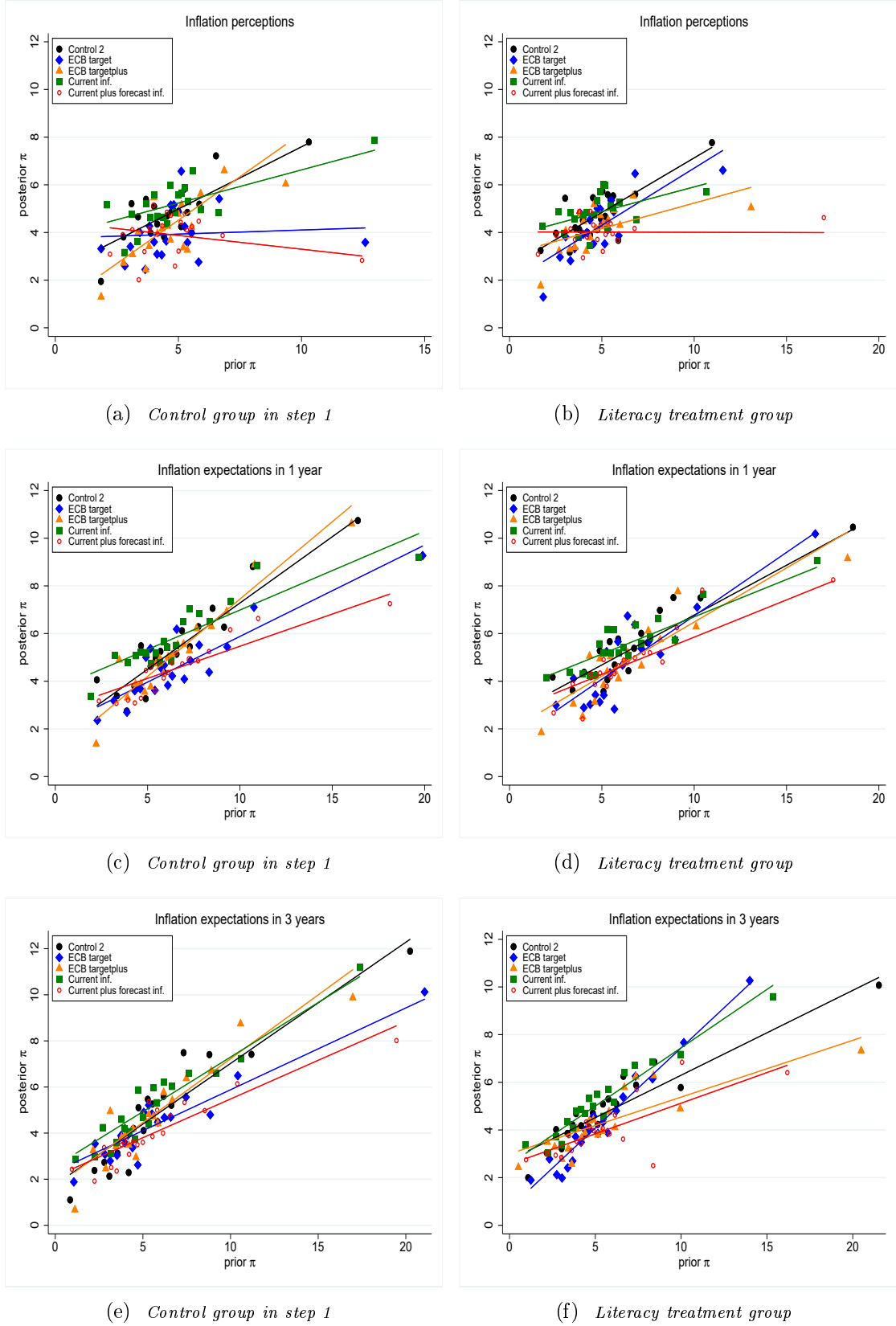
4.2 Effects on the uncertainty of posterior inflation predictions

This subsection studies the treatment effects on the uncertainty of posterior inflation predictions. Table 4 shows the results. Posterior forecast uncertainty correlates positively with the level of prior inflation predictions. In addition, we find that the *literacy* treatment increases the uncertainty of inflation expectations in the next 1 and 3 years. This result is in line with Rumler and Valderrama (2020) who find that individuals with higher inflation literacy are more uncertain about their inflation expectations. A possible explanation for this result is that inflation-literate individuals realize the difficulties involved in predicting inflation, and therefore become less overconfident regarding their forecast accuracy.

Moreover, the quantitative information treatments in the second step about current and projected inflation on average reduce the uncertainty of posterior predictions of current inflation, and, in the case of the *current plus forecast inf.* treatment, also of posterior expectations one year ahead compared to those in control group 2.

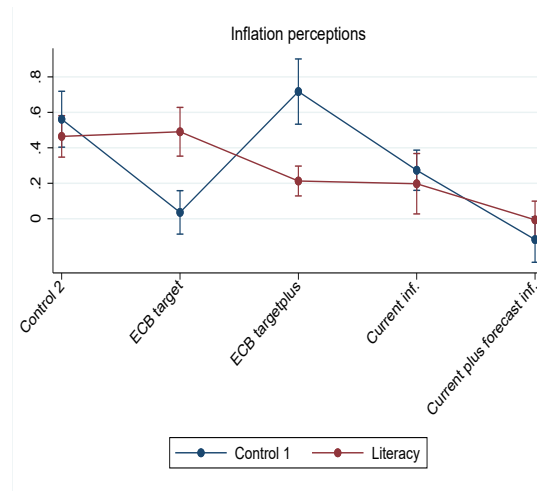
Regarding the interaction of the *literacy* treatment with the quantitative information treatments, we find that general information combined with quantitative information about the ECB target or about current and projected inflation reduces uncertainty more than for those without the *literacy* treatment. Overall, these results suggest that the general information we provide in the *literacy* treatment leads respondents to state a more narrow distribution of projected inflation in reaction to certain quantitative information. This counteracts the average increase in forecast uncertainty caused by the *literacy* treatment on average, and enhances the average reduction of forecast uncertainty by certain quantitative treatments.

Figure 1: Updating of Inflation Beliefs by Information Treatments

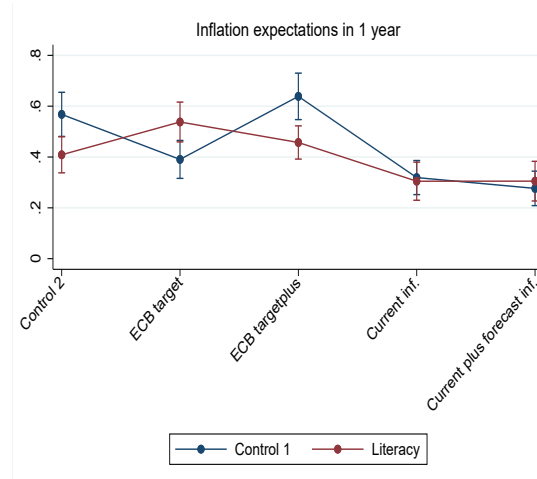


Note: All estimates are for wave 1. Binscatter plots weighted with Huber weights from the regressions in Table A17.

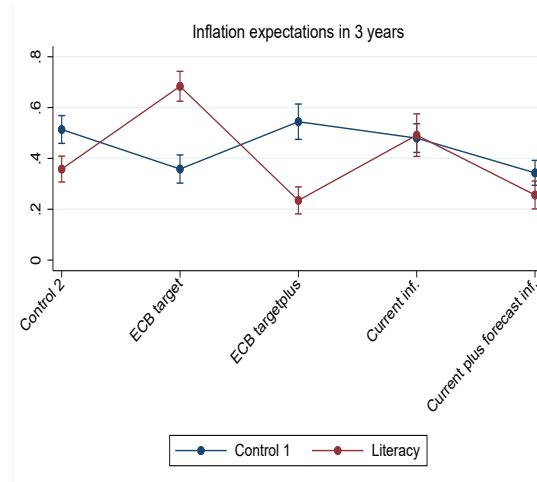
Figure 2: Average Marginal Effect of Prior Beliefs on Posterior Beliefs



(a)



(b)



(c)

Note: All estimates are for wave 1. Estimated marginal effects are shown with 90% confidence intervals.

Table 4: Treatment Effects on the Uncertainty of Posterior Predictions

	(1) $\sigma\pi^p$	(2) $\sigma\pi^{e,1y}$	(3) $\sigma\pi^{e,3y}$
π^{prior}	0.14*** (0.01)	0.089*** (0.01)	0.036*** (0.01)
literacy	-0.042 (0.18)	0.40** (0.16)	0.36** (0.16)
ECB target	-0.27 (0.19)	0.080 (0.17)	0.12 (0.17)
ECB targetplus	-0.034 (0.19)	0.090 (0.17)	0.15 (0.17)
Current inf.	-0.37** (0.19)	-0.013 (0.17)	0.17 (0.17)
Current plus forecast inf.	-0.48*** (0.18)	-0.28* (0.16)	-0.23 (0.16)
ECB target \times literacy	0.23 (0.26)	-0.43* (0.23)	-0.44* (0.23)
ECB targetplus \times literacy	0.21 (0.26)	-0.12 (0.23)	-0.17 (0.23)
Current inf. \times literacy	0.15 (0.26)	-0.45* (0.23)	-0.40* (0.23)
Current plus forecast inf. \times literacy	0.043 (0.26)	-0.34 (0.23)	-0.36 (0.23)
R ²	0.124	0.111	0.066
N observations	1846	1846	1846

Note: Estimates for wave 1. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from Huber robust regressions. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Effects on trust in the central bank

Finally, this subsection studies the treatment effects on trust in the central bank, including the ECB and the Bundesbank in our case. Table 5 shows the results. We find that inflation expectations are significantly negatively correlated with trust in the central bank, in line with the results in Christelis et al. (2020) and Rumler and Valderrama (2020).

The *literacy* treatment improves average trust in the central banks by 0.4-0.6 points, corresponding to an increase of about 10-14% in the average trust in the central banks in control group 1 (see Table A8 in the appendix). This implies that informing consumers about the general targets of monetary policy and how they are measured and may be achieved, leads to a stronger trust in the institution.

Regarding the quantitative information treatments about inflation, we find that informing respondents about the ECB's inflation target, either with or without the news about the ECB's commitment to take the effect of climate change into account, does not affect trust in the ECB and the Bundesbank. This may be due to the fact that actual inflation was strongly above target at the time of our survey. However, we discover that providing information about current inflation, together with projections predicting a fall inflation, causes a strong improvement in trust in both central banks by about 17-18% relative to the control group.

Respondents in the *current inf.* treatment also report higher trust in the Bundesbank, even though the effect is only marginally significant. However, this effect becomes negative for those who previously received the *literacy* treatment. This results make sense, as the information on the current inflation rate shows that the ECB was not able to maintain price stability at that moment. It implies that those who learn more about inflation and monetary policy in general, may also hold the central bank accountable more in situations where the mandate is not fulfilled. This suggests a potential pitfall of communicating with the general public, which links nicely to the theoretical model by Haldane et al. (2020).¹⁶

4.4 Persistence of Information Treatments

We further evaluate the persistence of the quantitative information treatments, and their interaction with the *literacy* treatment, for inflation predictions and trust in the central bank measured three months later.¹⁷ The results are shown in Tables A20-A22 and Figures A10-A11 in the appendix.

