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

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Motivation: The Role of Inflation Literacy

- Central banks increasingly communicate with the general public (Blinder et al., 2022):
  - Guiding and anchoring inflation expectations in the population
  - Building trust in the central bank

- However, consumers often struggle with concepts like inflation and do not fully understand how monetary policy functions (Blinder and Krueger, 2004; Burke and Manz, 2014; van der Cruijsen et al., 2015)

$\Rightarrow$ Research questions:

1. Which kind of communication strategy would be effective in improving literacy about inflation and monetary policy?
2. And would improving consumers' inflation literacy affect their inflation forecasts and help them better to incorporate quantitative information into their expectations?

This paper

- Survey experiment with a representative sample of German consumers with two steps:
  - Step 1: Study the causal effect of general and non-numerical information about inflation and monetary policy on inflation literacy, (prior) inflation predictions and trust in the central bank
  - Step 2: Study the causal effect of additional quantitative information about inflation on posterior inflation predictions and trust in the central bank $\Rightarrow$ measure interaction effects with the *literacy* treatment from Step 1
- Follow-up survey after three months to test persistence of treatment effects

Related Literature

- The effect of economic literacy on inflation expectations (e.g. Burke and Manz, 2014, van der Cruijsen et al., 2015, Haldane and McMahon, 2018, Rumler and Valderrama, 2020).
- The effect of economic literacy on trust in the central bank (e.g. Hayo and Neuenkirch, 2014, Mellina and Schmidt, 2018, Bholat et al., 2018, Haldane and McMahon, 2018, Christelis et al., 2020, Brouwer and de Haan, 2022a, Brouwer and de Haan, 2022b).
- The effect of monetary policy communications on household inflation expectations (e.g. Coibion et al., 2022, Dräger et al., 2022)

Survey Sample

- Online survey conducted by Bilendi research institute
- The first wave: 4,000 German consumers, representative with respect to age, gender, income, and region (March 1-11, 2022)
- The follow-up survey: 2,851 respondents who participated in the first wave (June 14 to July 11, 2022)

Survey Experiment Design: Step 1

- 50% of respondents in the *literacy* treatment receive a 1-minute reading text with general and non-numerical information about inflation and monetary policy.
  - Definition and measurement of inflation
  - Economic costs of high inflation and deflation, and economic benefits of low and stable inflation
  - Introduction of the Eurosystem including both the Bundesbank and the ECB, the primary goal of price stability, and the main monetary policy instruments
- Control group receives no general information

Wording of literacy treatment text

Survey Design: Step 1

Follow-up questions:

- Inflation literacy (Burke and Manz (2014): (1) the definition of inflation, (2) inflation and real consumption, (3) objectives of monetary policy, (4) monetary policy instruments, (5) macroeconomic policy and inflation)
- Financial literacy (Lusardi and Mitchell (2011): (1) inflation and real consumption, (2) interest rate compounding, and (3) risk diversification.)
- Point predictions on perceived and expected inflation as well as the ECB inflation target

Questionnaire

Survey Design: Step 2

- Randomly provide one of the following quantitative information on inflation and monetary policy:

  1. *ECB target*: Inflation target of the ECB
  2. *ECB targetplus* : Inflation target of the ECB and the ECB's commitment to take into account the effect of climate change.
  3. *Current Inf.*: Current inflation rate
  4. *Current plus forecast Inf.*: Current inflation rate and the Bundesbank's inflation projections over the next three years
  5. Control group: no further information

Wording of quantitative information treatment texts

Survey Design: Step 2

Follow-up questions:

- Probabilistic questions on inflation expectations (SCE, New York Fed)
- Trust in the ECB and Bundesbank (Rating scale from 0 to 10)

Questionnaire

Results I: Direct effects of the *Literacy* treatment

$$Y_i = \alpha + \beta Lit_i + \gamma X_i + \epsilon_i,$$

where X_i: demographic controls and Y_i:

- Economic literacy scores
- Inflation predictions
- Trust in the ECB and the Bundesbank

- Robustness checks w.r.t. time spent reading the treatment and heterogeneity regarding gender, education and attention to news on inflation

