Households' Response to the Wealth Effects of Inflation

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Introduction

- Inflation reached levels many households have never seen before

- Unexpected inflation redistributes wealth from creditors to debtors
  (Doepke and Schneider, 2006; Fisher, 1933)

- Consumption effects of the wealth redistribution (Fisher channel)?
  (Auclert, 2019)

- Evidence on households' response to the wealth effects lacking
  - ▶ Limited awareness b/c of money illusion?
    (Cohen, Polk, and Vuolteenaho, 2005; Modigliani and Cohn, 1979)
  - ▶ Limited reaction b/c of low MPC out of unrealized gains?
    (Di Maggio, Kermani, and Majlesi, 2020; Lettau and Ludvigson, 2004)

This paper

- Study how households respond to wealth effects of inflation

- Exploit exogenous variation in knowledge about erosion channel
  - ▶ Randomized information experiment with customers of German bank
  - ▶ Explain inflation-induced erosion of nominal positions

- Analyze whether/how knowledge affects beliefs and choices

- Preview of results
  - ▶ Limited awareness of debt-erosion channel in particular
    $\Rightarrow$ Direct consequences likely muted
  - ▶ Information provision $\rightarrow$ ↑ perceived wealth and ↑ debt beliefs
  - ▶ Information $\rightarrow$ ↑ consumption and ↑ (hypothetical) debt financing
    $\Rightarrow$ Wealth effects can mediate consumption-inflation sensitivity

Plan for the talk

- Data and experimental design

- Prior knowledge about the wealth effects of inflation

- The effects of information treatments on beliefs

- Wealth effects of inflation and economic choices

Survey administration

- Online survey experiment with customers of large German bank

- Survey period: July 2022, coincides with record inflation of 8.7%

- Invitation via short email sent by bank to around 215,000 customers

- Email states survey is on inflation and administered by Uni Frankfurt

- 3,840 completed surveys, 1.8% response rate in line w/ previous ones

- Median response time of 18 minutes

Sample selection

- Customers with activated PFM tool and regular account inflows
  - ▶ We can observe their consumption-savings decisions

- Also invite customers with outstanding mortgage or consumer loan
  - ▶ They should be particularly exposed to inflation-induced debt erosion

- Survey-participation incentive based on online-shopping voucher

- Take two steps to filter respondents:
  1. Wrong or implausible entries in balance-sheet decomposition, such as a negative share of a balance-sheet item relative to gross wealth
  2. Response time of <7 or >120 minutes (approximately 1.5% tails)
  - ▶ 3,190 customers remain in sample after these steps

Sample characteristics

Statistics:	Mean	SD	P25	P50	P75
Demographic characteristics					
University completed (0/1)	0.48	0.50	0.00	0.00	1.00
Homeowner (0/1)	0.59	0.49	0.00	1.00	1.00
Stockholdings (0/1)	0.54	0.50	0.00	1.00	1.00
Nominal assets / gross wealth (%)	42.67	33.66	10.00	30.00	79.00
Nominal debt / gross wealth (%)	16.78	22.88	0.00	5.00	30.00
Net nominal position / gross wealth (%)	25.89	44.90	0.00	20.00	60.00
Perceptions and expectations					
Inflation rate today (%)	8.78	6.24	7.00	7.90	8.00
Inflation important for own wealth (0–4)	2.37	1.02	2.00	2.00	3.00
GDP growth important for own wealth (0–4)	1.73	1.06	1.00	2.00	2.00
Interest rates important for own wealth (0–4)	1.34	1.14	0.00	1.00	2.00

⇒ Sample: well-off, exposed to inflation, accurate inflation perception

Experimental design

1. Pre-treatment section
   - ▶ Preexisting knowledge about erosion channel
   - ▶ Balance-sheet decomposition and real-net-wealth change

2. Treatment section
   - ▶ Control group receives info on current inflation only
   - ▶ One treatment group learns about inflation + nominal-asset erosion
   - ▶ One treatment group learns about inflation + nominal-debt erosion

3. Post-treatment section
   - ▶ Beliefs about nominal positions, own real wealth, economy
   - ▶ Planned consumption and hypothetical real-estate choice

- Track households over time to investigate actual choices

Text for loan-treatment group

The **current rate of inflation in Germany is 8.7%**, the highest rate for more than 70 years. That is, goods and services priced at €100 one year ago now cost €108.7 on average. This price increase has a relatively **positive effect on borrowers**: the loan amount is unchanged nominally, but worth less in real terms as a consequence of money depreciation.

As an example, consider a €50,000 loan with a three-year maturity that you took out one year ago. The real value of the loan has already fallen sharply, and will depreciate further if inflation remains high:

€50,000 loan value one year ago ⇓ €38,800 real loan value today

The **inflation-induced loan depreciation** thus has a positive effect on the real net wealth of borrowers.

Text for savings-treatment group

The **current rate of inflation in Germany is 8.7%**, the highest rate for more than 70 years. That is, goods and services priced at €100 one year ago now cost €108.7 on average. This price increase has a relatively **negative effect on savers**: the savings amount (e.g., checking account, bond, life insurance) is unchanged nominally or lower, but worth less in real terms as a consequence of money depreciation.

As an example, consider a €50,000 savings product with a three-year maturity that you invested in one year ago. The real value of the savings product has already fallen sharply, and will depreciate further if inflation remains high:

€50,000 savings value one year ago ⇓ €38,800 real value today

The **inflation-induced savings depreciation** thus has a negative effect on the real net wealth of savers.