¹⁶We also estimate the treatment effects on trust in the central bank for those who do not provide inflation predictions, shown in Table A18 in the appendix. Notably, in this sub-sample, there are fewer treatment effects from quantitative information, for instance the positive effect from information about current or projected inflation on trust is not significant. Only those who received the *ECB targetplus* treatment show higher trust in the ECB and the Bundesbank, however, the effect is significant only in the second wave.

¹⁷Note that in the second wave, we did not measure perceptions of current inflation, focusing on expectations one year and three years ahead.

Table 5: Treatment Effect on Trust in the Central Banks

	(1) Trust in the ECB	(2) Trust in the Bundesbank
$\pi^{prior,3y}$	-0.09*** (0.01)	-0.08*** (0.01)
literacy	0.44* (0.25)	0.57** (0.25)
ECB target	0.37 (0.26)	0.15 (0.26)
ECB targetplus	0.18 (0.26)	0.32 (0.26)
Current inf.	0.32 (0.26)	0.45* (0.26)
Current plus forecast inf.	0.76*** (0.26)	0.73*** (0.26)
ECB target \times literacy	-0.35 (0.36)	-0.39 (0.36)
ECB targetplus \times literacy	0.16 (0.36)	-0.27 (0.35)
Current inf. \times literacy	-0.51 (0.36)	-0.83** (0.36)
Current plus forecast inf. \times literacy	-0.48 (0.35)	-0.43 (0.35)
R ²	0.083	0.091
N observations	1846	1846

Note: Estimates for wave 1. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Generally, we find only few remaining treatment effects after three months: As shown in Table A20 and Figures A10-A11 the *current plus forecast inf.* treatment remains an informative signal for updates of expectations one and three years ahead also after three months. However, this effect is only significant for those in control group 1, and becomes insignificant for those who received the *literacy* treatment in the first wave. However, Figure A11 also shows that the differences between the *literacy* treatment and the control group 1 generally become insignificant in the second wave. Table A21 presents the effects on forecast uncertainty in the second wave. Both the average effect of the treatments and most of the interaction effects become insignificant. The only exception is a marginally significant negative effect on uncertainty of expectations one year ahead for those who received both the *literacy* and the *current inf.* treatment.

Finally, Table A22 shows the treatment effects on trust in the central bank in the second wave. While the average effect of the *literacy* treatment becomes insignificant, respondents who were informed about current and projected inflation report higher levels of trust also after three months irrespective of being in the *literacy* treatment. Moreover, respondent in the *literacy* treatment who later received the *ECB targetplus* treatment, which informs about the ECB target and the ECB’s new focus on climate issues, report higher trust in the ECB after three months compared to those in the control group. While the size of the effects on trust in the second wave are of similar magnitude than those in the first wave, they are only marginally significant.

Overall, it seems that both the *literacy* and the quantitative information treatments are relatively short-lived with respect to their effect on inflation predictions and trust in the central bank. This is largely in line with the evidence from other RCT studies on consumer inflation expectations (e.g., Cavallo et al., 2017 and Coibion et al., 2022). While we show in Table 1 that the effect of the *literacy* treatment on knowledge about inflation and monetary policy persists after three months, it seems that the treatment effects on inflation predictions and trust nevertheless fade relatively quickly. This is perhaps not surprising considering that respondents are constantly exposed to all kinds of different information and spent just one minute reading the *literacy* text on average. As shown in Table A23 in the appendix, the treatments do not affect respondents’ stated attention to news on inflation or monetary policy in the second wave. In line with the evidence in Ehrmann et al. (2023), this implies that consumers’ attention to these topics is not affected by short pieces of central bank communication.

5 Conclusion

This paper studies whether general and qualitative information about inflation and monetary policy can improve consumers’ inflation literacy and whether an increase in literacy leads consumers to adjust their inflation predictions differently to further quantitative

information. We test this research question using a two-step RCT design on a sample of 4,000 German consumers surveyed in March, 2022.

Our results are somewhat two-sided: On the one hand, the general information provided in the *literacy* treatment in the first step of our RCT significantly improves inflation literacy, and this effect persists after three months. Moreover, the improvement in literacy leads to a higher likelihood of providing inflation predictions. On the other hand, the *literacy* treatment does not affect the level of predictions in comparison to the control group. This suggests that the general and qualitative information made consumers more confident in their ability to provide quantitative inflation predictions, but did not affect the level of predicted inflation. However, the *literacy* treatment also has an effect on trust in both the ECB and the Bundesbank, which may interact with its effect on the confidence in providing inflation predictions: For those who provided point forecasts, we observe that the *literacy* treatment significantly improved trust in both central banks, while the effect is smaller and only significant for trust in the Bundesbank in the overall sample.

Moreover, we find that the *literacy* treatment interacts with some quantitative information treatments provided in the second step of our RCT design. While respondents adjusted their posterior inflation forecasts to information about current and projected inflation regardless of whether they received the *literacy* treatment beforehand, only the respondents in the *literacy* treatment regarded the information about the ECB's intention to account for effects of climate change as relevant information. By contrast, respondents, who did not receive the general information in the *literacy* treatment, adjusted their posterior forecasts also towards the information about the ECB's inflation target. In addition, we find that the *literacy* treatment affects posterior prediction uncertainty as well as trust in monetary policy institutions, and this effect also interacts with some information treatments. While respondents in the *literacy* treatment seem to be more aware of the difficult inflation forecast environment at the time of our survey, their forecast uncertainty is reduced more when they are shown the information about the ECB inflation target or current inflation. Similarly, the *literacy* treatment on average improves trust in the central bank, but when in addition information is shown that current inflation is high, this reduces trust for the more literate relative to those who did not receive the *literacy* treatment.

Overall, our results tell a cautious tale about efforts to improve knowledge about inflation and monetary policy in the general public. While it may be possible to generate literacy with simple and general information, this does not automatically imply an effect on consumers' predictions about current and future inflation. Rather, the effect seems to be more subtle, affecting the confidence to provide forecasts, reaction to certain types of further information or trust in the central bank (which in turn correlates with inflation expectations). What's more, higher literacy also seems to make consumers more aware of the difficulties in projecting inflation. This may increase their forecast uncertainty – which

could be a good thing if they were overconfident in their forecasts before. Importantly, higher literacy may generate trust in the central bank, but can also lead to larger losses in trust in an inflationary environment.

Finally, it needs to be stressed that the treatment effects are rather short-lived also with respect to our *literacy* treatment. This common result in the literature suggests that even successful communication – in the sense that the information reaches the general public – would have to be frequently repeated in order to generate long-lasting effects on consumers’ inflation predictions and their trust in the central bank.

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A Appendix

A.1 Summary Statistics

Table A1: The Distribution of Respondents across Treatments

	Control 2	ECB target	ECB target plus	current Inf.	current plus forecast Inf.	Total
Wave 1						
Control 1	419	392	386	387	412	1,996
Literacy	420	392	395	387	410	2,004
Total	839	784	781	774	822	4,000
Wave 2						
Control 1	294	266	284	277	288	1,409
Literacy	299	281	275	280	307	1,442
Total	593	547	559	557	595	2,851

Table A2: Demographic characteristics: Control group vs. Literacy treatment (Step 1)

Variable	Wave 1					Wave 2				
	Control 1		Literacy		Mean diff. p-value	Control 1		Literacy		Mean diff. p-value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Age	46.41	15.22	46.55	15.35	0.78	48.54	14.71	48.97	14.77	0.44
College	0.43	0.49	0.42	0.49	0.89	0.43	0.50	0.42	0.49	0.68
Male	0.50	0.50	0.50	0.50	0.80	0.53	0.50	0.52	0.50	0.70
Income (euro)	2993	1750	3032	1753	0.49	2990	1769	3002	1795	0.87
Full-time job	0.47	0.50	0.48	0.50	0.84	0.46	0.50	0.46	0.50	0.99
Part-time job	0.15	0.36	0.14	0.34	0.21	0.15	0.36	0.13	0.34	0.14
Retired	0.18	0.38	0.18	0.39	0.61	0.21	0.40	0.21	0.41	0.52
Renter	0.54	0.50	0.53	0.50	0.61	0.53	0.50	0.52	0.50	0.73
HH-size	2.23	1.08	2.25	1.10	0.59	2.18	1.06	2.17	1.07	0.86
East Germany	0.15	0.36	0.14	0.35	0.32	0.16	0.36	0.15	0.35	0.50

Table A3: Demographic characteristics (Wave 1): Control group vs. further treatments (Step 2)

Variable	(1) Control 2	(2) ECB target	(3) ECB targetplus	(4) Current inf.	(5) Current plus forecast inf.	(2)-(1) Pairwise t-test	(3)-(1) Pairwise t-test	(4)-(1) Pairwise t-test	(5)-(1) Pairwise t-test
	Mean/(SD)	Mean/(SD)	Mean/(SD)	Mean/(SD)	Mean/(SD)	P-value	P-value	P-value	P-value
Age	46.681 (15.035)	46.622 (15.338)	46.104 (15.136)	46.609 (15.479)	46.366 (15.472)	0.939	0.442	0.924	0.675
College	0.442 (0.497)	0.397 (0.490)	0.442 (0.497)	0.412 (0.493)	0.427 (0.495)	0.063*	0.985	0.223	0.533
Male	0.532 (0.499)	0.478 (0.500)	0.492 (0.500)	0.492 (0.500)	0.509 (0.500)	0.032**	0.108	0.114	0.347
Income	3100.128 (1780.550)	2893.342 (1610.659)	3002.063 (1732.000)	3045.862 (1798.427)	3015.909 (1820.449)	0.018**	0.279	0.556	0.357
Full-time job	0.501 (0.500)	0.467 (0.499)	0.516 (0.500)	0.442 (0.497)	0.456 (0.498)	0.174	0.536	0.018**	0.070*
Part-time job	0.138 (0.345)	0.133 (0.339)	0.132 (0.339)	0.152 (0.360)	0.155 (0.362)	0.742	0.708	0.419	0.349
Retired	0.169 (0.375)	0.195 (0.397)	0.174 (0.379)	0.195 (0.397)	0.173 (0.378)	0.177	0.795	0.179	0.850
Renter	0.553 (0.497)	0.522 (0.500)	0.540 (0.499)	0.552 (0.498)	0.521 (0.500)	0.206	0.608	0.956	0.186
HH size	2.209 (1.051)	2.213 (1.086)	2.247 (1.108)	2.266 (1.092)	2.265 (1.119)	0.933	0.473	0.281	0.288
East Germany	0.149 (0.356)	0.125 (0.331)	0.143 (0.351)	0.161 (0.368)	0.155 (0.362)	0.161	0.751	0.488	0.754

Table A4: Demographic characteristics (Wave 2): Control group vs. further treatments (Step 2)