Effect of the Literacy treatment on economic literacy

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

Effect of the Literacy treatment on inflation predictions

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

Effect of the Literacy treatment on trust in the central bank

	Immediate		3 months later	
	(1) ECB	(2) Bundesbank	(3) ECB	(4) Bundesbank
Literacy	0.2	0.4**	0.2	0.3
	(0.19)	(0.20)	(0.25)	(0.24)
R^2	0.057	0.064	0.050	0.071
N observations	767	765	525	522

Results II: Interaction of general information with further quantitative information treatments

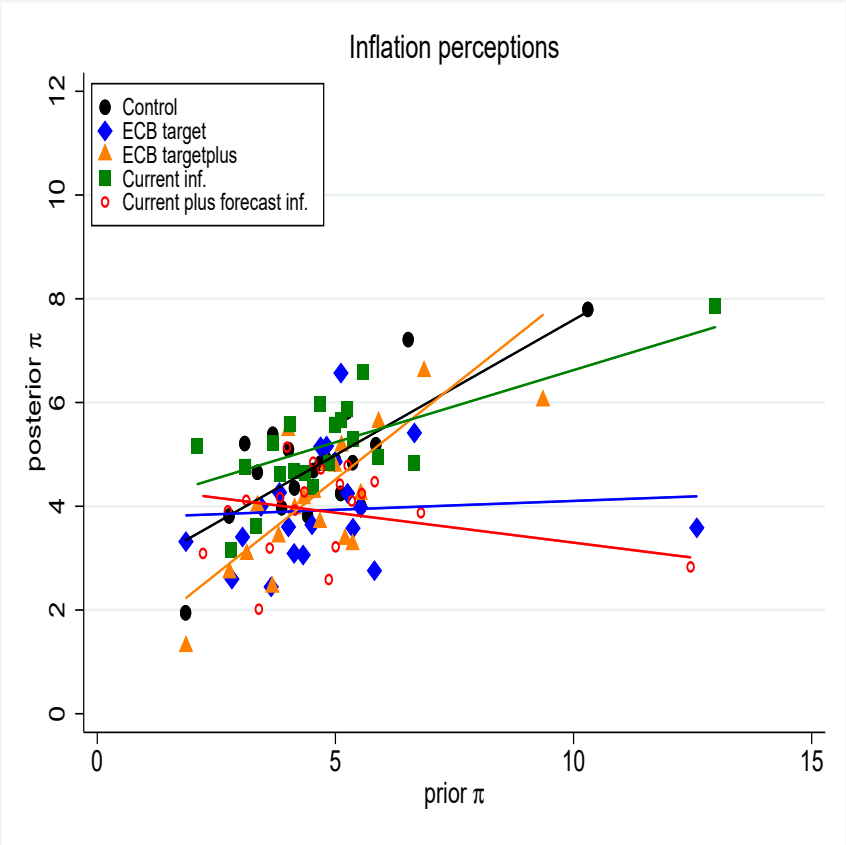
- Bayesian updating

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

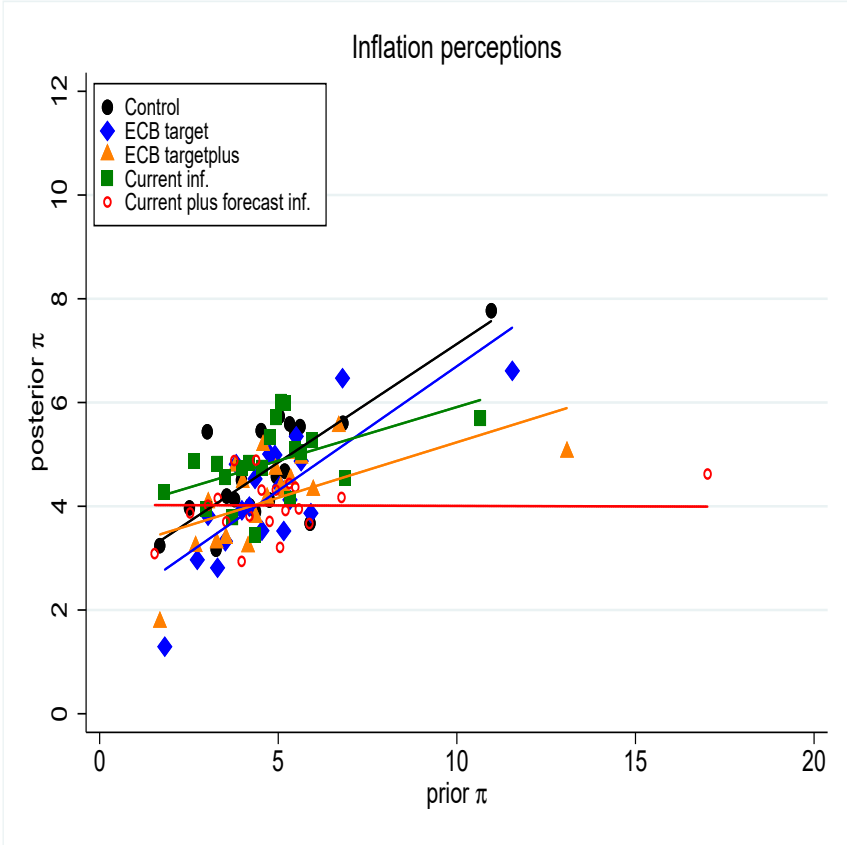
- Econometric estimation:

