

The pass-through from Inflation Perceptions to Inflation Expectations¹

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¹The views and opinions expressed in this presentation are those of the authors and do not necessarily reflect the view of the Deutsche Bundesbank or the Eurosystem.

Inflation Expectations and Inflation Perceptions

of households increased substantially over the last months in Germany

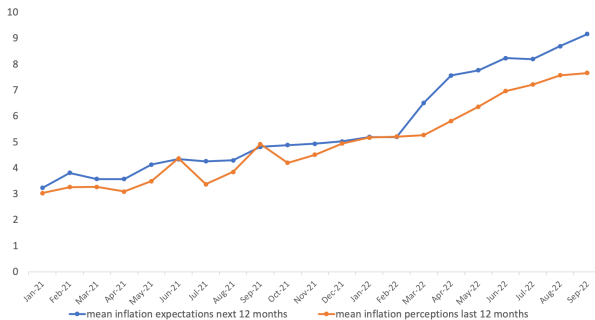


Figure: Dynamics of mean inflation expectations and perceptions

Sources: Bundesbank Online Panel Households (BOP-HH). Expectations and perceptions: Weighted means, observations truncated to interval [-5;+30].

▶ median

▶ CPI

▶ Long-term Expectations

Policy Relevance of Inflation Expectations

- Households' inflation expectations may influence spending
(e.g., Duca-Radu et al., 2021; Ichiue and Nishiguchi, 2015)

“For the actual process of setting wages and prices, it is the expectations of the public that matter most.”

(Christine Lagarde, 2020)

“There is an important role of the central bank in shaping the expectations of the general public [...] more research is needed to understand the different factors that shape the inflation expectations of individual households.”

(former ECB Vice-President Vitor Constancio, 2017)

This Paper

Do **inflation perceptions** help to understand **inflation expectations**?

Related Literature

- Correlation of expectations and perceptions
(e.g., Jonung 1981; Draeger, 2015; Arioli et al., 2017; D'Acunto et al., 2021)

▶ Related Literature

This Paper

Research Questions

- 1 Do perceptions causally drive short-term expectations?
- 2 What about long-term expectations?
- 3 How do households form their inflation perceptions?
- 4 What drives the link between perceptions and expectations?
- 5 What does this link imply for policy?

▶ [Related Literature](#)

Preview of Results

- 1 Household i 's perceptions P_i causally drive expectations $\mathbb{E}(\pi_i)$
 - Various estimation methods and specifications
 - RCT information provision experiment
- 2 Perceptions matter for short- and long-term inflation expectations
- 3 Food/fuel prices and uncertainty influence perceptions
- 4 Heterogeneity in pass-through strength $P_i \rightarrow \mathbb{E}(\pi_i)$
 - Socio-economic groups
 - Periods of low versus high inflation
- 5 Factor moderating the pass-through strength
 - Level of uncertainty about the development of the inflation rate

The Data

The Data and Key Variables

- **Bundesbank Online Panel Households (BOP-HH)**, monthly data for 2 500 to 5 000 individuals
- **Periods covered:** April to June 2019; April 2020 to September 2022
- **Inflation Perceptions:**
 - *Quantitative:* What do you think the rate of inflation or deflation in Germany was over the past twelve months?
- **Inflation Expectations**
 - *Qualitative:* What developments do you expect in the inflation/deflation rate over the next 12 months?
 - *Probabilistic:* In your opinion, how likely is it that the rate of inflation will develop as follows over the next twelve months?
 - *Quantitative:* What do you think the rate of inflation/deflation will roughly be over the next 12 months?

▶ Survey Details

▶ Descriptives

The Perception-Expectation Link

Baseline Regression

Relationship b/w expectations (next 12 months) and perceptions (past 12 months)

$$\mathbb{E}(\pi_{i,t \rightarrow t+12}) = \beta_0 + \beta_1' X_{i,t} + \beta_2 \tilde{P}_{i,t} + F_t + \varepsilon_{i,t}$$

- $\mathbb{E}(\pi_{i,t \rightarrow t+12})$ denotes the inflation rate household i surveyed in wave t expects for the next 12 months (percentage points).
- $X_{i,t}$ denotes a vector of controls for individual i ; gender, age, age squared, education, employment status, income, region.
- $\tilde{P}_{i,t}$ is our variable of interest, household's i perceived average inflation rate over the last 12 months (percentage points).
- F_t denotes the survey-wave fixed effects.

Results

Relationship b/w expectations (next 12 months) and perceptions (past 12 months)