Variable	(1) Control 2	(2) ECB target	(3) ECB targetplus	(4) Current inf.	(5) Current plus forecast inf.	(2)-(1) Pairwise t-test	(3)-(1) Pairwise t-test	(4)-(1) Pairwise t-test	(5)-(1) Pairwise t-test
	Mean/(SD)	Mean/(SD)	Mean/(SD)	Mean/(SD)	Mean/(SD)	P-value	P-value	P-value	P-value
Age	49.622 (14.170)	49.241 (14.877)	48.229 (14.990)	48.594 (14.998)	48.091 (14.667)	0.658	0.105	0.232	0.067*
College	0.442 (0.497)	0.406 (0.492)	0.428 (0.495)	0.420 (0.494)	0.427 (0.495)	0.220	0.626	0.458	0.604
Male	0.553 (0.498)	0.512 (0.500)	0.510 (0.500)	0.503 (0.500)	0.541 (0.499)	0.164	0.141	0.087*	0.680
Income	3057.932 (1759.980)	2903.809 (1686.948)	2960.878 (1797.437)	2988.985 (1807.825)	3058.587 (1849.341)	0.144	0.369	0.525	0.995
Full-time job	0.484 (0.500)	0.457 (0.499)	0.497 (0.500)	0.417 (0.493)	0.461 (0.499)	0.363	0.651	0.022**	0.418
Part-time job	0.130 (0.336)	0.122 (0.328)	0.118 (0.323)	0.171 (0.376)	0.158 (0.365)	0.709	0.545	0.053*	0.167
Retired	0.202 (0.402)	0.227 (0.419)	0.206 (0.405)	0.226 (0.419)	0.192 (0.394)	0.317	0.888	0.325	0.641
Renter	0.548 (0.498)	0.499 (0.500)	0.540 (0.499)	0.539 (0.499)	0.494 (0.500)	0.098*	0.790	0.748	0.063*
HH size	2.164 (1.044)	2.128 (1.073)	2.177 (1.059)	2.214 (1.078)	2.207 (1.063)	0.570	0.827	0.424	0.481
East Germany	0.155 (0.362)	0.128 (0.334)	0.150 (0.358)	0.167 (0.373)	0.156 (0.363)	0.190	0.818	0.586	0.956

Table A5: Summary statistics on inflation and financial literacy – Wave 1: Control group
1

Variable	Mean	Std. Dev.	Min.	Max.	N
Inflation literacy score	2.34	1.38	0	5	1996
(1) Question on inflation definition	0.77	0.42	0	1	1996
(2) Question on inflation and real consumption	0.6	0.49	0	1	1996
(3) Question on objective of monetary policy	0.34	0.47	0	1	1996
(4) Question on monetary policy instruments	0.49	0.5	0	1	1996
(5) Question on monetary policy and inflation	0.27	0.44	0	1	1996
Financial literacy score	1.91	0.95	0	3	1996
(1) Question on inflation and real consumption	0.6	0.49	0	1	1996
(2) Question on interest rate compounding	0.62	0.49	0	1	1996
(3) Question on risk diversification	0.69	0.46	0	1	1996

Note: The exact wording of the inflation and financial literacy questions is shown in the appendix.

Table A6: Share of Respondents Providing Inflation Predictions – Wave 1: Control group
1

Variable	Mean	Std. Dev.	Min.	Max.	N
Perceived inflation (π^P)	0.74	0.44	0	1	1996
Expected inflation in the next year ($\pi^{e,1y}$)	0.73	0.44	0	1	1996
Expected inflation in the next 3 years ($\pi^{e,3y}$)	0.67	0.47	0	1	1996
Inflation target of the ECB ($\pi^{ECB,target}$)	0.52	0.5	0	1	1996

Table A7: Summary statistics on inflation predictions – Wave 1: Control group 1

Variable	Mean	Median	Std. Dev.	Min	Max	N
π^P	4.97	5	2.59	1.5	30	881
$\pi^{e,1y}$	7.00	6	4.13	1.0	40	881
$\pi^{e,3y}$	6.39	5	5.28	0.0	42.5	881
$\pi^{ECB,target}$	2.99	2	2.62	-2.0	30	699

Note: Summary statistics for truncated inflation predictions.

Table A8: Summary statistics on trust in the central bank – Wave 1: Control group 2

Variable	Mean	Median	Std. Dev.	Min	Max	N
Trust in the ECB	4.11	5	2.51	0	10	376
Trust in the Bundesbank	4.39	5	2.56	0	10	377

Note: This table shows summary statistics on trust in the central bank for those who do not receive any information treatments.

Figure A1: Distribution of inflation and financial literacy – Wave 1: Control group 1

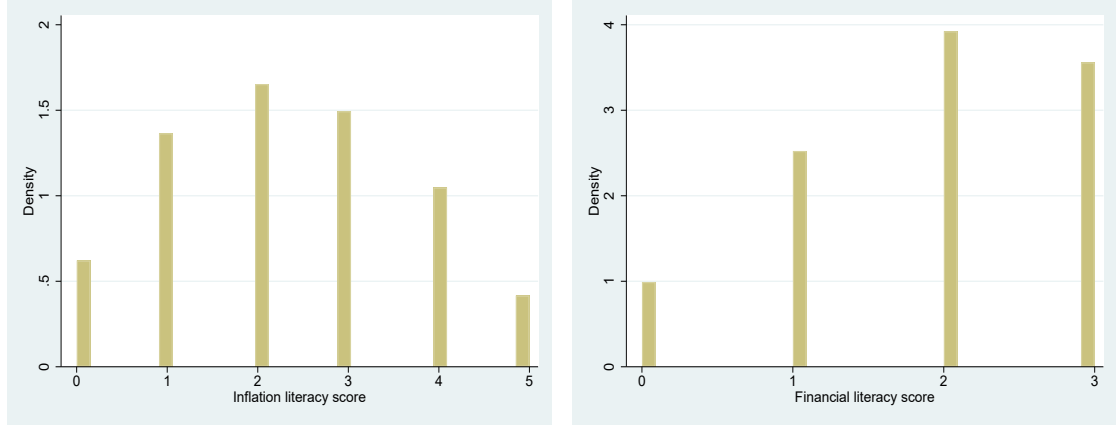
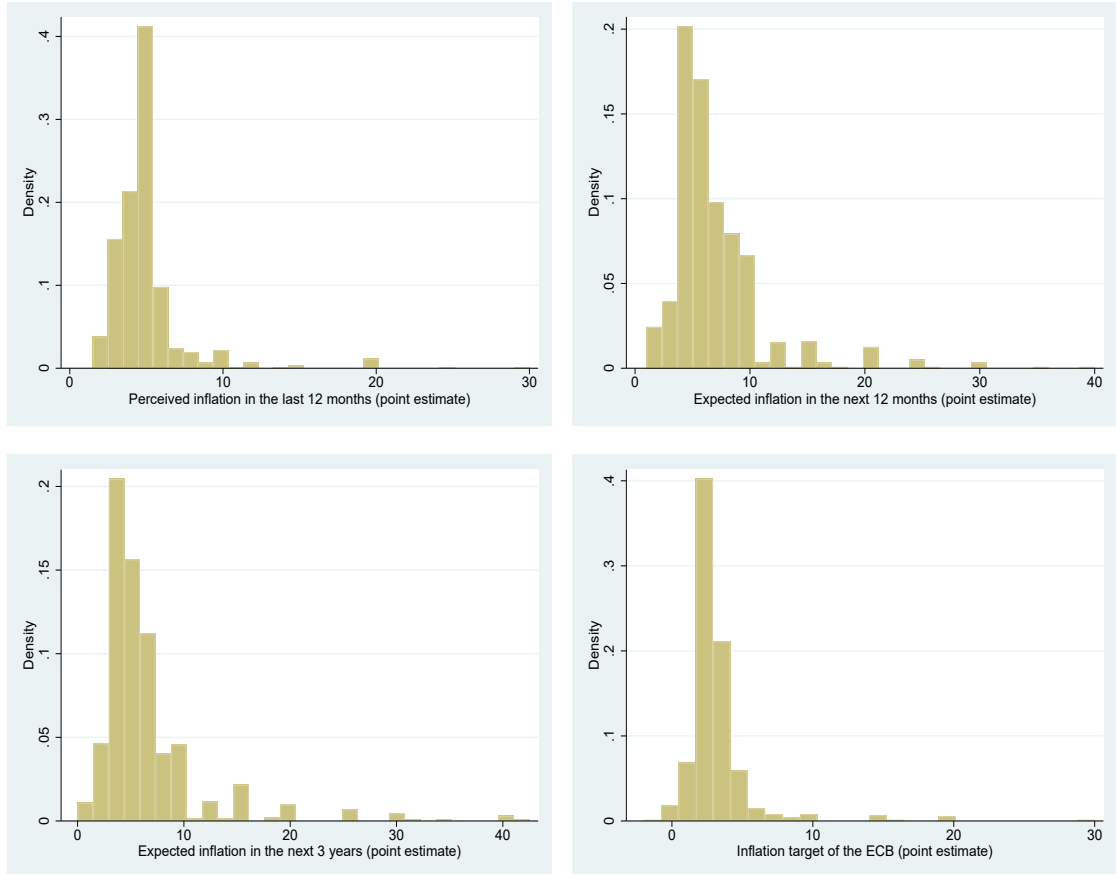
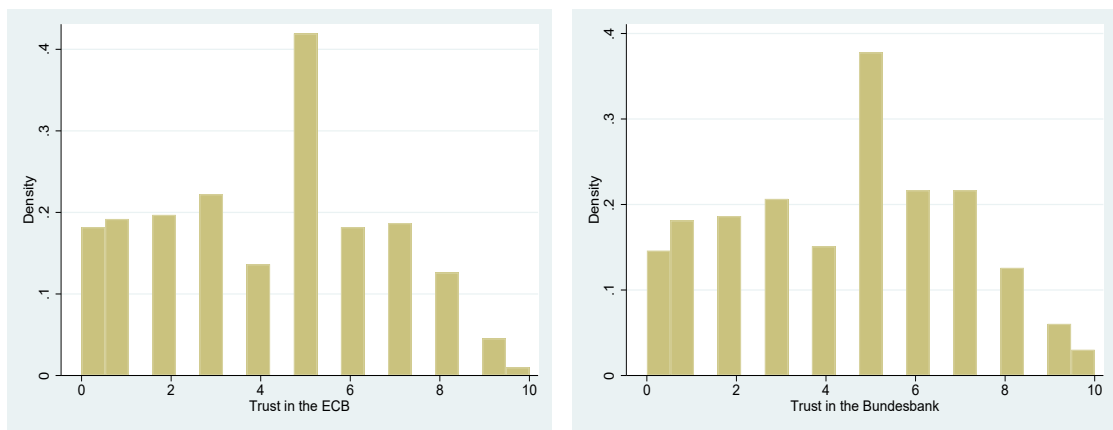


Figure A2: Distribution of inflation predictions – Wave 1: Control group 1



Note: This figure shows the distribution of point inflation predictions for truncated inflation predictions.

Figure A3: Distribution of trust in the central bank – Wave 1: Control group 2



Note: This figure shows the distribution of trust in the central bank for those who do not receive any information treatments in either step 1 or step 2.

Table A9: Balance Tests: Control group (Step 1) vs. Literacy Treatment, Respondents Who Provide Inflation Predictions

Variable	Control group		Literacy treatment		Mean Difference p-value
	Mean	Std. Dev.	Mean	Std. Dev.	
Age	47.73	15.19	48.15	15.59	0.55
College	0.52	0.50	0.51	0.50	0.66
Male	0.60	0.49	0.61	0.49	0.66
Income	3313	1793	3222	1715	0.28
Full-time job	0.51	0.50	0.52	0.50	0.61
Part-time job	0.14	0.35	0.13	0.33	0.33
Retired	0.19	0.39	0.21	0.41	0.35
Renter	0.50	0.50	0.48	0.50	0.4
HH-size	2.25	1.08	2.22	1.09	0.57
East Germany	0.15	0.36	0.14	0.35	0.63
Attention to inflation news	0.72	0.015	0.70	0.015	0.27
Attention to monetary policy news	0.34	0.016	0.37	0.016	0.17

Note: This table compares the control group in step 1 with the literacy treatment, evaluating only respondents who provide inflation predictions within the truncation boundaries. The last column states p-values from balance tests on equality of means between the samples across socio-demographic characteristics.