$$\pi_i^{post} = \alpha + \beta_0 Lit_i + \xi \times \pi_i^{prior} + \sum_{j=1}^{4} \beta_j Quan.Info_{j,i} + \sum_{j=1}^{4} \eta_j Quan.Info_{j,i} \times Lit_i$$
$$+ \gamma_0 Lit_i \times \pi_i^{prior} + \sum_{j=1}^{4} \gamma_j Quan.Info_{j,i} \times \pi_i^{prior} + \sum_{j=1}^{4} \lambda_j Quan.Info_{j,i} \times Lit_i \times \pi_i^{prior}$$
$$+ \zeta X_i + \epsilon_i,$$

Response of inflation beliefs by treatments (π^{perc})

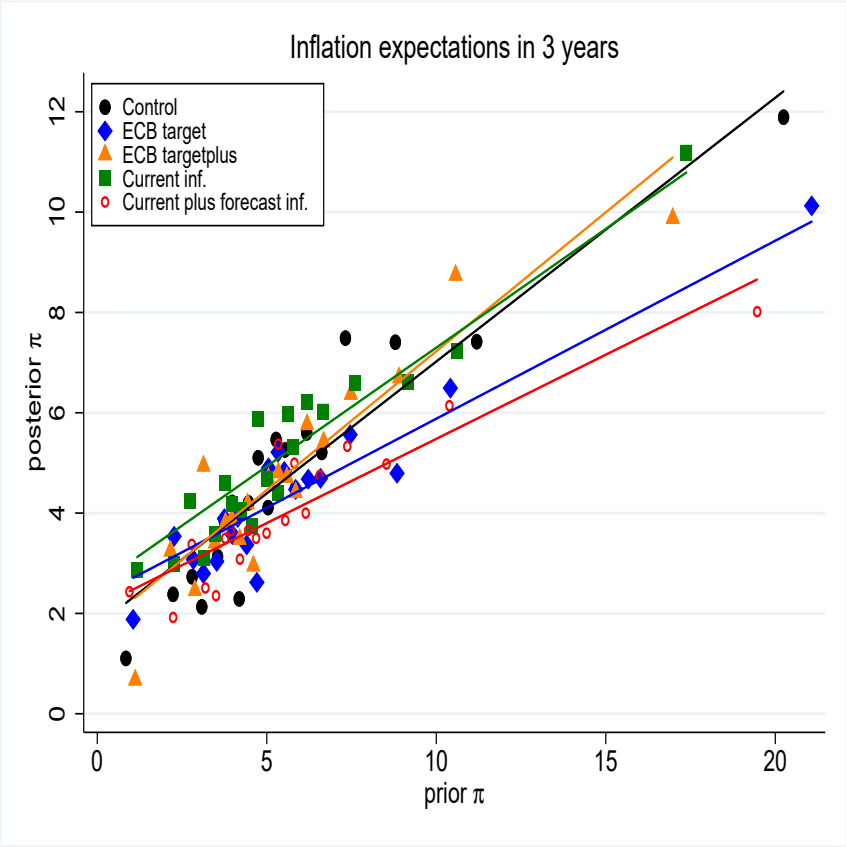


Control



Literacy

Response of inflation beliefs by treatments ($\pi^{e,3yrs}$)