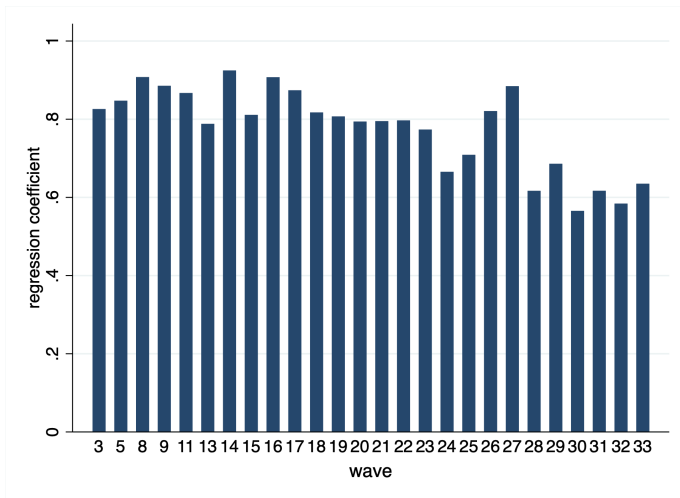
Dependent variable: Short-term Inflation Expectations (next 12 months)							
	OLS	OLS	OLS	OLS	panel FE	panel RE	panel Δ on Δ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Perceptions	0.880*** (0.00718)	0.792*** (0.00901)	0.869*** (0.00735)	0.771*** (0.00928)	0.826*** (0.0105)	0.857*** (0.00855)	0.581*** (0.0333)
Wave dummies	-	+	-	+	-	-	-
Controls	-	-	+	+	-	-	-
<i>N</i>	63318	63318	59434	59434	45395	45395	5739
<i>R</i> ²	0.541	0.564	0.541	0.567	0.495	0.496	0.272

Notes: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors (Eicker-White) are reported in parentheses. Wave controls include a dummy for each wave. Socio-demographic controls include gender, household income, education, current employment status, East residence dummy, age, age squared. Panel regressions are conducted on the sample of consumers who participated in the survey more than once. Perceptions and expectations truncated [30;-5]. The data span waves 1-30 of the survey (April - June 2019, April 2020 - September 2022)

Result I: Inflation perceptions $\tilde{P}_{i,t}$ have a positive, large and significant effect on households' short-term inflation expectations.

Correlation is high at all times

Relationship b/w expectations (next 12 months) and perceptions (past 12 months)



Correlation is high at all times

... but less in high-inflation environments

Dependent variable: Short-term Inflation Expectations					
	before July 2021	after July 2021	full sample		
	(1)	(2)	(3)	(4)	(5)
Perceptions (past 12 months)	0.872*** (0.0153)	0.701*** (0.0117)	0.771*** (0.00928)	0.771*** (0.00928)	0.864*** (0.0151)
High inflation (dummy)				2.531*** (0.115)	3.306*** (0.139)
Perceptions × High inflation					-0.161*** (0.0190)
Wave dummies	+	+	+	+	+
Controls	+	+	+	+	+
<i>N</i>	20702	38732	59434	59434	59434
<i>R</i> ²	0.578	0.488	0.567	0.567	0.570

Notes: OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors (Eicker-White) in parentheses. High-inflation dummy equal to 1 for periods starting from July 2021 and 0 otherwise. Before July 2021, the German economy experienced a stable and low inflation rate equal to 1.1 on average (sd of 0.83). After July 2021, the average inflation rate equaled 6.2 (sd of 1.9). [Long-term Expectations](#)

Result II: Pass-through from households' perceptions to short-term inflation expectations is stronger during low-inflation periods.

Do Perceptions also matter for Long-Term Expectations?

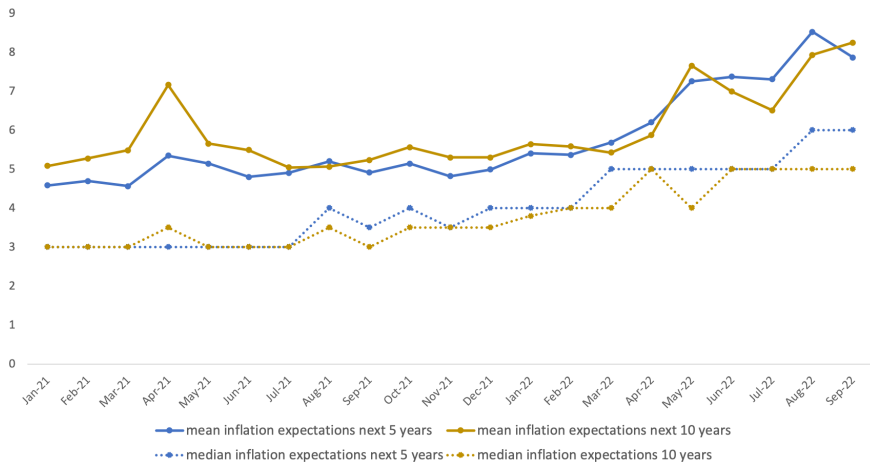
Survey Questions: Long-Term Expectations

BOP-HH survey has two quantitative questions measuring long-term inflation expectations, respondents are randomly split between them:

Question 1 (inflation over the next five years): *What value do you think the rate of inflation or deflation will take on average over the next five years? Answer: [...] percent*

Question 2 (inflation over the next ten years): *What value do you think the rate of inflation or deflation will take on average over the next ten years? Answer: [...] percent*

Long-term Inflation Expectations (5/10 years ahead)



Sources: Bundesbank Online Panel Households (BOP-HH). Expectations: Weighted means/medians, observations truncated to interval [-5;+30].

Results

Relationship b/w expectations (next 5/10 years) and perceptions (past 12 months)

Dependent variable: Long-term Inflation Expectations				
	5-Years		10-Years	
	(1)	(2)	(3)	(4)
Perceptions	0.649*** (0.0241)	0.184*** (0.0233)	0.672*** (0.0264)	0.291*** (0.0302)
Expectations (short-term)		0.593*** (0.0232)		0.490*** (0.0261)
Wave dummies	+	+	+	+
Controls	+	+	+	+
<i>N</i>	24304	24024	21421	21168
<i>R</i> ²	0.212	0.309	0.174	0.218

OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors (Eicker-White) in parentheses. Perceptions and expectations truncated [30;-5]. Survey waves 1-33 (April - June 2019, April 2020 - September 2022).