Table A10: Balance Tests: Control group vs. Literacy treatment, Respondents Who Do Not Provide Inflation Predictions

Variable	Control group		Literacy treatment		Mean Difference p-value
	Mean	Std. Dev.	Mean	Std. Dev.	
Age	45.37	15.17	45.05	14.97	0.62
College	0.35	0.48	0.34	0.47	0.69
Male	0.43	0.49	0.40	0.49	0.15
Income	2725	1667	2848	1769	0.11
Full-time job	0.45	0.50	0.44	0.50	0.66
Part-time job	0.15	0.36	0.14	0.35	0.48
Retired	0.17	0.37	0.16	0.37	0.71
Renter	0.57	0.49	0.58	0.49	0.69
HH-size	2.22	1.09	2.28	1.10	0.21
East Germany	0.15	0.36	0.14	0.35	0.37
Attention to inflation news	0.46	0.015	0.45	0.015	0.92
Attention to monetary policy news	0.20	0.012	0.22	0.013	0.37

Note: This table compares the control group in step 1 with the literacy treatment, evaluating only respondents who either do not provide inflation predictions, or whose predictions lie outside the truncation boundaries. The last column states p-values from balance tests on equality of means across demographic characteristics.

A.2 Robustness Checks and Heterogeneity

Table A11: Effect of the Literacy Treatment on Inflation Literacy: Individual Test Questions

	Wave 1					Wave 2				
	(1) Q1	(2) Q2	(3) Q3	(4) Q4	(5) Q5	(6) Q1	(7) Q2	(8) Q3	(9) Q4	(10) Q5
literacy	0.081*** (0.01)	0.053*** (0.02)	0.16*** (0.02)	0.14*** (0.01)	0.042*** (0.01)	0.025* (0.01)	0.053*** (0.02)	0.037** (0.02)	0.0079 (0.02)	0.021 (0.02)
Pseudo R ²	0.052	0.018	0.056	0.071	0.065	0.049	0.021	0.036	0.063	0.083
N observations	4000	4000	4000	4000	4000	2851	2851	2851	2851	2851

Note: Q1-5 refer to five inflation literacy questions: (1) Inflation definition, (2) Inflation and real consumption, (3) Objectives of monetary policy, (4) Monetary policy instrument, (5) Macroeconomic policy and inflation, respectively. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports marginal effects of probit estimations. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Effect of the Literacy Treatment on Trust in the Central Bank: Control Group (Step 2)

	Consumers with prior inflation predictions				Consumers without prior inflation predictions			
	Immediate		3 months later		Immediate		3 months later	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ECB	Bundesbank	ECB	Bundesbank	ECB	Bundesbank	ECB	Bundesbank
literacy	0.5* (0.26)	0.6** (0.25)	-0.1 (0.32)	-0.03 (0.31)	-0.03 (0.26)	0.08 (0.27)	0.5 (0.36)	0.5 (0.35)
R ²	0.063	0.090	0.086	0.102	0.058	0.052	0.039	0.092
N observations	370	370	284	284	373	371	228	225

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. The sample consists of the control group in the second stage, who did not receive any further quantitative information treatments. This table reports estimated coefficients from OLS regressions. Robust Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A13: Effect of the Literacy Treatment on Economic Literacy Scores: Attention to the Treatment

	Immediate		3 months later
	(1) Inflation literacy score	(2) Financial literacy score	(3) Inflation literacy score
literacy_normal	0.44*** (0.04)	0.15*** (0.03)	0.19*** (0.05)
literacy_short	-0.071 (0.09)	-0.29*** (0.07)	-0.23* (0.13)
literacy_long	0.46*** (0.09)	0.046 (0.07)	0.20 (0.12)
R ²	0.164	0.105	0.135
N observations	4000	4000	2851

Note: The literacy treatment group is divided into three subgroups: Literacy_normal, literacy_short, and literacy_long. These subgroups represent respondents who spent 15-145 seconds, less than 15 seconds, and more than 145 seconds, respectively, reading the information of the *literacy* treatment. The control group consists of respondents who did not receive literacy treatment. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A14: Effect of the Literacy Treatment on Inflation Predictions: Attention to the Treatment

	Extensive Margin				Intensive Margin			
	(1) π^P	(2) $\pi^{e,1y}$	(3) $\pi^{e,3y}$	(4) $\pi^{ECB,target}$	(5) π^P	(6) $\pi^{e,1y}$	(7) $\pi^{e,3y}$	(8) $\pi^{ECB,target}$
literacy_normal	0.07*** (0.01)	0.07*** (0.01)	0.07*** (0.01)	0.06*** (0.02)	-0.05 (0.06)	-0.1 (0.11)	-0.1 (0.11)	0.02 (0.05)
literacy_short	-0.09*** (0.03)	-0.1*** (0.03)	-0.05 (0.03)	-0.04 (0.03)	0.1 (0.14)	-0.05 (0.25)	0.6** (0.27)	0.2** (0.12)
literacy_long	0.08*** (0.03)	0.07** (0.03)	0.05 (0.03)	0.05 (0.03)	-0.10 (0.12)	-0.3 (0.22)	-0.3 (0.23)	-0.07 (0.11)
Pseudo R ²	0.071	0.064	0.066	0.081				
R ²					0.010	0.039	0.021	0.028
N observations	4000	4000	4000	4000	1846	1846	1846	1499

Note: The literacy treatment group is divided into three subgroups: Literacy_normal, literacy_short, and literacy_long. These subgroups represent respondents who spent 15-145 seconds, less than 15 seconds, and more than 145 seconds, respectively, reading the information of the *literacy* treatment. The control group consists of respondents who did not receive literacy treatment. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. The extensive margin measures the treatment effect on the probability of providing inflation forecasts. The intensive margin measures the treatment effect on the size of inflation forecasts, provided that a forecast is made by respondents. This table reports the marginal effect from probit regressions (columns 1-4) and estimated coefficients from Huber robust regressions (columns 5-8). Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A15: Effect of the Literacy Treatment on Trust in the Central Banks: Attention to the Treatment

	Immediate		3 months later	
	(1) ECB	(2) Bundesbank	(3) ECB	(4) Bundesbank
literacy_normal	0.2 (0.19)	0.4** (0.19)	0.08 (0.24)	0.2 (0.24)
literacy_short	0.1 (0.40)	0.06 (0.41)	0.6 (0.56)	0.3 (0.55)
literacy_long	0.6 (0.44)	0.8** (0.38)	0.3 (0.47)	0.7 (0.47)
R ²	0.058	0.067	0.049	0.073
N observations	767	765	525	522

Note: The literacy treatment group is divided into three subgroups: Literacy_normal, literacy_short, and literacy_long. These subgroups represent respondents who spent 15-145 seconds, less than 15 seconds, and more than 145 seconds, respectively, reading the information of the *literacy* treatment. The control group consists of respondents who did not receive literacy treatment. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. The sample consists of the control group in the second stage, who did not receive any further quantitative information treatments. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A16: Effect of the Literacy Treatment on Individual Test Questions: Attention to the Treatment

	Immediate					3 months later				
	(1) Q1	(2) Q2	(3) Q3	(4) Q4	(5) Q5	(6) Q1	(7) Q2	(8) Q3	(9) Q4	(10) Q5
literacy_normal	0.11*** (0.01)	0.075*** (0.02)	0.16*** (0.02)	0.16*** (0.02)	0.044*** (0.01)	0.033** (0.01)	0.076*** (0.02)	0.036* (0.02)	0.014 (0.02)	0.029 (0.02)
literacy_short	-0.096*** (0.03)	-0.063* (0.03)	0.067** (0.03)	-0.048 (0.03)	0.025 (0.03)	-0.051 (0.03)	-0.083** (0.04)	-0.0016 (0.04)	-0.069* (0.04)	-0.022 (0.04)
literacy_long	0.078*** (0.03)	0.014 (0.04)	0.24*** (0.04)	0.15*** (0.03)	0.043 (0.03)	0.048* (0.03)	0.016 (0.04)	0.085** (0.04)	0.045 (0.04)	0.0078 (0.04)
Pseudo R ²	0.066	0.021	0.058	0.078	0.065	0.052	0.025	0.037	0.065	0.084
N observations	4000	4000	4000	4000	4000	2851	2851	2851	2851	2851

Note: The literacy treatment group is divided into three subgroups: Literacy_normal, literacy_short, and literacy_long. These subgroups represent respondents who spent 15-145 seconds, less than 15 seconds, and more than 145 seconds, respectively, reading the information of the *literacy* treatment. The control group consists of respondents who did not receive literacy treatment. Q1-5 refer to five inflation literacy questions: (1) Inflation definition, (2) Inflation and real consumption, (3) Objectives of monetary policy, (4) Monetary policy instrument, (5) Macroeconomic policy and inflation, respectively. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports marginal effects of probit estimations. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A4: Heterogeneous literacy treatment effects on inflation literacy score

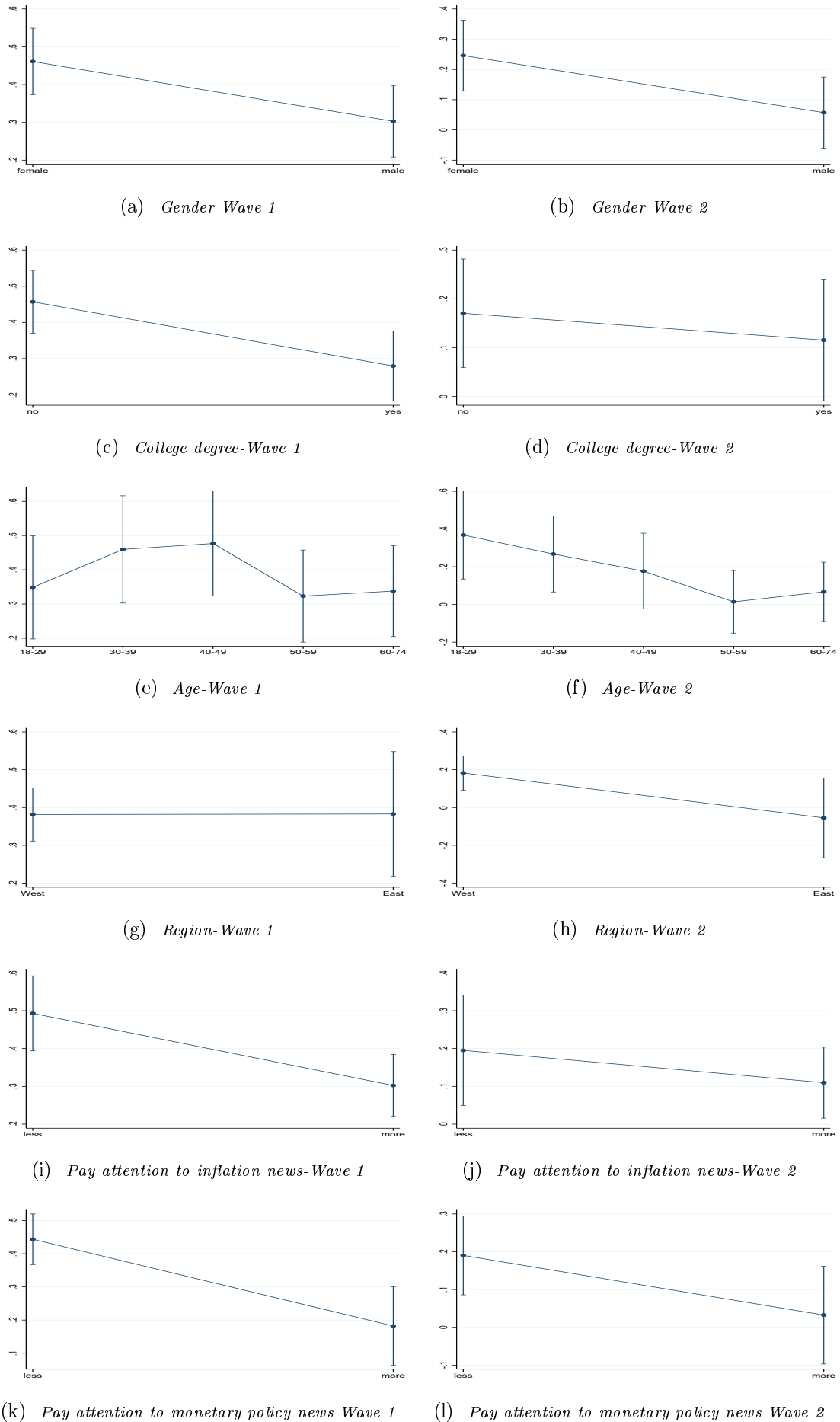


Figure A5: Heterogeneous literacy treatment effects on inflation perceptions: Wave 1

