# The pass-through from inflation perceptions to expectations

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Inflation, expectations and perceptions in Germany
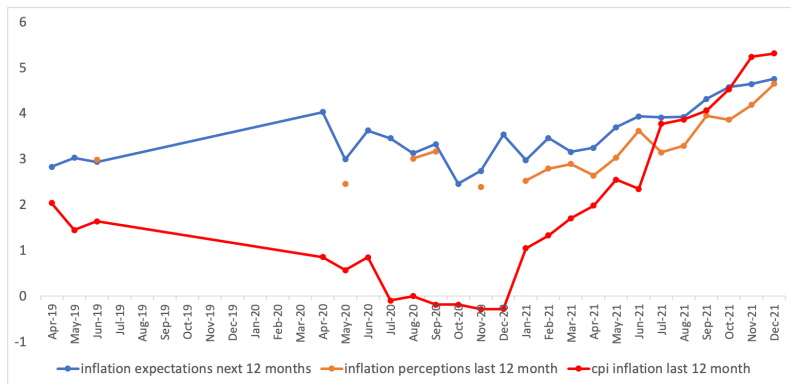
Sources: Bundesbank Online Panel Households (BOP-HH), Destatis: Price indices at a glance - German Federal Statistical Office (destatis.de)

Summary of the project

- **RQ:** *How do inflation perceptions influence inflation expectations and what factors determine the strength of the link between inflation perceptions and expectations?*

- **Data:** Bundesbank Online Panel Households (BOP-HH), monthly, 2500-5000 individuals/wave; panel component

- **Results:**

  1. Strong link between inflation perceptions and inflation expectations (both short-term and long-term)

  2. Heterogeneity in pass-through from perceptions to expectations
     - socio-economic groups
     - high/low inflation environment

  3. Factors moderating the pass-through are:
     - differences in the use of information sources
     - level of uncertainty about the development of the inflation rate (U-shape relationship between the pass-through and uncertainty)

Perceptions-expectations pass-through

Dependent variable: inflation expectations (short-term, next 12 months)							
	OLS	OLS	OLS	OLS	panel, FE	panel, RE	Δ on Δ
inflation perceptions	0.859***	0.855***	0.849***	0.840***	0.708***	0.864***	0.765***
(last 12 months)	(0.00390)	(0.00396)	(0.00456)	(0.00469)	(0.0136)	(0.00449)	(0.0241)
cons	1.038***	0.483***	1.091***	0.479***	1.432***	0.996***	-0.0870
	(0.0174)	(0.0683)	(0.0853)	(0.111)	(0.0402)	(0.0198)	(0.0753)
Wave dummies	-	+	-	+	-	-	-
Controls	-	-	+	+	-	-	-
N	42478	42478	35060	35060	31212	31212	1318
R^2	0.533	0.536	0.528	0.532	0.385	0.533	0.435

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Perceptions and expectations truncated [30;-5].

Control variables: gender, household income, education, current employment status, uncertainty about inflation expectations

Finding: Strong link; robust to
adding controls, wave dummies, and different specifications.

Influence of perceptions on long-term expectations

Dependent variable: inflation expectations (long-term, next 5 or 10 years)				
	(OLS)	(OLS)	(OLS)	(OLS)
	5Y	5Y	10Y	10Y
inflation perceptions	0.677***	0.287***	0.654***	0.322***
(last 12 months)	(0.0106)	(0.0158)	(0.0129)	(0.0187)
inflation expectations		0.459***		0.419***
(next 12 months)		(0.0136)		(0.0159)
cons	2.444***	1.841***	3.191***	2.515***
	(0.204)	(0.193)	(0.247)	(0.239)
N	10685	10569	10520	10379
R^2	0.305	0.362	0.234	0.268

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Perceptions and expectations truncated [30;-5].

Control variables: gender, household income, education, region, current employment status

Finding: Inflation perceptions affect long-term inflation expectations

Pass-through is heterogeneous

- by socio-economic characteristics

Pass-through ↑	Female ↑, East ↑, Renters ↑, Employed ↑, High income ↑, Have loans ↑, Young ↑
	Intend to buy property ↑, Optimistic ↑, Small city ↑, No trust in ECB ↑
	Do not consider covid a serious issue ↑, Not risk averse ↑, Not liquidity constrained ↑
	Did not decrease consumption due to covid ↑,No income loss due to covid ↑

- by inflation environment (low versus high) ▸ Appendix

Dependent variable: short-term inflation expectations (next 12 months)		
	(Low inflation)	(High inflation)
inflation perceptions	0.884***	0.797***
(last 12 months)	(0.00487)	(0.00672)
constant	0.887***	1.379***
	(0.0209)	(0.0312)
N	24358	18120
R^2	0.575	0.437

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Low inflation: April 2019-June 2021, and high inflation: after July 2021.