Result III: Inflation perceptions $\tilde{P}_{i,t}$ have positive, large, significant effect on households' long-term inflation expectations. [▶ More](#)

Is the Effect of Inflation Perceptions on Inflation Expectations causal?

Randomized Control Trial Design

- Implemented in August 2022 (survey wave 32)
- Random allocation to four groups
- Group 1: no information, the control group
- Treatment Group 2-4:
 - Information about official inflation rate of past 12 months
 - Reminder of respondents' point prediction about inflation rate over past 12 months

Randomized Control Trial Design

Timeline

- 1 Elicit pre-treatment:
quantitative perceptions $\tilde{p}_{i,t}^{pre}$ and expectations $\mathbb{E} \left(\pi_{i,t \rightarrow t+12}^{pre} \right)$
- 2 Information provision (control group + 3 treatments)
- 3 Elicit post-treatment:
quantitative perceptions $\tilde{p}_{i,t}^{post}$ and expectations $\mathbb{E} \left(\pi_{i,t \rightarrow t+12}^{post} \right)$

Information Treatments

Treatment 1: The Federal Statistical Office reported the official inflation rate for Germany for the past twelve months, as measured by the consumer price index, as being **7.5%** in July 2022. You indicated that you believe the inflation rate was [...] over the past twelve months.

Treatment 2: The Federal Statistical Office reported the official inflation rate for Germany for the past twelve months, as measured by the Harmonised Index of Consumer Prices, as being **8.5%** in July 2022. You indicated that you believe the inflation rate was [...] over the past twelve months.

Note: Post-treatment inflation perception $\tilde{p}_{i,t}^{post}$ equals info provided. For those with prior perceptions smaller (higher) than provided CPI value, treatment is "bad (good) news".

Information Treatments

Treatment 3: The Federal Statistical Office reported the official inflation rate for Germany for the past twelve months, for the definition excluding energy and food, as being **3.2%** in July 2022. You indicated that you believe the overall inflation rate, i.e. including energy and food, was [...] over the past twelve months.

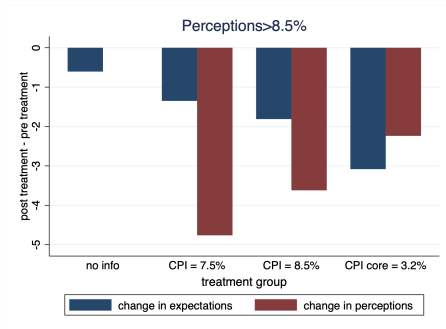
Note: Post-treatment inflation perception $\tilde{P}_{i,t}^{post}$ elicited explicitly.

Elicit Post-treatment Expectations/Perceptions

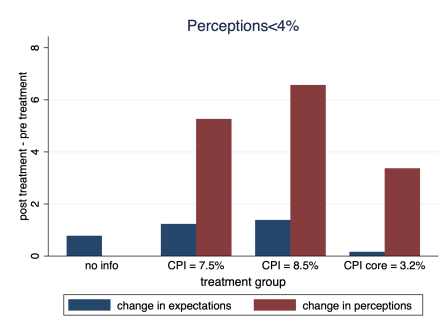
- Survey fatigue! Don't ask the same questions
- Instead ask min/max probability questions (standard approach, e.g., Coibion et al. 2021)
- Assume triangular distribution to calculate moments (mean, median, standard deviation)

▸ Details

Results



(a) Good news



(b) Bad news

Figure: Treatment effect on consumers' perceptions and expectations

▶ More

Empirical Strategy

- Does a change in perception lead to a change in expectations?

$$\mathbb{E} \left(\pi_{i,t \rightarrow t+12}^{post} \right) - \mathbb{E} \left(\pi_{i,t \rightarrow t+12}^{pre} \right) = \beta_0 + \beta_1' X_{i,t} + \beta_2 (\tilde{\rho}_{i,t}^{post} - \tilde{\rho}_{i,t}^{pre}) + \varepsilon_{i,t}$$

- $\mathbb{E} \left(\pi_{i,t \rightarrow t+12} \right)$ denotes the inflation rate household i expects for the next 12 months (percentage points).
- $X_{i,t}$ denotes a vector of controls for individual i ; gender, age, age squared, education, employment status, income, region.
- $\tilde{\rho}_{i,t}$ is household's i perceived average inflation rate over the last 12 months (percentage points).

Results

Changes in Perceptions cause Changes in Expectations

Dependent variable: Change in Short-term Inflation Expectations				
Treatment	1-3 pooled	# 1 <i>CPI</i> = 7.5	# 2 <i>CPI</i> = 8.5	# 3 <i>CPI</i> _{core} = 3.2
$(\tilde{P}_{i,t}^{post} - \tilde{P}_{i,t}^{pre})$	0.326*** (0.0430)	0.362*** (0.0883)	0.347*** (0.0840)	0.258*** (0.0587)
<i>N</i>	1800	612	608	580
<i>R</i> ²	0.119	0.137	0.149	0.133

Notes: Columns 1-4 report OLS estimates. Robust standard errors (Eicker-Huber-White) are reported in parentheses. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Socio-demographic controls include gender, household income, education, current employment status, region, age, age squared. Perceptions and expectations truncated [30;-5]. The data span wave 32 of the survey (August 2022).