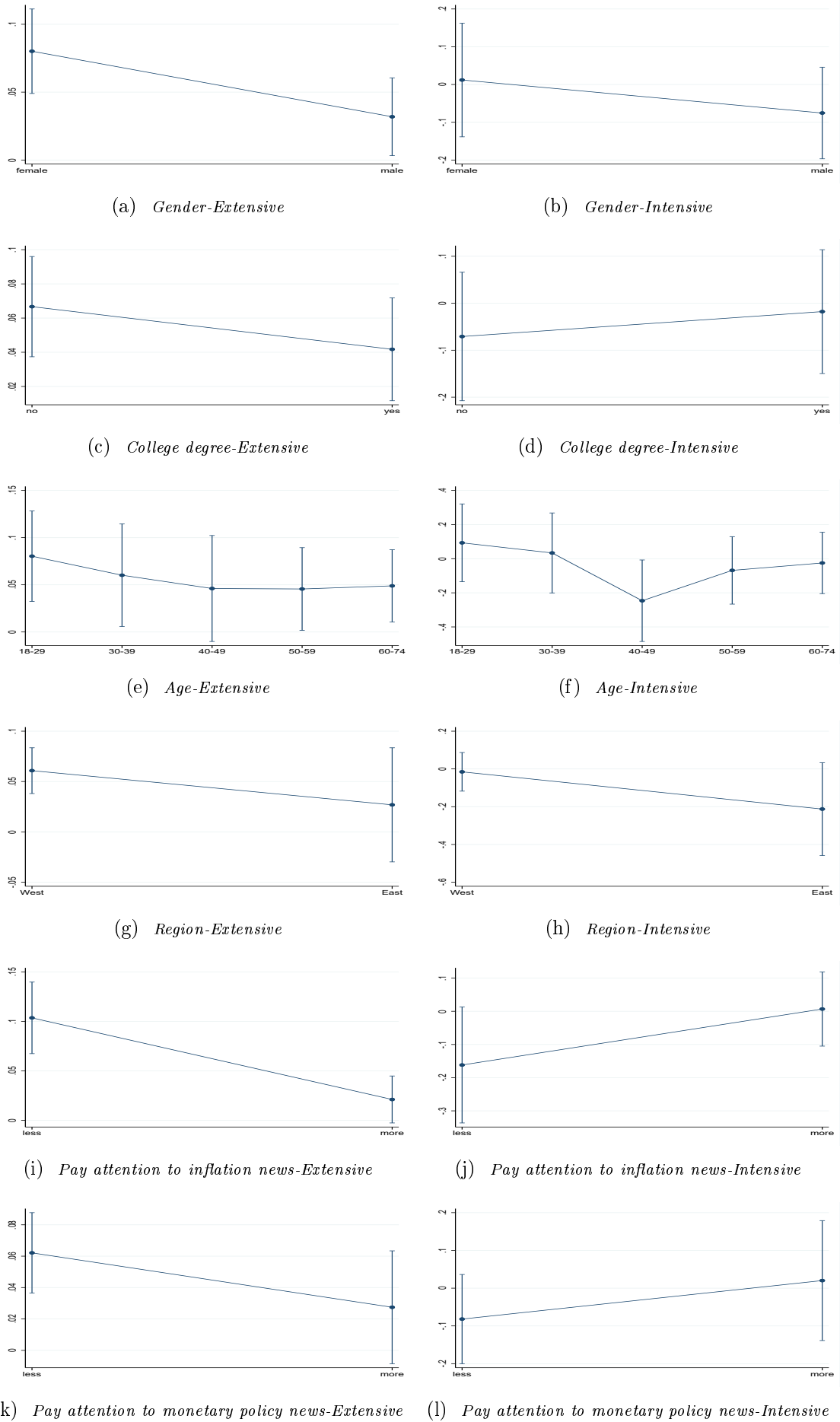


Figure A6: Heterogeneous literacy treatment effects on expected inflation in 1y: Wave 1

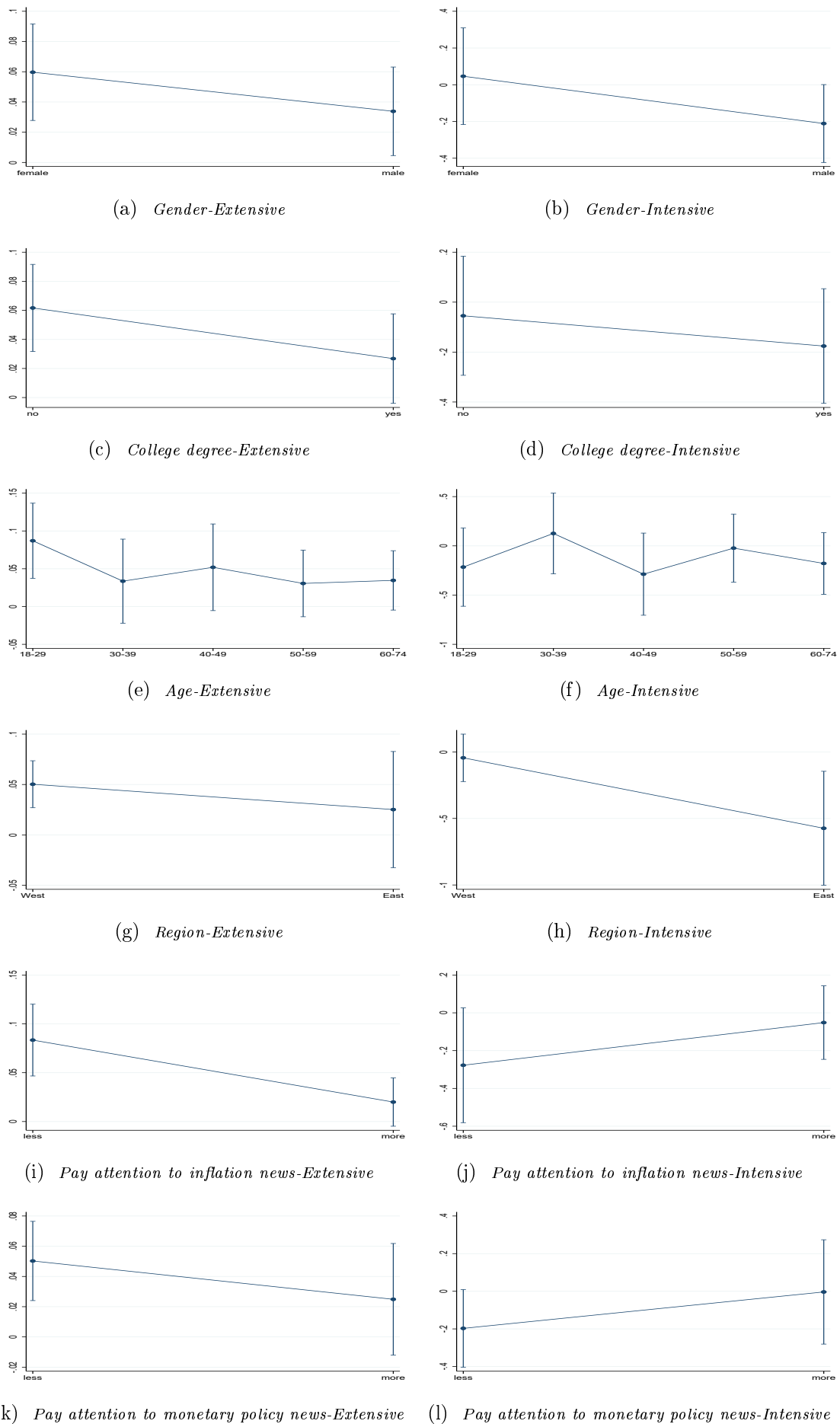


Figure A7: Heterogeneous literacy treatment effects on expected inflation in 3y: Wave 1