What is behind the observed heterogeneity?

- Differential information acquisition
- Different levels of uncertainty about inflation dynamics

Additional questions on information acquisition

Two new questions added to the survey:

You said you think prices for essential goods [...] over the past twelve months. Is that based more on things you have heard or read or on your own experiences when shopping?
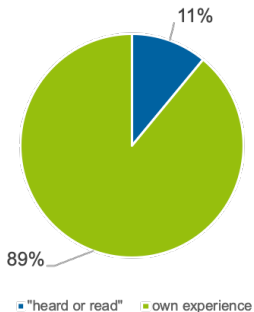
Aside from this survey, have you, over the past four weeks, heard or read anything about inflation in Germany?

11%

89%

- "heard or read" - own experience

44%

56%

- Yes - No

Effects of information acquisition
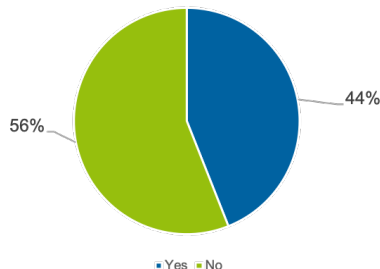
Both aspects vary across socio-economic groups:

- low-income, low-educated, women, and the young are less likely to have heard about inflation
- low-educated, women, and the old are more likely to base their perceptions on own shopping experience

... and influence expectations, perceptions and pass-through strength.

Appendix

Uncertainty

- measured as standard deviation from probabilistic question
- varies by socio-economic groups
- non-linear effect on perception-to-expectation pass-through

	low uncertainty (bottom quartile)	medium uncertainty (two middle quartiles) expectations	high uncertainty (top quartile)
perceptions (last 12 months)	0.855*** (0.00754)	0.823*** (0.00814)	0.902*** (0.00920)
constant	1.260*** (0.0435)	0.943*** (0.0237)	0.799*** (0.0367)
N	10629	13519	7064
R^2	0.548	0.430	0.576

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Perceptions and expectations truncated [30;-5].

Control variables: gender, income, education, region, current employment status
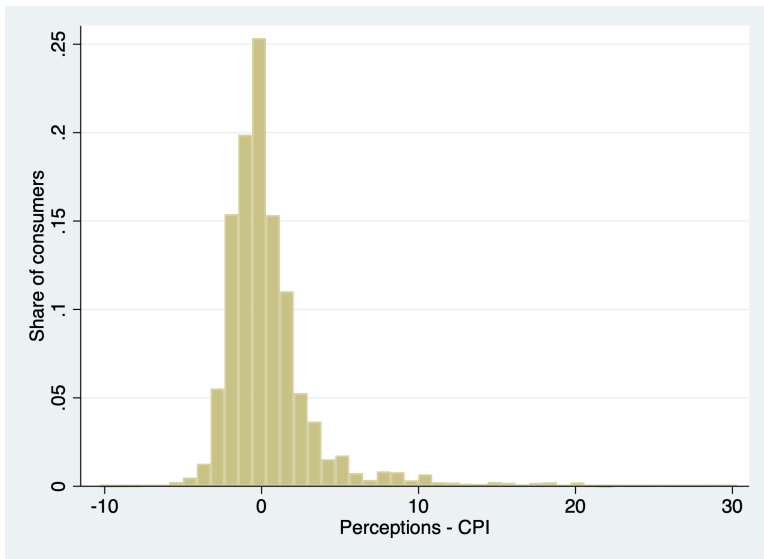
Appendix

Summary and conclusions

- Inflation perceptions strongly linked to inflation expectations (short-term and long-term)

- Pass-through varies across socioeconomic groups and across inflation regimes. Potential moderating factors:
  - heterogeneous choices of information
  - uncertainty
    (U-shaped relationship between uncertainty and pass-through)

- To what degree can communication actually influence expectations, if a large part is pure extrapolation?

- Is it possible to influence expectations by "correcting" wrong perceptions about past inflation rates?