Result 4: Households' inflation perceptions $\tilde{P}_{i,t}$ over the last 12 months have a direct positive, sizable, and significant causal effect on households' short-term inflation expectations for the next twelve months $\mathbb{E}(\pi_{i,t \rightarrow t+12})$.

Which Factors matter for Inflation Perceptions?

Question on Factors influencing Perceptions

(we added a question to the survey wave April 2022)

- Ask household which factors are important when they form inflation perceptions:

At the start of the survey, you estimated the inflation rate over the last twelve months to have been [...].

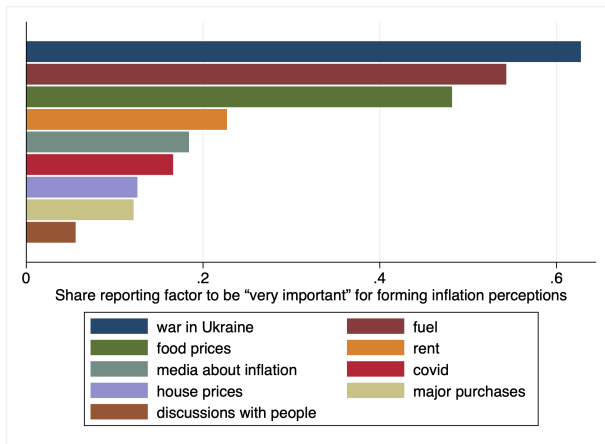
In your opinion, how important are the following factors for your assessment regarding the average inflation rate over the past twelve months?

Answers: 5-point scale, from *very important* to *not at all important*.

[▶ Survey Details](#)

Self-reported Factors driving Perceptions

(question added to the survey wave April 2022)



Result 5: Prices of frequently bought goods (food and fuel) and uncertainty are the key factors households rely on when forming inflation perceptions over the previous twelve months.

Heterogeneity in the Perception-Expectation Link

Heterogeneity in pass-through strength

Heterogeneity along socio-demographic characteristics

- Sample splits show that strength of the relationship between perceptions and expectations depends on socio-demographics.
- Stronger for women, residents of East Germany, the employed, the low-educated, those younger than 60. [▶ Results with Interaction terms](#)

What is behind the observed heterogeneity?

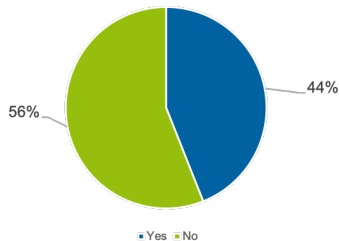
- Different information sources used (to form perceptions)
- Different levels of individual uncertainty about inflation dynamics

Heterogeneity in the Pass-Through Strength: The Role of Information for Perceptions

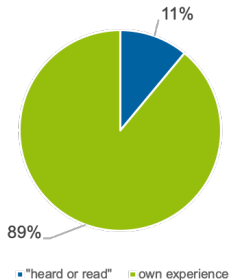
Most people rely on own shopping experience

when forming inflation perceptions (we added these questions to wave July 2021)

Aside from this survey, have you, over the past four weeks, heard or read anything about inflation in Germany?



You said you think prices for essential goods have [...] over the past twelve months. Is that based more on things you have heard or read or on your own experiences when shopping?



Information matters for Perceptions

Dependent variable:	Perceptions (1)	ST Expectations (2)	(3)
Inflation info (dummy)	0.465*** (0.140)	0.149 (0.162)	-0.165 (0.120)
Perceptions based on shopping (dummy)	0.450** (0.146)	0.506* (0.204)	0.193 (0.161)
Perceptions			0.808*** (0.0471)
Controls	+	+	+
<i>N</i>	2772	2779	2735
<i>R</i> ²	0.053	0.045	0.452

Notes: OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Controls: gender, income, education, employment status, region, age, age squared. Perceptions and expectations truncated [30;-5]. Survey wave 19 (July 2021).

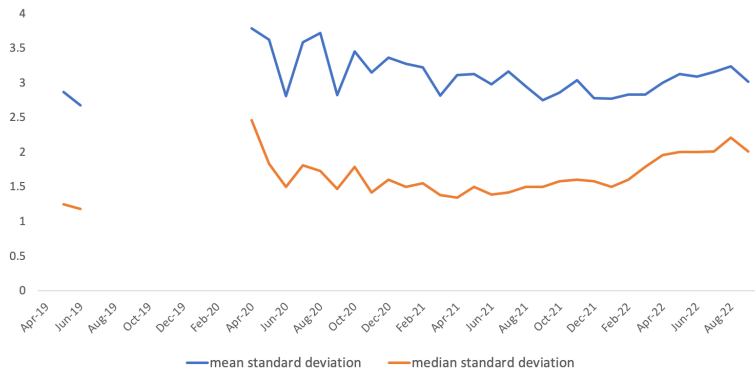
Result 6: Both information variables have direct effect on perceptions $\tilde{P}_{i,t}$. No direct effect on expectations.