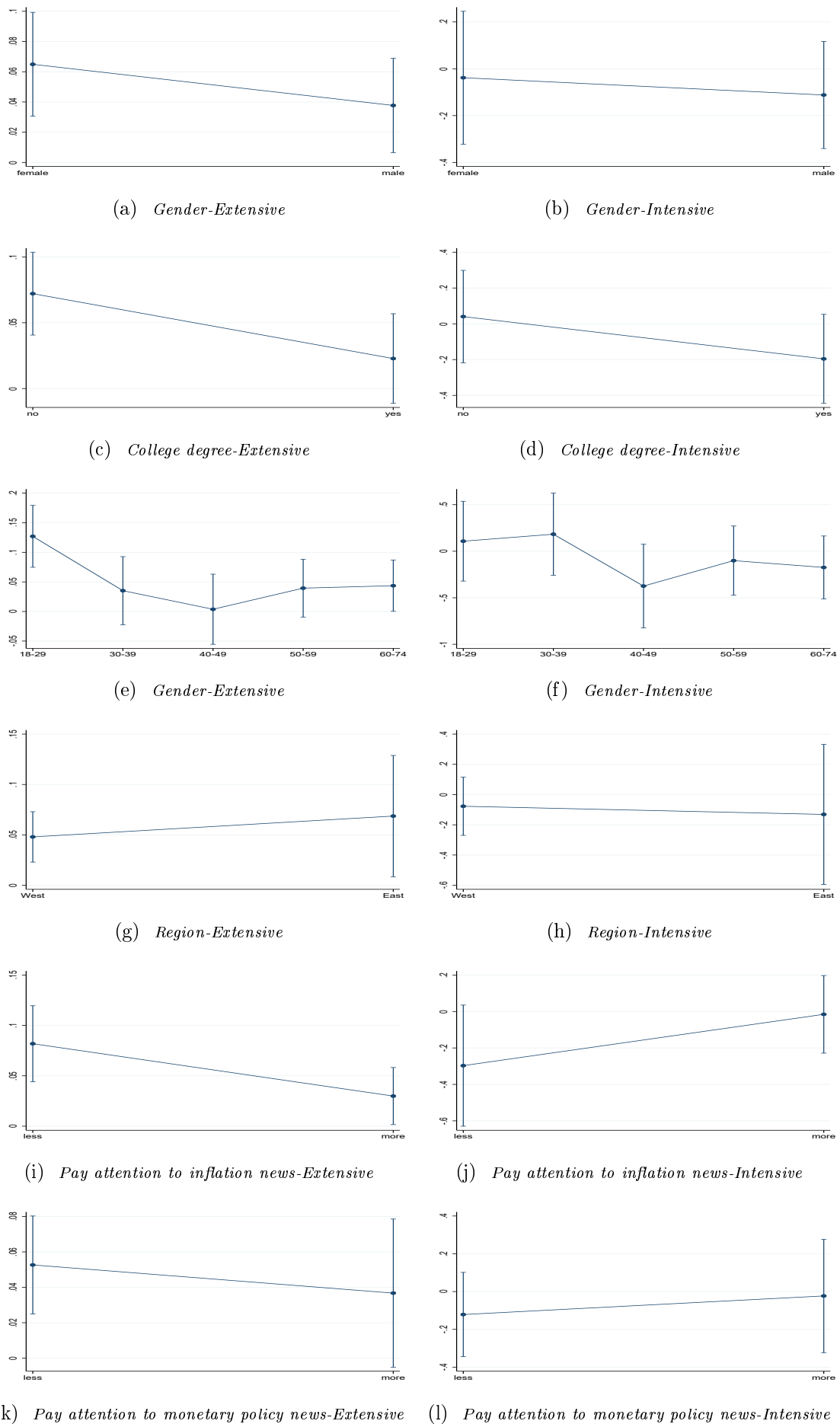


Figure A8: Heterogeneous literacy treatment effects on trust in the ECB

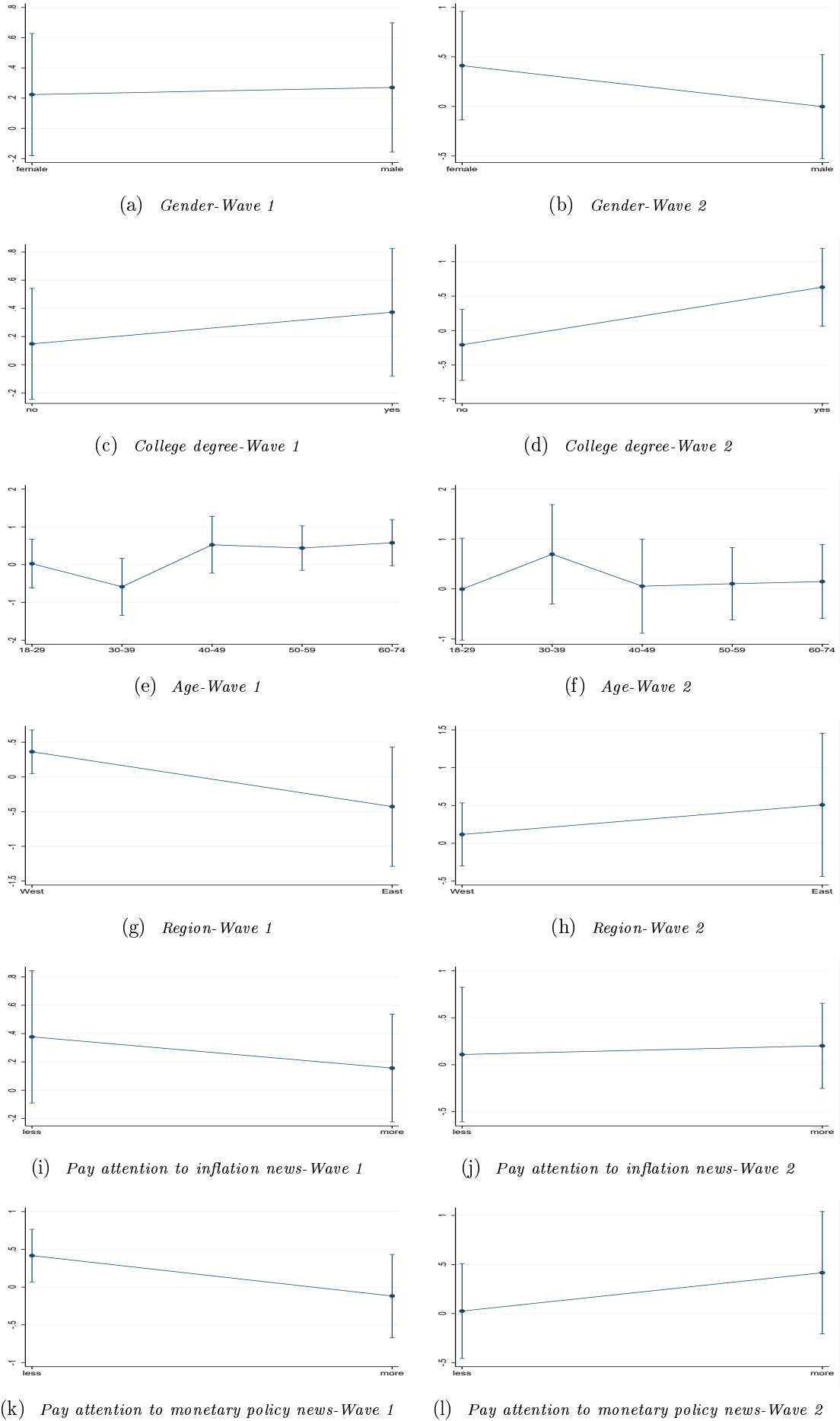
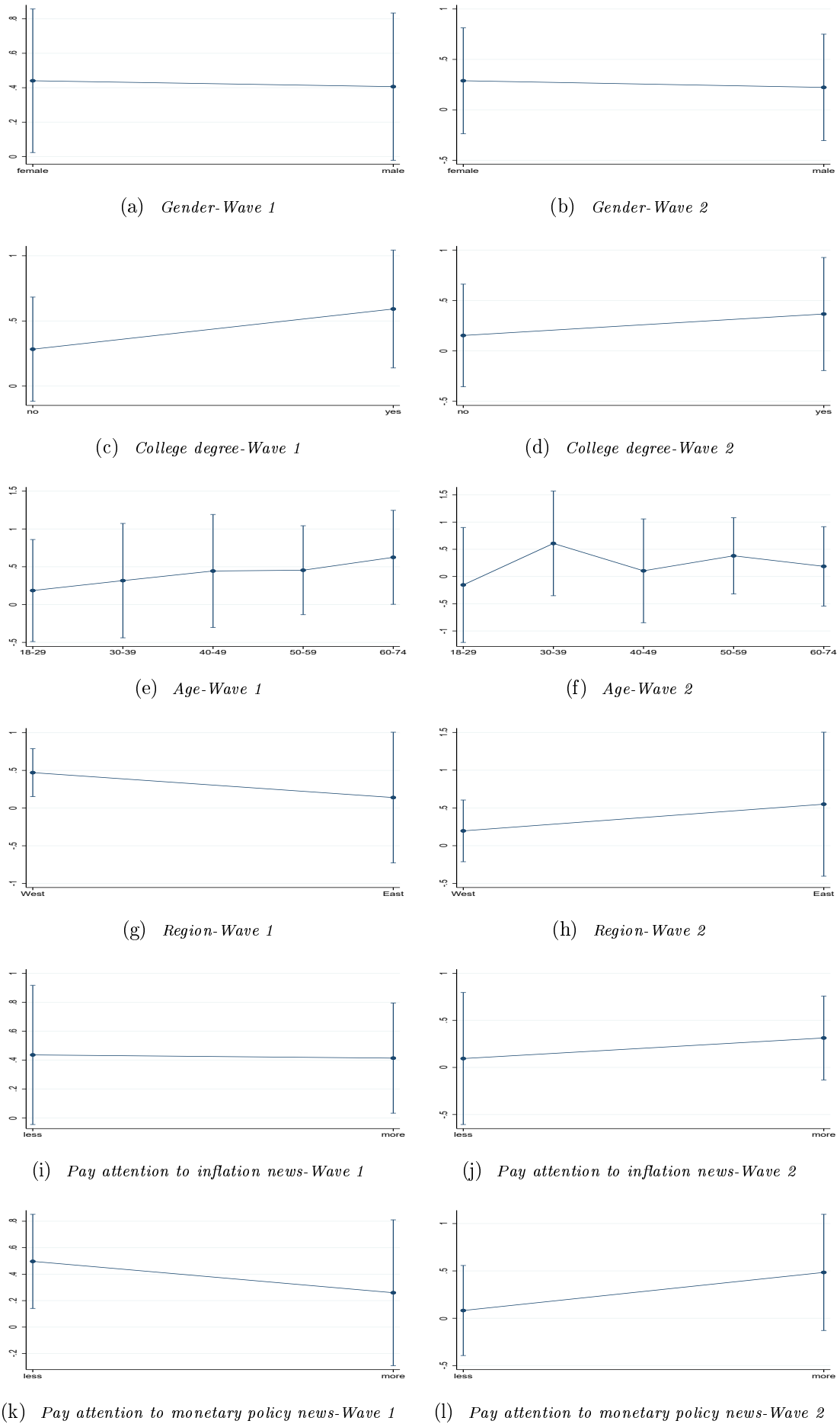


Figure A9: Heterogeneous literacy treatment effects on trust in the Bundesbank



A.3 Interaction of the *literacy* treatment with quantitative information treatments

Table A17: Treatment Effects on Posterior Inflation Predictions

	(1) π^P	(2) $\pi^{e,1y}$	(3) $\pi^{e,3y}$
π^{prior}	0.56*** (0.10)	0.57*** (0.05)	0.51*** (0.03)
literacy	0.34 (0.67)	1.00* (0.54)	0.89** (0.38)
ECB target	1.52** (0.68)	0.32 (0.55)	0.45 (0.39)
ECB targetplus	-1.30* (0.78)	-0.62 (0.59)	-0.092 (0.42)
Current inf.	1.65** (0.67)	2.10*** (0.54)	0.68* (0.40)
Current plus forecast inf.	2.25*** (0.68)	1.08** (0.54)	0.25 (0.38)
ECB target \times literacy	-2.18** (0.92)	-1.57** (0.75)	-2.50*** (0.54)
ECB targetplus \times literacy	1.85* (0.95)	-0.10 (0.77)	0.37 (0.56)
Current inf. \times literacy	-0.30 (0.95)	-1.12 (0.73)	-0.86 (0.58)
Current plus forecast inf. \times literacy	-0.74 (0.88)	-0.95 (0.73)	-0.42 (0.53)
Literacy $\times \pi^{prior}$	-0.097 (0.12)	-0.16** (0.07)	-0.16*** (0.05)
ECB target $\times \pi^{prior}$	-0.53*** (0.12)	-0.18** (0.07)	-0.16*** (0.05)
ECB targetplus $\times \pi^{prior}$	0.16 (0.15)	0.071 (0.08)	0.031 (0.05)
Current inf. $\times \pi^{prior}$	-0.29** (0.12)	-0.25*** (0.07)	-0.034 (0.05)
Current plus forecast inf. $\times \pi^{prior}$	-0.68*** (0.12)	-0.29*** (0.07)	-0.17*** (0.04)
ECB target \times literacy $\times \pi^{prior}$	0.55*** (0.16)	0.31*** (0.09)	0.48*** (0.07)
ECB targetplus \times literacy $\times \pi^{prior}$	-0.41** (0.17)	-0.022 (0.10)	-0.15** (0.07)
Current inf. \times literacy $\times \pi^{prior}$	0.021 (0.17)	0.14 (0.09)	0.17** (0.08)
Current plus forecast inf. \times literacy $\times \pi^{prior}$	0.21 (0.16)	0.19** (0.09)	0.069 (0.06)
R ²	0.135	0.348	0.478
N observations	1846	1846	1846

Note: Estimates for wave 1. Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from Huber robust regressions. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A18: Treatment Effect on Trust in the Central Banks: Those Who Do Not Provide Inflation Expectations