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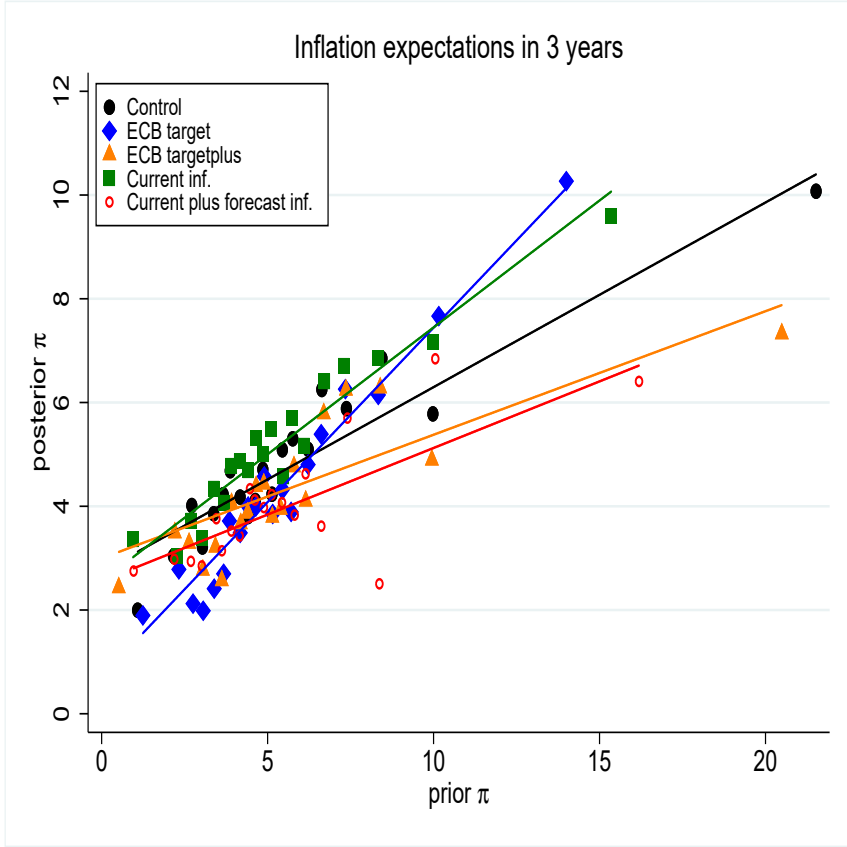
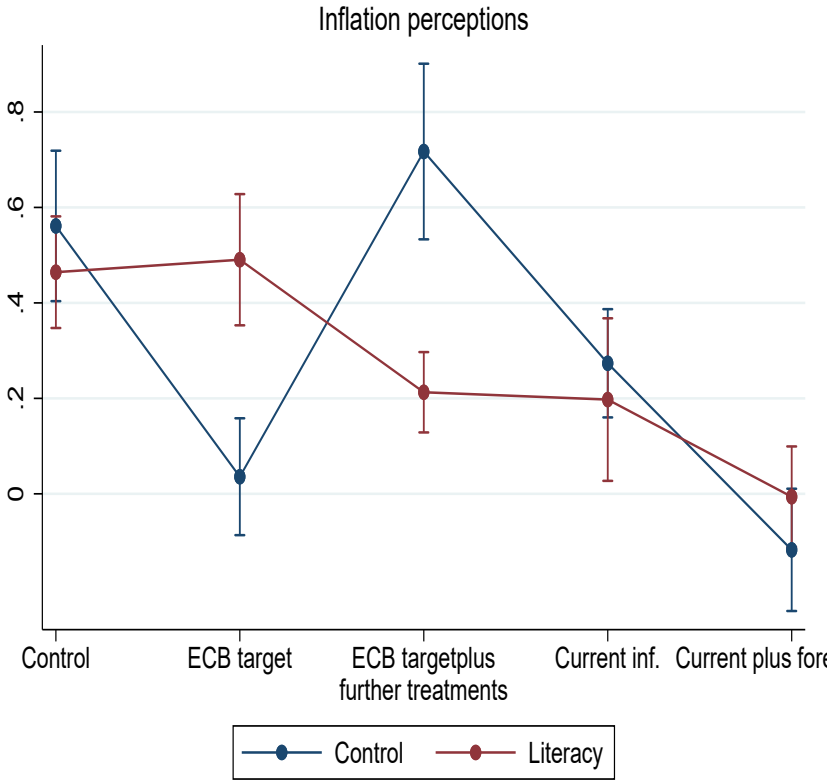
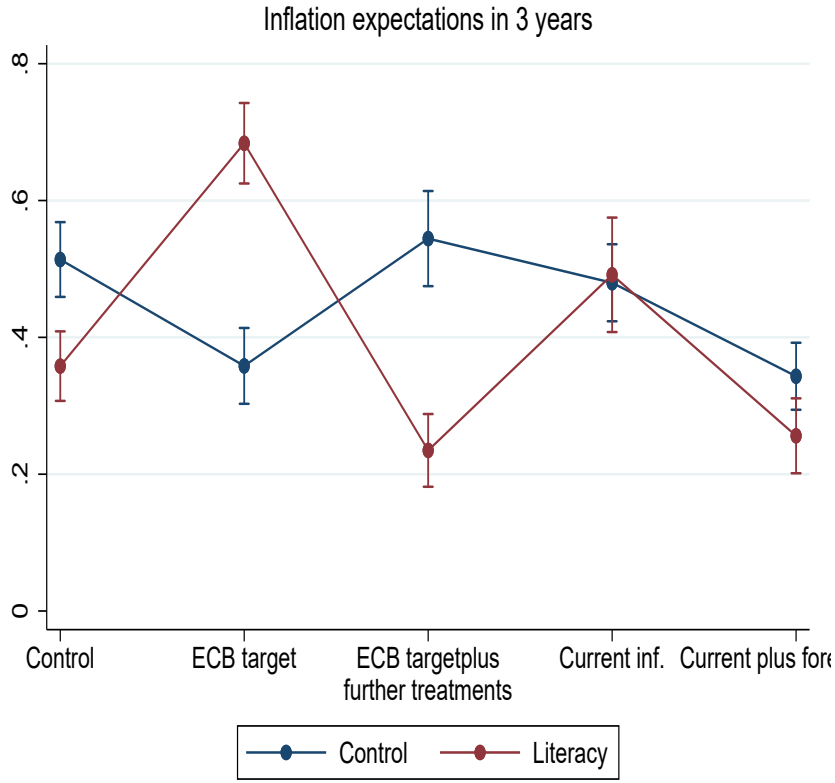