Heterogeneity in the Pass-Through Strength: The Role of Individual Inflation Uncertainty

Measuring Uncertainty about Future Inflation

at the individual level

- Extract SD from probabilistic inflation expectation question [Details](#)



SD of subjective probability distribution of probabilistic question. Participants asked to distribute a probability of 100% over 10 categories b/w deflation rate $\geq 12\%$ and inflation rate $\geq 12\%$.

Uncertainty varies by socio-demographic groups

- Women, low-income, low-educated, residents of East Germany, the young show higher levels of uncertainty.

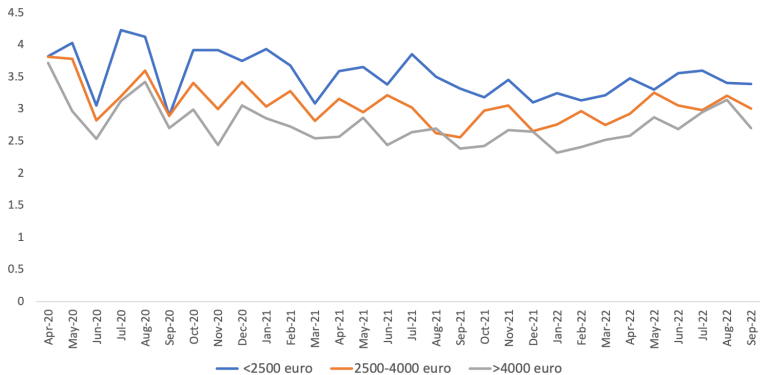


Figure: Inflation Uncertainty by Household Income

Uncertainty matters for the pass-through

Dependent variable: Short-term Inflation Expectations (next 12 months)			
	Low uncertainty (bottom quartile)	Medium uncertainty (2 medium quartiles)	High uncertainty (top quartile)
	(1)	(2)	(3)
Perceptions (past 12 months)	0.764*** (0.0129)	0.657*** (0.0181)	0.835*** (0.0199)
Wave dummies	+	+	+
Controls	+	+	+
<i>N</i>	20138	26210	13086
<i>R</i> ²	0.526	0.574	0.615

Notes: OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors in parentheses. Controls include gender, income, education, employment status, region, age, age squared. Survey waves 1-33 (April-June 2019, April 2020 - September 2022). [Interaction Term](#) [Long-Term Expectations](#)

Result 7: Stronger pass-through for individuals with low and high uncertainty than for middle uncertainty.

Conclusion and Policy Implication

Conclusion

- Inflation expectations are—to a large part—extrapolated from perceptions about past inflation
- Inflation perceptions strongly linked to inflation expectations (short-term and long-term)
- Information provision experiment suggests that perceptions causally drive inflation expectations
- Inflation perceptions are driven mainly by shopping experience (food and fuel prices)
- Pass-through strength varies
 - stronger for those with very low and very high uncertainty
 - stronger during low-inflation than during high-inflation periods

Policy Implications

- To what degree can communication actually influence expectations, if large part is pure extrapolation from perceptions about past inflation?
- Is it possible to influence expectations by correcting "wrong" perceptions about past inflation rates through communication?
 - RCT information provision experiment suggests: yes
 - Reality: households hard to reach
- Current Situation
 - Experienced inflation (esp. frequently bought products) crucial
 - (Perceived) inflation away from target (for too long) risks "de-anchoring" of (short- and long-term) inflation expectations

Thank you.

Back-up Slides

What drives inflation expectations?

Related Literature

- **Knowledge, IQ and financial literacy**
(e.g., Bruine de Bruin et al., 2010; Burke and Manz, 2014; Coibion and Gorodnichenko, 2015; D'Acunto et al., 2019; Doovern et al., 2015; Lein and Maag, 2011)
- **Information and central bank/media communication**
(e.g., Lamla and Vinogradov, 2019; Fuester et al. 2018; Kryvtsov and Petersen, 2021)
- **Historic inflation experiences**
(e.g., Angelico and Di Giacomo 2019; Malmendier et al. 2017; Goldfayn-Frank and Wohlfart 2020)
- **Personal shopping experiences**
(e.g., Weber et al., 2022; D'Acunto et al., 2021)

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Inflation Expectations and Inflation Perceptions