	Immediate		3 months later	
	(1) ECB	(2) Bundesbank	(3) ECB	(4) Bundesbank
literacy	-0.04 (0.26)	0.07 (0.26)	0.4 (0.34)	0.5 (0.33)
ECB target	-0.1 (0.25)	0.1 (0.26)	0.2 (0.34)	0.1 (0.34)
ECB targetplus	0.3 (0.25)	0.3 (0.26)	0.6* (0.34)	0.6* (0.34)
Current inf.	-0.01 (0.26)	0.08 (0.27)	0.4 (0.35)	0.2 (0.35)
Current plus forecast inf.	0.02 (0.25)	0.1 (0.25)	0.01 (0.33)	0.2 (0.34)
ECB target \times literacy	0.3 (0.36)	0.07 (0.37)	-0.3 (0.48)	-0.2 (0.47)
ECB targetplus \times literacy	-0.3 (0.36)	-0.4 (0.36)	-0.7 (0.48)	-1.1** (0.46)
Current inf. \times literacy	-0.2 (0.37)	-0.07 (0.38)	-0.5 (0.49)	-0.3 (0.50)
Current plus forecast inf. \times literacy	-0.4 (0.36)	-0.5 (0.37)	-0.2 (0.47)	-0.2 (0.47)
R ²	0.036	0.041	0.036	0.054
N observations	1772	1760	1144	1131

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.4 Treatment Effects in Wave 2

Table A19: Effect of the Literacy Treatment on Point Inflation Predictions for the Control group (Step 2): Wave 2

	Extensive Margin				Intensive Margin			
	(1) π^p	(2) $\pi^{e,1y}$	(3) $\pi^{e,3y}$	(4) $\pi^{ECB,target}$	(5) π^p	(6) $\pi^{e,1y}$	(7) $\pi^{e,3y}$	(8) $\pi^{ECB,target}$
literacy	0.010 (0.03)	0.01 (0.03)	-0.01 (0.03)	-0.02 (0.04)	-0.2 (0.22)	0.05 (0.34)	0.06 (0.34)	-0.07 (0.15)
Pseudo R ²	0.080	0.096	0.092	0.124				
R ²					0.072	0.069	0.091	0.046
N observations	593	593	593	593	289	292	292	243

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. The extensive margin measures the treatment effect on the probability of providing inflation forecasts. The intensive margin measures the treatment effect on the size of inflation forecasts, provided that a forecast is made by respondents. This table reports the marginal effect from probit regressions (columns 1-4) and estimated coefficients from Huber robust regressions (columns 5-8). Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A10: Response of Inflation Beliefs by Information Treatments: Wave 2

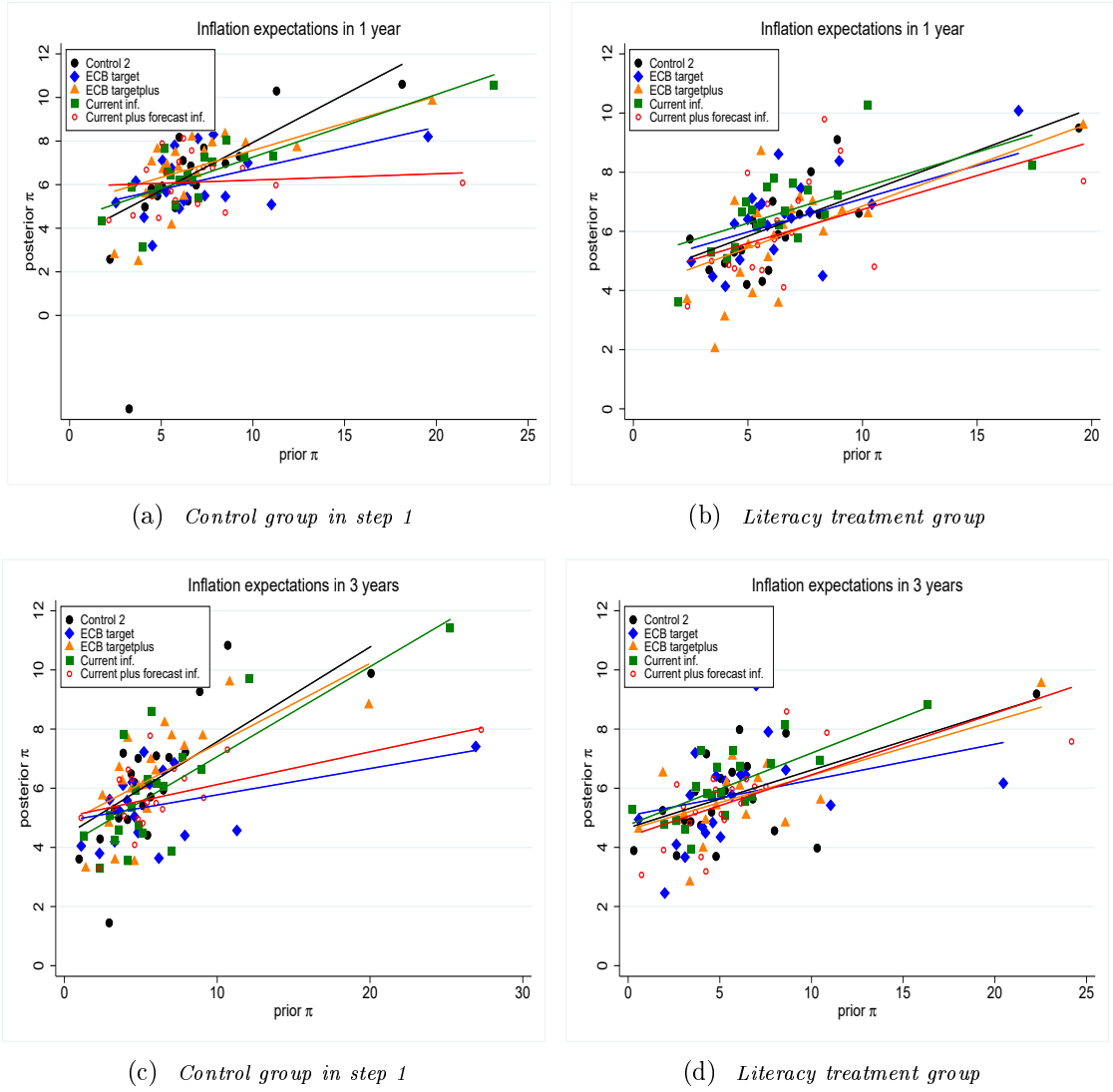
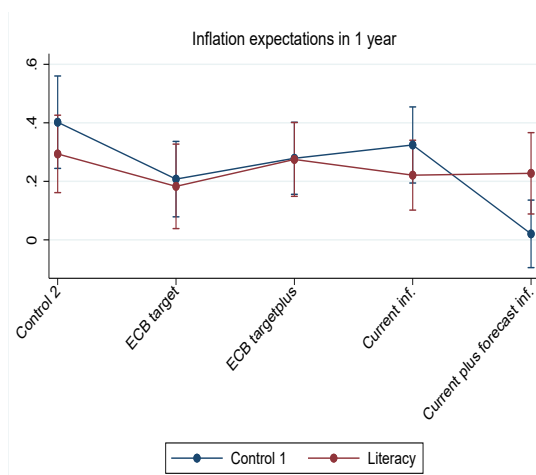
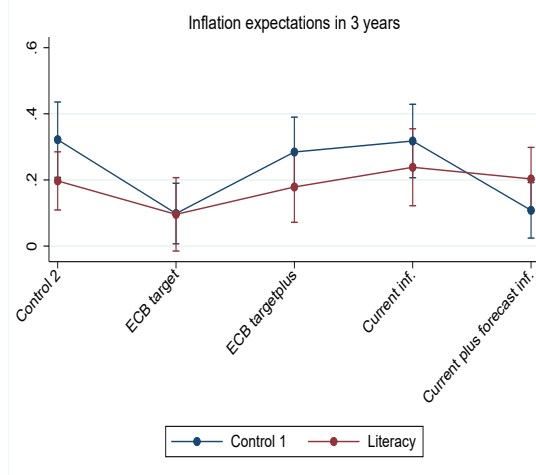


Figure A11: Average Marginal Effect of Prior Beliefs on Posterior Beliefs with 90% CIs:
Wave 2



(a)



(b)

Table A20: Treatment Effects on Posterior Predictions: Wave 2

	(1) $\pi^{e,1y}$	(2) $\pi^{e,3y}$
π^{prior}	0.40*** (0.10)	0.32*** (0.07)
literacy	0.50 (0.97)	0.21 (0.69)
ECB target	0.91 (0.99)	0.40 (0.71)
ECB targetplus	1.07 (0.97)	0.30 (0.72)
Current inf.	0.41 (0.99)	-0.40 (0.74)
Current plus forecast inf.	2.13** (0.95)	0.60 (0.69)
ECB target \times literacy	-0.085 (1.36)	0.19 (0.98)
ECB targetplus \times literacy	-1.29 (1.33)	-0.27 (1.00)
Current inf. \times literacy	0.44 (1.31)	0.53 (1.01)
Current plus forecast inf. \times literacy	-2.00 (1.29)	-0.86 (0.94)
ECB target \times π^{prior}	-0.19 (0.12)	-0.22** (0.09)
ECB targetplus \times π^{prior}	-0.12 (0.12)	-0.037 (0.09)
Current inf. \times π^{prior}	-0.078 (0.12)	-0.0041 (0.10)
Current plus forecast inf. \times π^{prior}	-0.38*** (0.12)	-0.21** (0.09)
Literacy \times π^{prior}	-0.11 (0.12)	-0.12 (0.09)
ECB target \times literacy \times π^{prior}	0.084 (0.17)	0.12 (0.12)
ECB targetplus \times literacy \times π^{prior}	0.10 (0.16)	0.019 (0.13)
Current inf. \times literacy \times π^{prior}	0.0052 (0.16)	0.045 (0.13)
Current plus forecast inf. \times literacy \times π^{prior}	0.32* (0.17)	0.22* (0.12)
R ²	0.114	0.136
N observations	1392	1392

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from the Huber robust regressions. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A21: Treatment Effects on the Uncertainty of Posterior Predictions: Wave 2

	(1) $\sigma\pi^{e,1y}$	(2) $\sigma\pi^{e,3y}$
π^{prior}	0.023* (0.01)	0.033*** (0.01)
literacy	0.015 (0.22)	-0.0096 (0.21)
ECB target	-0.15 (0.23)	-0.11 (0.22)
ECB targetplus	-0.10 (0.22)	-0.12 (0.21)
Current inf.	0.15 (0.22)	-0.013 (0.22)
Current plus forecast inf.	-0.077 (0.22)	-0.19 (0.22)
ECB target \times literacy	0.041 (0.31)	-0.092 (0.31)
ECB targetplus \times literacy	-0.18 (0.31)	-0.040 (0.31)
Current inf. \times literacy	-0.52* (0.31)	-0.20 (0.31)
Current plus forecast inf. \times literacy	0.0079 (0.31)	-0.095 (0.30)
R ²	0.075	0.073
N observations	1392	1392

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from the Huber robust regressions. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A22: Treatment Effect on Trust in the Central Banks: Wave 2

	(1) Trust in the ECB	(2) Trust in the Bundesbank
$\pi^{prior,3y}$	-0.08*** (0.01)	-0.09*** (0.01)
literacy	-0.07 (0.30)	-0.03 (0.30)
ECB target	0.4 (0.32)	0.3 (0.32)
ECB targetplus	-0.2 (0.30)	0.4 (0.29)
Current inf.	0.5 (0.31)	0.8** (0.31)
Current plus forecast inf.	0.5* (0.32)	0.6* (0.31)
ECB target \times literacy	-0.04 (0.43)	0.03 (0.43)
ECB targetplus \times literacy	0.8* (0.43)	0.2 (0.42)
Current inf. \times literacy	-0.4 (0.43)	-0.8* (0.43)
Current plus forecast inf. \times literacy	0.06 (0.43)	0.04 (0.43)
R ²	0.093	0.095
N observations	1392	1392