Literacy

Average marginal effect of prior beliefs on posterior beliefs





Further results

- Literacy treatment increases the uncertainty of inflation expectations on average, but the effect is reduced if respondents receive further quantitative information on the ECB inflation target or about current inflation
- Literacy treatment increases trust in the central bank, but the effect is reduced if respondents receive further quantitative information about current inflation
- The follow-up survey shows almost no persistence in treatment effects from the first wave

Conclusion

- Online survey experiment with a representative sample of German consumers in a period with high inflation (March and June/July 2022)
- Providing general information about inflation and monetary policy improves (i) inflation and monetary policy literacy, (ii) the likelihood of giving inflation predictions, and (iii) trust in the central bank
- When updating inflation beliefs, the literacy treated group puts more weights on "new" information: the ECB's commitment to account for the effect of climate change on the stability of the financial system.

Conclusion

- Generated literacy leads to higher forecast uncertainty $\Rightarrow$ less overconfident forecasts? $\Rightarrow$ but lower uncertainty when literacy interacts with information on ECB target or current inflation

- Generated literacy leads to more trust in the central bank, but this effect is reduced if respondents are informed that inflation is currently high

$\Rightarrow$ Results tell a cautious tale about efforts to improve knowledge about inflation and monetary policy in the public, particularly in times of above-target inflation rates

Thank you for your attention!