of households increased substantially over the last months in Germany

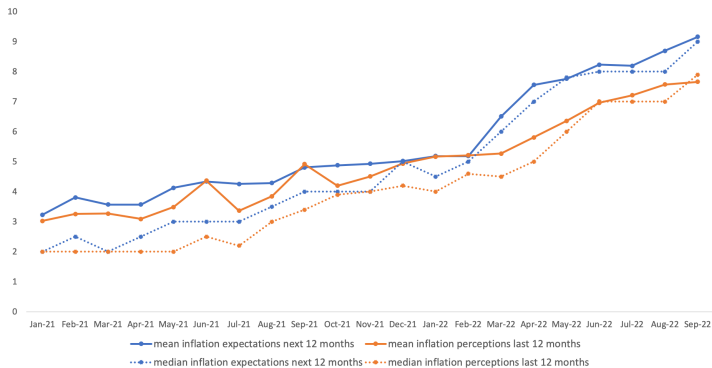
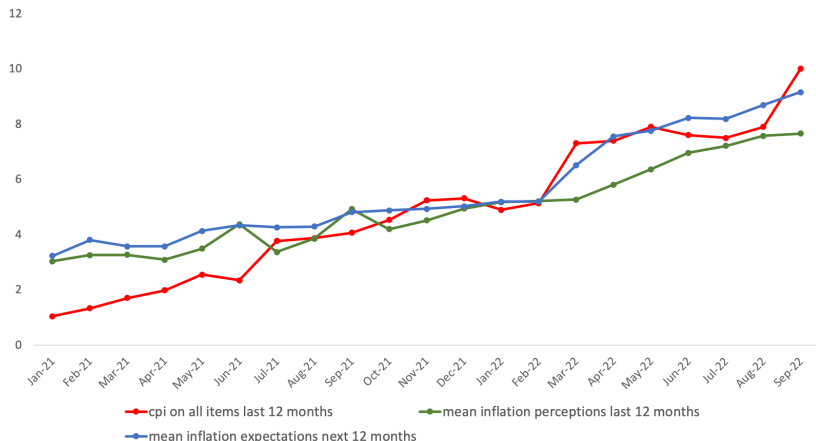


Figure: Dynamics of mean/median inflation expectations and perceptions

Sources: Bundesbank Online Panel Households (BOP-HH). Expectations and perceptions: Weighted means/medians, observations truncated to interval [-5;+30].

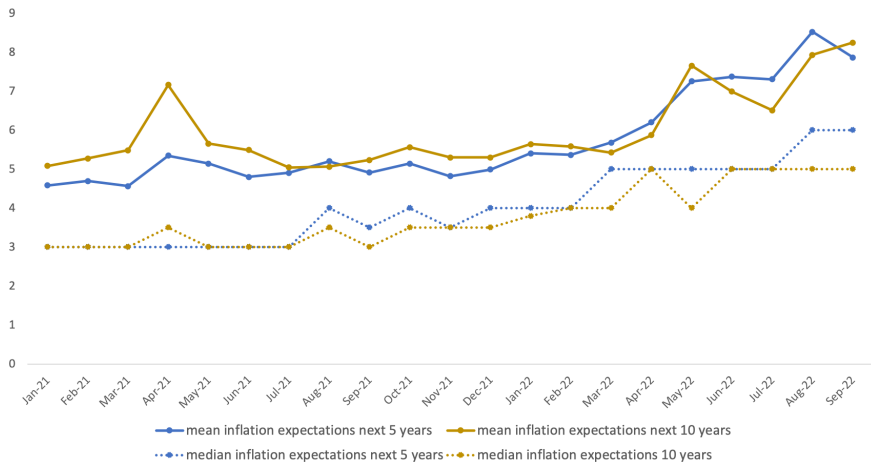
Inflation Expectations, Perceptions, and CPI



Sources: Bundesbank Online Panel Households (BOP-HH).

Expectations/perceptions: Weighted means, observations truncated to interval [-5;+30]. [◀ Return](#)

Long-term Inflation Expectations (5/10 years ahead)



Sources: Bundesbank Online Panel Households (BOP-HH). Expectations: Weighted means/medians, observations truncated to interval [-5;+30]. [Return](#)

Survey Questions: Details

- 1 **Inflation perceptions:** *What do you think the rate of inflation or deflation in Germany was over the past twelve months?*

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

Please enter a value here: [] percent

- 2 **Qualitative inflation expectations:** *What developments do you expect in the inflation rate over the next twelve months? Will the inflation rate:*

1 decrease significantly

2 decrease slightly

3 stay roughly the same

4 increase slightly

5 increase significantly

[◀ Return](#)

Survey Questions: Details (cont.)

- 1 **Quantitative inflation expectations:** *What do you think the rate of inflation/deflation will roughly be over the next twelve months?*

Note: Inflation is the percentage increase in the general price level. It is mostly measured using the consumer price index. A decrease in the price level is generally described as "deflation".

Please enter a value in the input field (values may have one decimal place). percent

[← Return](#)

Survey Questions: Details (cont.)

- **Probabilistic inflation expectations:** *In your opinion, how likely is it that the rate of inflation will change as follows over the next twelve months?*

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

- 1 The rate of deflation (opposite of inflation) will be 12% or higher.
- 2 The rate of deflation (opposite of inflation) will be between 8% and less than 12%.
- 3 The rate of deflation (opposite of inflation) will be between 4% and less than 8%.
- 4 The rate of deflation (opposite of inflation) will be between 2% and less than 4%.
- 5 The rate of deflation (opposite of inflation) will be between 0% and less than 2%.
- 6 The rate of inflation will be between 0% and less than 2%.
- 7 The rate of inflation will be between 2% and less than 4%.
- 8 The rate of inflation will be between 4% and less than 8%.
- 9 The rate of inflation will be between 8% and less than 12%.
- 10 The rate of inflation will be 12% or higher. [◀ Return](#)

Probabilistic inflation expectations

- **Probabilistic inflation expectations:** *In your opinion, how likely is it that the rate of inflation will change as follows over the next twelve months?*