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from OLS regressions. Robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A23: Treatments effect on attention to inflation and monetary policy news: Wave 2

	(1) Attention to news on inflation	(2) Attention to news on monetary policy
attention to news (prior)	1.0*** (0.05)	1.0*** (0.06)
literacy	-0.01 (0.12)	0.1 (0.11)
ECB target	-0.1 (0.12)	0.05 (0.12)
ECB targetplus	-0.1 (0.12)	0.06 (0.12)
Current inf.	0.06 (0.12)	0.02 (0.12)
Current plus forecast inf.	-0.06 (0.12)	0.1 (0.11)
ECB target \times literacy	0.08 (0.17)	-0.03 (0.16)
ECB targetplus \times literacy	0.2 (0.17)	-0.002 (0.16)
Current inf. \times literacy	0.06 (0.17)	-0.2 (0.16)
Current plus forecast inf. \times literacy	-0.02 (0.16)	-0.1 (0.16)
Pseudo R ²	0.162	0.158
N observations	2851	2851

Note: Demographic controls include age, education, gender, income, employment status, home owner, household size, and region. This table reports estimated coefficients from probit estimations. The dependent variable is a dummy variable for respondents who pay close attention to news. Standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A.5 Survey questions

After some questions about demographics, we randomly assign each respondent to either the “Control group 1” or Treatment group. The treatment group receives the following information:

Please look at the following information carefully before continuing with the survey.

“Inflation is the percentage increase in the general price level. This means that 1 Euro buys less than it did 12 months ago. By contrast, a fall in general prices is called “deflation”. Inflation is usually measured using the index of consumer prices and comparing prices today with prices 12 months ago. The index of consumer prices measures prices of a basket of selected goods and services, such as rent, energy, food and drink, transport, health, education and durable goods like furniture, computers or household appliances.

High inflation has economic costs, for instance reducing the purchasing power of those with fixed incomes or savings. However, people with debt, for instance households with a mortgage, also benefit from inflation, since inflation reduces the value of their debt. Low and stable inflation is regarded as optimal for the economic development, since low inflation encourages investment, while keeping down the economic costs of inflation. Deflation is detrimental for economic development because with prices falling, there is an incentive to not consume or invest today, but rather wait to see if prices will fall further. This can cause a recession with rising unemployment.

Since Germany is part of the Euro area, its monetary policy is decided by the Eurosystem, consisting of the European Central Bank and the national central banks like the Bundesbank. The Eurosystem is responsible for keeping prices stable throughout the Euro area over the medium term. This means that average inflation over a period of 1-3 years should be low and stable. The Eurosystem can achieve this by setting interest rates and/or by buying securities from banks.”

☐ I have read the text in full. [Allow to proceed to the next screen only if the box is checked].

Now we would like to ask you a few general questions about inflation and monetary policy. Please answer all questions according to your current knowledge.

Inflation, monetary, and financial literacy

- *Inflation definition:* The rate of inflation in an economy is best described as the percentage increase in
 - 1 the overall price level of goods and services.
 - 2 the overall level of money wages.

3 the long-term interest rate.

4 prices of stocks

999 Don't know

- *Inflation and real consumption:* Suppose that in the year 2023, your net income (after taxes) has doubled and the prices of all goods have doubled as well. In 2023, how much will you be able to buy with your income?

1 More than you can buy today.

2 The same as you can buy today.

3 Less than you can buy today.

4 It cannot be determined from the information given.

999 Don't know

- *Objective of monetary policy:* The primary purpose of the monetary policy of the European Central Banks (ECB) today is to

1 Stabilize the price level of goods and services.

2 Stabilize the price of corporate stocks.

3 Keep interest rates low and steady.

4 Reduce national debt.

999 Don't know

- *Monetary policy instruments:* Which of the following is a tool of monetary policy?

1 Raising and lowering income taxes

2 Increasing and decreasing unemployment benefits

3 Raising and lowering interest rates

4 Increasing and decreasing government spending

999 Don't know

- *Monetary policy and inflation:* Which of the following measures is most likely to lead to lower inflation?

1 Raising the short-term interest rate.

2 Lowering the short-term interest rate.

3 Lowering income taxes.

4 Raising the level of government spending.

999 Don't know

- *Interest rate compounding:* Imagine you have 100 € in a bank account. Your money earns 10% interest per year. How many dollars are in your account after two years?
 1 Exactly 110 €
 2 Exactly 120 €
 3 Exactly 200 €
 4 Slightly more than 120 €
 999 Don't know
- *Risk diversification:* Do you agree with the following statement: "The investment in the stock of a single company is less risky than investing in a fund with stocks in similar companies"?
 1 I agree
 2 I do not agree
 999 Don't know

Point inflation predictions

- We would like to ask you about the rate of inflation/deflation in the last 12 months (Note: inflation is the percentage rise in overall prices in the economy, most commonly measured by the Consumer Price Index and deflation corresponds to when prices are falling). Please enter a number in the box below. If you prices did not change in the last 12 months, please enter a "0". If you think there was deflation, enter a negative value. If you think there was inflation, enter a positive value.

 Over the last 12 months, the rate of inflation/deflation was ... percent (one decimal allowed).

 999 Don't know
- What do you think the rate of inflation or deflation will be over the next 12 months? Please enter a number in the box below. If you think prices will not change in the next 12 months, please enter a "0". If you think there will be deflation, enter a negative value. If you think there will be inflation, enter a positive value.

 Over the next 12 months, I expect the rate of inflation/deflation to be ... percent (one decimal allowed).

 999 Don't know
- What do you think the rate of inflation or deflation will be on average over the next 3 years? Please enter a number in the box below. If you think prices will not change over the next 3 years, please enter a "0". If you think there will be deflation, enter a negative value. If you think there will be inflation, enter a positive value.

Over the next 3 years, I expect the average rate of inflation/deflation to be ... percent (one decimal allowed).

999 Don't know

- What is your best guess about the annual inflation rate that the ECB tries to achieve on average over the medium run (about 1-3 years)? (Please use a percentage between -100 and 100) ... % per year

999 Don't know

Randomly assign each respondent to either the “Control group 2” or Treatment groups 1-4. For treatment groups 1-4:

Please look at the following information carefully before continuing with the survey.

- Treatment group 1: Since its strategy review enacted in July 2021, the European Central Bank (ECB) is committed to setting its monetary policy to ensure that inflation stabilizes at its 2% target in the medium term. This target is symmetric, meaning that the ECB considers negative and positive deviations from this target as equally undesirable.

☐ I have read the text in full. [Allow to proceed to the next screen only if the box is checked].

- Treatment group 2: Since its strategy review enacted in July 2021, the European Central Bank (ECB) is committed to setting its monetary policy to ensure that inflation stabilizes at its 2% target in the medium term. This target is symmetric, meaning that the ECB considers negative and positive deviations from this target as equally undesirable.

In addition, the ECB is now committed to accounting for the effect of climate change on the stability of the financial system.

☐ I have read the text in full. [Allow to proceed to the next screen only if the box is checked].

- Treatment group 3: The inflation rate in Germany, measured as the year-on-year change in the consumer price index, was measured at +4.9% in January 2022. Since 1994, inflation rates across German federal states have been very close to each other.

☐ I have read the text in full. [Allow to proceed to the next screen only if the box is checked].

- Treatment group 4: The inflation rate in Germany, measured as the year-on-year change in the consumer price index, was measured at +4.9% in January 2022. The

Bundesbank inflation projections, published in December 2021, forecast average inflation in Germany at 3.6% in 2022, 2.2% in 2023 and 2.2% in 2024.

☐ I have read the text in full. [Allow to proceed to the next screen only if the box is checked].

Probabilistic inflation predictions

- Now we would like to ask you about the rate of inflation/deflation you expect in February 2022 compared with February 2021.

In this question, you will be asked about the percent chance of something happening. The percent chance must be a number between 0 and 100 and the sum of your answers must add up to 100.

What do you think is the percent chance that, in February 2022... (Respondi: sum percentages automatically and only allow to go to the next question if they sum to 100%)

- 1 the rate of deflation (opposite of inflation) will be -12% or less —
- 2 the rate of deflation (opposite of inflation) will be between -8% and -12% —
- 3 the rate of deflation (opposite of inflation) will be between -4% and -8% —
- 4 the rate of deflation (opposite of inflation) will be between -2% and -4% —
- 5 the rate of deflation (opposite of inflation) will be between 0% and -2% —
- 6 the rate of inflation will be between 0% and 2% —
- 7 the rate of inflation will be between 2% and 4% —
- 8 the rate of inflation will be between 4% and 8% —
- 9 the rate of inflation will be between 8% and 12% —
- 10 the rate of inflation will be 12% or more —
- % Total —
- 999 Don't know

- Now we would like to ask you about the rate of inflation/deflation you expect in the next 12 months.

In this question, you will be asked about the percent chance of something happening. The percent chance must be a number between 0 and 100 and the sum of your answers must add up to 100.

What do you think is the percent chance that, over the next 12 months... (Respondi: sum percentages automatically and only allow to go to the next question if they sum to 100%)

- 1 the rate of deflation (opposite of inflation) will be -12% or less —
- 2 the rate of deflation (opposite of inflation) will be between -8% and -12% —
- 3 the rate of deflation (opposite of inflation) will be between -4% and -8% —
- 4 the rate of deflation (opposite of inflation) will be between -2% and -4% —
- 5 the rate of deflation (opposite of inflation) will be between 0% and -2% —
- 6 the rate of inflation will be between 0% and 2% —
- 7 the rate of inflation will be between 2% and 4% —
- 8 the rate of inflation will be between 4% and 8% —
- 9 the rate of inflation will be between 8% and 12% —
- 10 the rate of inflation will be 12% or more —
- % Total —
- 999 Don't know

- Now we would like to ask you about the rate of inflation/deflation you expect in the next 3 years.

In this question, you will be asked about the percent chance of something happening. The percent chance must be a number between 0 and 100 and the sum of your answers must add up to 100.

What do you think is the percent chance that, over the next 3 years... (Respondents: sum percentages automatically and only allow to go to the next question if they sum to 100%)

- 1 the rate of deflation (opposite of inflation) will be -12% or less —
- 2 the rate of deflation (opposite of inflation) will be between -8% and -12% —
- 3 the rate of deflation (opposite of inflation) will be between -4% and -8% —
- 4 the rate of deflation (opposite of inflation) will be between -2% and -4% —
- 5 the rate of deflation (opposite of inflation) will be between 0% and -2% —
- 6 the rate of inflation will be between 0% and 2% —
- 7 the rate of inflation will be between 2% and 4% —
- 8 the rate of inflation will be between 4% and 8% —
- 9 the rate of inflation will be between 8% and 12% —
- 10 the rate of inflation will be 12% or more —
- % Total —
- 999 Don't know

Trust in the central banks

- How much do you trust the European Central Bank (ECB)? Please indicate your level of trust on a scale from 0 to 10, where 0 means you cannot trust at all and 10 means that you fully trust.

999 Don't know

- How much do you trust the Bundesbank? Please indicate your level of trust on a scale from 0 to 10, where 0 means you cannot trust at all and 10 means that you fully trust.

999 Don't know