Summary statistics: Control group 1

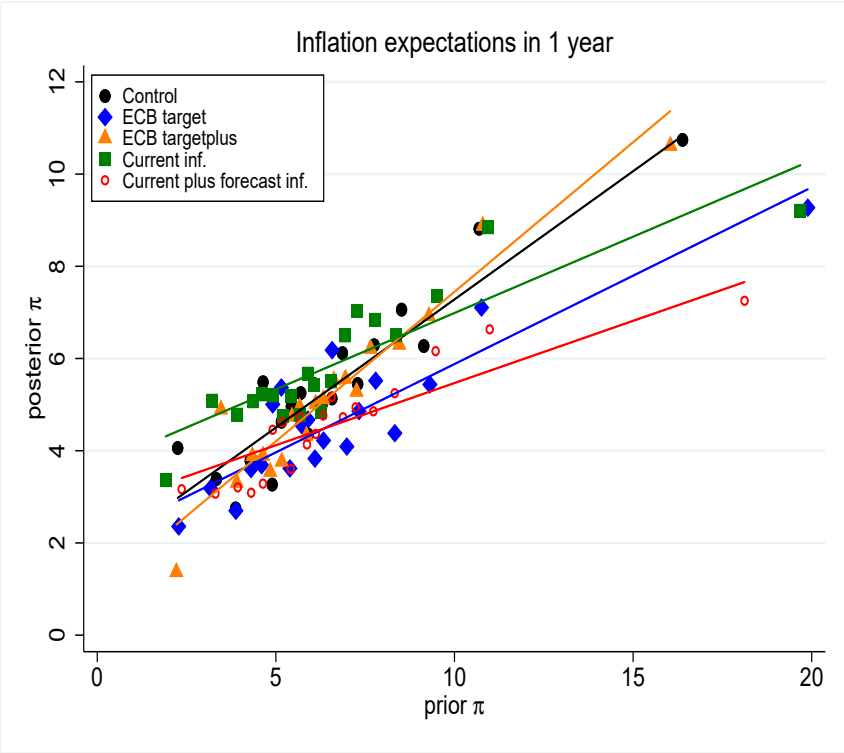
Variable	Mean	Median	Std. Dev.	Min.	Max.	N
inflation literacy	2.34	2	1.38	0	5	1996
financial literacy	1.91	2	0.95	0	3	1996
π^{p}	6.15	5	7.99	-50	100	1479
$\pi^{e,1y}$	8.26	6	8.84	-25	100	1461
$\pi^{e,3y}$	7.97	5	11.29	-15	100	1325
$\pi^{ECB,target}$	4.25	2	8.4	-10	100	1034
Control 1 & 2:						
trust ECB	4.11	5	2.51	0	10	376
trust Bundesbank	4.39	5	2.56	0	10	377

Balance Tests Control Group vs. Literacy Treatment Group

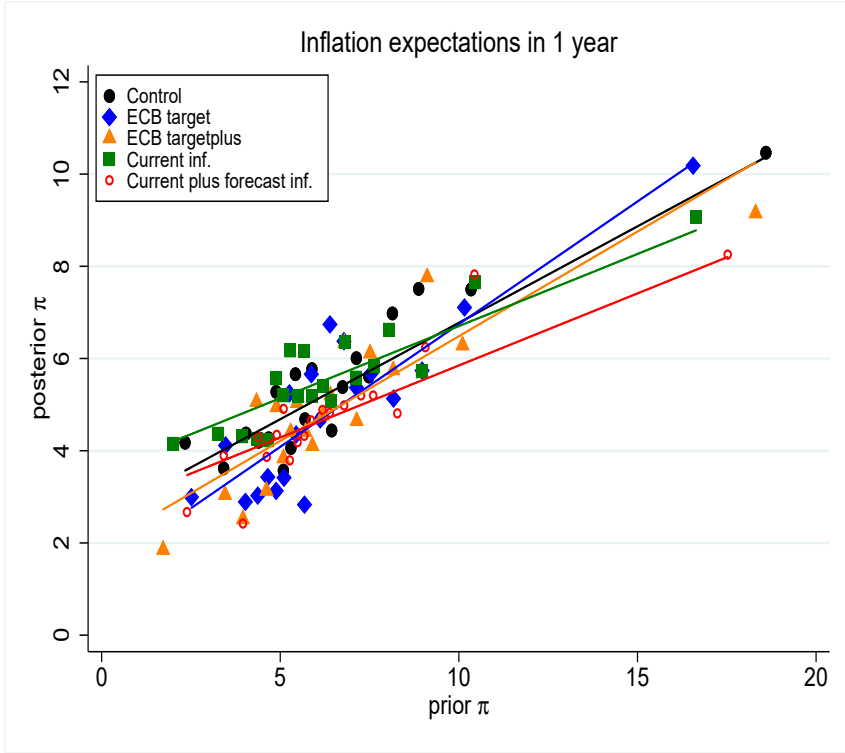
Table: Demographic characteristics: Control group vs. Literacy treatment (Step 1)