Appendix 0. Factors that affect inflation expectations

1. Information and central bank/media communication (e.g., Lamla and Vinogradov, 2019; Fuester et al. 2018; Kryvtsov and Petersen, 2021)

2. Knowledge, IQ and financial literacy (e.g., Bruine de Bruin et al., 2010; Burke and Manz, 2014; D'Acounto et al., 2019; Coibion and Gorodnichenko, 2015; Dovern et al. , 2015; Lein and Maag, 2011)

3. Hystoric inflation experiences (e.g., Angelico and Di Giacomo 2019; Malmendier et al. 2017; Goldfayn-Frank and Wohlfart 2020)

4. Personal shopping experience (e.g., Weber et al., 2022; D'Acunto et al., 2021)

5. Perceptions of price changes in the recent past (e.g., Jonung 1981; Dräger, 2015; Arioli et al., 2017; D'Acounto et al., 2021; Bosch et al., 2015; Weber et al., 2022; Cavallo et al. 2017)

Appendix A. Perceptions and CPI
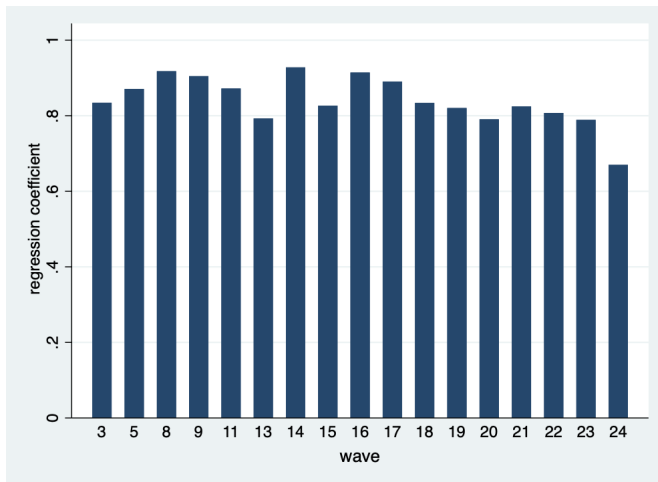
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Appendix C. Socio-economic heterogeneity in information acquisition

	own shopping experience	not informed
uncertainty	-0.000652*	0.00271***
	(0.000328)	(0.000503)
female	0.0301*	0.160***
	(0.0120)	(0.0184)
income	0.00193	-0.0191***
	(0.00301)	(0.00462)
education	-0.0345***	-0.0390***
	(0.00710)	(0.0109)
age	0.00105*	-0.00907***
	(0.000408)	(0.000624)
cons	1.873***	2.071***
	(0.0356)	(0.0545)
N	2659	2662
R^2	0.015	0.120

$* p < 0.05$, $** p < 0.01$, $*** p < 0.001$

Findings

- less informed: uncertain, females, lower income, lower education, young

- base perceptions on shopping experience: less uncertain, females, lower education, older

Appendix D. Effects of information on expectation, perceptions and uncertainty.

	expectations	perceptions	uncertainty
inflation info	0.482**	0.614***	4.349***
	(0.153)	(0.126)	(0.705)
own shopping experience	0.600*	0.557**	-2.007
	(0.251)	(0.207)	(1.140)
_cons	2.087***	1.207**	4.636
	(0.527)	(0.434)	(2.402)
N	2801	2793	2676
R^2	0.006	0.011	0.015

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Findings

- less informed: ↑ Exp, ↑ Perc, ↑ Uncertainty
- base perceptions on shopping experience: ↑ Exp, ↑ Perc

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Appendix E. Effects of shopping experience and information acquisition combined

	expectations	perceptions	expectations	expectations
informed and use information	-0.850**	-0.738**	-0.316	-1.112**
	(0.321)	(0.265)	(0.227)	(0.418)
perceptions			0.819***	0.814***
			(0.0173)	(0.0174)
perceptions ∗ informed and use information				0.332*
				(0.146)
cons	3.967***	3.191***	1.320***	1.335***
	(0.0786)	(0.0648)	(0.0774)	(0.0776)
N	2805	2797	2760	2760
R^2	0.002	0.003	0.451	0.452

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix F. Non-linear effects of uncertainty

	(OLS) expectations			
perceptions	0.859***	0.871***	0.856***	0.873***
	(0.00429)	(0.00500)	(0.00430)	(0.00552)
uncertainty	0.00842***	0.0122***	0.0210***	0.0282***
	(0.000812)	(0.00111)	(0.00174)	(0.00238)
*perceptions * uncertainty*		-0.000691***		-0.00157***
		(0.000141)		(0.000333)
uncertainty^2			-0.000140***	-0.000190***
			(0.0000172)	(0.0000242)
*perceptions * uncertainty*^{2}				0.0000107***
				(0.00000283)
cons	0.999***	0.957***	0.961***	0.908***
	(0.0180)	(0.0199)	(0.0185)	(0.0215)
N	38356	38356	38356	38356
R^2	0.534	0.534	0.534	0.535

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix J. Work in progress

- ask household which factors are important when they form inflation perceptions and expectations (question added to the survey in April 2022)
- RCT to obtain a causal link between perceptions and expectations (question will be added one of in the coming waves of the survey)
- search for instruments to causally measure the effect of perceptions on expectations