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

- 1 The rate of deflation (opposite of inflation) will be 12% or higher.
- 2 The rate of deflation (opposite of inflation) will be between 8% and less than 12%.
- 3 The rate of deflation (opposite of inflation) will be between 4% and less than 8%.
- 4 The rate of deflation (opposite of inflation) will be between 2% and less than 4%.
- 5 The rate of deflation (opposite of inflation) will be between 0% and less than 2%.
- 6 The rate of inflation will be between 0% and less than 2%.
- 7 The rate of inflation will be between 2% and less than 4%.
- 8 The rate of inflation will be between 4% and less than 8%.
- 9 The rate of inflation will be between 8% and less than 12%.
- 10 The rate of inflation will be 12% or higher. [◀ Return](#)

Survey Questions: Long-Term Expectations

BOP-HH survey has two quantitative questions measuring long-term inflation expectations, respondents are randomly split between them:

Question 1 (inflation over the next five years): *What value do you think the rate of inflation or deflation will take on average over the next five years? Answer: [...] percent*

Question 2 (inflation over the next ten years): *What value do you think the rate of inflation or deflation will take on average over the next ten years? Answer: [...] percent*

[← Return](#)

Post-treatment elicitation of inflation expectations

Question 1: What are the minimum and maximum values you expect for the rate of inflation over the next twelve months?

Note: If you assume there will be deflation, please enter a negative value. Values may have one decimal place. Please ensure that the minimum is not greater than the maximum.

Question 2: In your opinion, how likely is it that the rate of inflation will be above $[(\text{min} + \text{max})/2]$ over the next twelve months?

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

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Additional Questions on Perception Factors

Factors:

- Development of **food prices** over the past 12 months
- Development of **fuel prices** over the past 12 months
- Development of **house prices** in your region over past 12 months
- Development of **rent** and ancillary costs in your region over the past 12 months
- Development of **prices of major purchases** over past 12 months
- **Media** reports on the inflation rate
- **Discussions** about inflation with colleagues, friends or relatives
- Development of the **COVID-19 pandemic** over past 12 months
- Development of the geopolitical situation over past 2 months, particularly the **war in Ukraine** [◀ Return](#)

Summary Statistics

	N obs	Mean	St. Dev	25th	Median	75th
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Inflation expectations</i>						
1-year	120130	5.13	4.17	2	4	7
5-year	43342	5.59	6.24	3	4	6
10-year	34296	5.38	6.41	2.5	4	6
<i>Inflation perceptions</i>						
1-year	64286	4.30	3.73	2	3.5	5.5
<i>CPI inflation</i>						
food	127601	6.09	5.42	1.51	4.47	8.4
energy	127601	16.98	16.76	2.46	18.31	35.6
excluding food and energy	127601	2.53	1.22	1.42	2.90	3.5
overall	127601	4.25	3.03	1.44	4.53	7.4

Notes: The data span waves 1-30 of the survey (April 2019 - June 2019, April 2020 - September 2022).

[← Return](#)

Low- versus High-Inflation Regime

- Stronger pass-through during low-inflation environment

Dependent variable: Long-term Inflation Expectations				
	5 years		10 years	
	before July 2021	after July 2021	before July 2021	after July 2021
	(1)	(2)	(3)	(4)
Perceptions (past 12 months)	0.722*** (0.04)	0.594*** (0.03)	0.659*** (0.04)	0.655*** (0.03)
Wave dummies	+	+	+	+
Controls	+	+	+	+
<i>N</i>	4620	13786	4506	12268
<i>R</i> ²	0.36	0.21	0.26	0.20

Notes: OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors reported in parentheses. Controls include gender, household income, education, current employment status, region, age, age squared.

RCT Treatments

- *Control group*: no information
- *Treatment 1*: The Federal Statistical Office reported the official inflation rate for Germany for the past twelve months, as measured by the consumer price index, as being **7.5%** in July 2022. You indicated that you believe the inflation rate was [] over the past twelve months.
- *Treatment 2*: The Federal Statistical Office reported the official inflation rate for Germany for the past twelve months, as measured by the Harmonised Index of Consumer Prices, as being **8.5%** in July 2022. You indicated that you believe the inflation rate was [] over the past twelve months.
- *Treatment 3*: The Federal Statistical Office reported the official inflation rate for Germany for the past twelve months, for the definition excluding energy and food, as being **3.2%** in July 2022. You indicated that you believe the overall inflation rate, i.e. including energy and food, was [] over the past twelve months.

Perceptions and Long-term Inflation Expectations

Dependent variable: Long-term Inflation Expectations (10Y)							
	OLS	OLS	OLS	OLS	panel FE	panel RE	panel Δ on Δ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Perceptions last 12 months	0.628*** (0.0208)	0.706*** (0.0245)	0.601*** (0.0223)	0.672*** (0.0264)	0.344*** (0.0272)	0.523*** (0.0207)	0.374*** (0.0856)
Wave dummies	-	+	-	+	-	-	-
Controls	-	-	+	+	-	-	-
<i>N</i>	23269	23269	21421	21421	15630	15630	598
<i>R</i> ²	0.150	0.162	0.164	0.174	0.068	0.068	0.042

Notes: Robust standard errors (Eicker-White) are in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Socio-demographic controls include gender, household income, education, current employment status, East residence dummy, age, age squared. The dependent variable (long-term inflation expectations) is measured by the quantitative survey question: "And what value do you think the rate of inflation or deflation will take on average over the next ten years?". The independent variable (short-term inflation perceptions) are measured by the quantitative survey question: "What do you think the rate of inflation or deflation in Germany was over the past 12 months?". Perceptions and expectations truncated [30;-5]. Survey waves 1-33 (April 2020 - June 2020, April 2021 - September 2022).