	Control group		Literacy treatment		mean difference
variable	mean	sd	mean	sd	P-value
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
hhsize	2.25	1.08	2.22	1.09	0.57
East Germany	0.15	0.36	0.14	0.35	0.63

Response of inflation beliefs by treatments ($\pi^{e,1y}$)

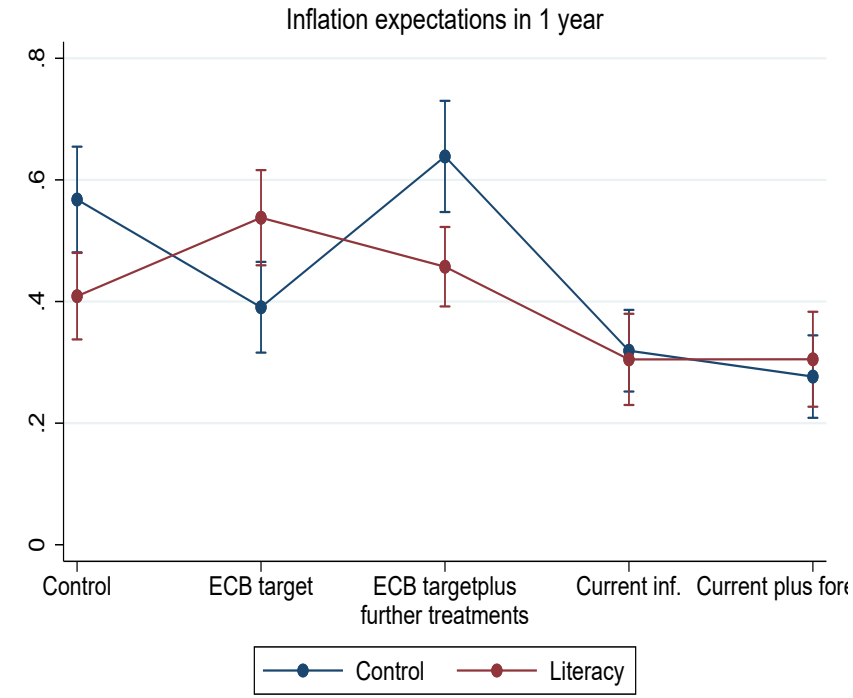


Control



Literacy

Average marginal effect of prior beliefs on posterior beliefs



Treatment effects on the uncertainty of predictions

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

Treatment effects on the trust in the central bank

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

Non-numerical Information Treatment (1)

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.

Non-numerical Information Treatment (2)

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.

Non-numerical Information Treatment (3)

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.

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Numerical Information Treatments (1)

- Treatment 1 (*ECB target*): "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."

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- Treatment 2 (*ECB targetplus*) : "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."

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Numerical Information Treatments (2)

- Treatment 3 (*Current Inf.*): "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."

Numerical Information Treatments (2)

- Treatment 3 (*Current Inf.*): "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 (*Current plus forecast Inf.*): "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."

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Survey questions: Inflation Predictions

- Point forecast: Over the next 12 months, I expect the rate of inflation/deflation to be ... percent

- Probabilistic forecast: 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, the rate of inflation will be [-12% or less], [12%;8%], [8%;4%], [4%;2%], [2%;0%], [0%;2%], [2%;4%], [4%;8%], [8%;12%], and [12% or more]

- 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)?

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Survey questions: Trust in the Central Bank

- Trust in the ECB: 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

- Trust in the Bundesbank: 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

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