[← Return](#)

Uncertainty matters for the pass-through

- Stronger for individuals with low and high uncertainty than for middle uncertainty.

Dependent variable: Long-term Inflation Expectations (next 5 years)			
	Low uncertainty (bottom quartile) (1)	Medium uncertainty (2 medium quartiles) (2)	High uncertainty (top quartile) (3)
Perceptions (past 12 months)	0.613*** (0.0300)	0.454*** (0.0488)	0.778*** (0.0616)
Wave dummies	+	+	+
Controls	+	+	+
<i>N</i>	8505	10594	5205
<i>R</i> ²	0.220	0.142	0.247

Notes: OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors reported in parentheses. Controls include gender, household income, education, current employment status, region, age, age squared.

Uncertainty matters for the pass-through

- Strongest for individuals with high uncertainty.

Dependent variable: Long-term Inflation Expectations (next 10 years)			
	Low uncertainty (bottom quartile)	Medium uncertainty (2 medium quartiles)	High uncertainty (top quartile)
	(1)	(2)	(3)
Perceptions (past 12 months)	0.602*** (0.0317)	0.650*** (0.0687)	0.713*** (0.0623)
Wave dummies	+	+	+
Controls	+	+	+
<i>N</i>	7301	9478	4642
<i>R</i> ²	0.177	0.121	0.200

Notes: OLS estimates. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Robust standard errors reported in parentheses. Controls include gender, household income, education, current employment status, region, age, age squared.

Uncertainty matters for the pass-through

Dependent variable: Short-term Inflation Expectations		
	(1)	(2)
perceptions (last 12 months)	0.611*** (0.0110)	0.561*** (0.0135)
uncertainty	0.0441*** (0.00224)	0.0286*** (0.00380)
<i>perceptions</i> × <i>uncertainty</i>		0.00344*** (0.000775)
uncertainty ²	-0.000153*** (0.0000237)	-0.000135*** (0.0000374)
<i>perceptions</i> × <i>uncertainty</i> ²		-0.0000115* (0.00000635)
Controls	+	+
Wave dummies	+	+
<i>N</i>	53545	53545
<i>R</i> ²	0.656	0.658

Notes: OLS estimates. Robust standard errors (Eicker-White) are reported in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Socio-demographic controls include gender, household income, education, current employment status, region, age, age squared. The variable uncertainty is measured as the variance of the subjective probability distribution from the probabilistic question regarding inflation expectations. We also control for the mean inflation expectations derived from the subjective probability distribution from the probabilistic question. Perceptions and expectations truncated [30;-5]. The data span waves 1-33 (April 2020 - June 2020, April 2021 - September 2022).

Heterogeneity in Perception-Expectation Link

Dependent variable: Short-term Inflation Expectations (next 12 months)					
	(1)	(2)	(3)	(4)	(5)
Perceptions (past 12 months)	0.716*** (0.0121)	0.763*** (0.0100)	0.797*** (0.0108)	0.732*** (0.0124)	0.747*** (0.0133)
Female (dummy)	0.121* (0.0557)				
Perception × female	0.0919*** (0.0142)				
East (dummy)		0.180* (0.0715)			
Perception × East		0.0392* (0.0179)			
Old (dummy)			0.245*** (0.0704)		
Perception × Old			-0.0693*** (0.0142)		
Employed (dummy)				-0.208* (0.0872)	
Perception × Employed				0.0671*** (0.0141)	
Low-educated (dummy)					0.0214 (0.0551)
Perception × Low-Educated					0.0349* (0.0145)
Constant	+	+	+	+	+
Wave dummies	+	+	+	+	+
Controls	+	+	+	+	+
<i>N</i>	59434	59434	59434	59434	59750
<i>R</i> ²	0.568	0.567	0.568	0.568	0.566

Notes: OLS estimates. Robust standard errors (Eicker-White) are reported in parentheses. Significance levels: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Wave controls include a dummy for each wave. Socio-demographic controls include gender, household income, education, current employment status, East residence dummy, age, age squared. Perceptions and expectations truncated [30;-5]. The data span waves 1-33 of the survey (April - June 2019, April 2020 - September 2022).

RCT Results

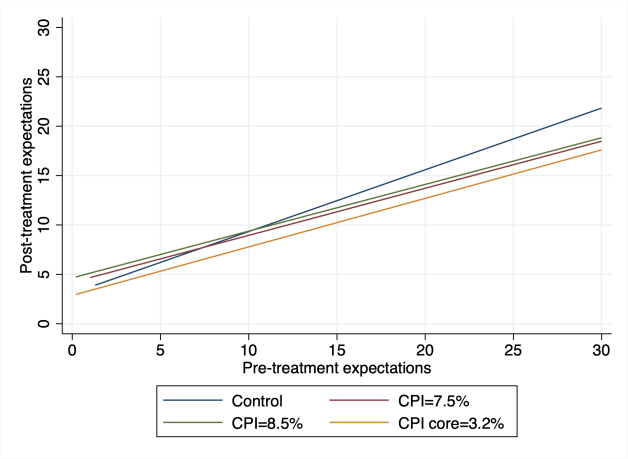


Figure: Treatment effect on Expectations

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