Text for control group

The **current rate of inflation in Germany is 8.7%**, the highest rate for more than 70 years. That is, goods and services priced at €100 one year ago now cost €108.7 on average.

- Control group receives first two sentences only
- ⇒ All groups learn about prevailing level of inflation
- ⇒ By comparing groups, isolate effect of erosion-channel information

Administrative bank data

- Match survey responses to data provided by bank partner

- Set of demographics: age, zip code, marital status, etc.

- Account transactions for 2,670 customers from bank's PFM tool
  - Drop in N due to PFM activation and $>$€100 income restriction
  - Registers and classifies in- and outflows into $>$50 categories

- Three measures of consumption:
  1. Total: all outflows except for investments, insurances, and loans
  2. Discretionary: e.g., clothing, leisure, cash withdrawals, online shopping
  3. Nondiscretionary: difference between total and discretionary spending

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Prior knowledge about wealth effects of inflation

Question: "Which of the following financial instruments should yield the highest real-net-wealth return in times of unexpectedly high inflation?"

Wealth protection when unexpected increase in inflation

Savings ■ Stocks ■ Real estate ■ FR loans
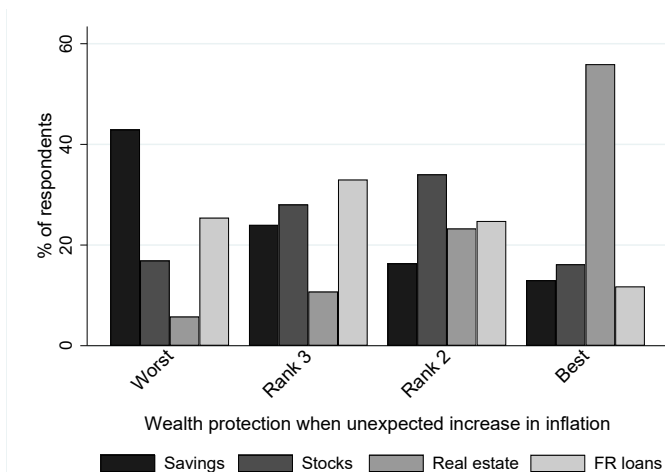
$\Rightarrow$ Awareness of inflation-induced savings erosion, limited for debt

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Equation to estimate treatment effects on beliefs

$$posterior_i = const + \sum_{j=1}^{2} \beta_j \, I\{i \in treat \, j\} + \gamma \, prior \, rnw_i + controls_i + error_i$$

with

- $posterior_i$ = post-treatment measure of beliefs of respondent i
- $I\{i \in treat \, j\}$ = dummy variable indicating that respondent i receives treatment j (savings or loan erosion)
- $prior \, rnw_i$ = prior beliefs on real-net-wealth change
- $controls_i$ from survey and bank data:
  - ▶ Gross wealth, quadratic polynomial in age, risk tolerance
  - ▶ Dummies for education, survey characteristics, gender, marital status, employment status, balance-sheet positions, inflation beliefs, zip code

Treatment effects on beliefs about nominal positions

$$posterior_i = const + \sum_{j=1}^{2} \beta_j \; I\{i \in treat \; j\} + \gamma \; prior \; rnw_i + controls_i + error_i$$

Dependent variable:	Inflation-protection ranking					
	Nominal assets		Nominal debt		Debt aversion	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat: savings erosion	−0.131***	−0.133***	0.050	0.055	0.043	0.053
	(0.047)	(0.045)	(0.043)	(0.044)	(0.049)	(0.048)
Treat: loan erosion	−0.085*	−0.084*	0.196***	0.187***	−0.136***	−0.142***
	(0.048)	(0.046)	(0.045)	(0.045)	(0.050)	(0.048)
Controls	N	Y	N	Y	N	Y
Observations	2,977	2,928	2,977	2,928	3,190	3,134
R-squared	0.00	0.11	0.01	0.04	0.00	0.11

- Savings treatment → ↓ nominal-asset beliefs by 12% of SD
- Loan treatment → ↑ nominal-debt beliefs by 19% of SD
- Loan treatment → more positive beliefs beyond inflation context

Treatment effects on perceived changes in real net wealth

$$posterior_i = const + \sum_{j=1}^{2} \beta_j \, I\{i \in treat \, j\} + \gamma \, prior \, rnw_i + controls_i + error_i$$

DV:	Change in real net wealth						
	Last 12 months		Next 12 months		Last + next 12 months		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treat: savings	−0.932	−0.807	−0.835	−0.981	−1.767	−1.788	−1.606**
	(0.648)	(0.646)	(0.769)	(0.773)	(1.217)	(1.222)	(0.781)
Treat: loan	1.490**	1.743***	1.260	1.204	2.749**	2.947**	2.495***
	(0.676)	(0.666)	(0.769)	(0.761)	(1.222)	(1.207)	(0.787)
Controls prior	Y	Y	Y	Y	Y	Y	Y
Controls demo	N	Y	N	Y	N	Y	Y
Robust reg	N	N	N	N	N	N	Y
Avg. Y CG	-2.51	-2.55	-3.11	-3.01	-5.62	-5.56	-6.33
Observations	3,190	3,134	3,190	3,134	3,190	3,134	3,099
R-squared	0.17	0.19	0.10	0.13	0.18	0.20	0.40

- Savings treatment has limited effect on wealth perception
- Loan treatment increases perceived wealth by 3 percentage points
- Results robust to and more precise with Huber-robust estimations

Treatment effects on changes in real net wealth by NNP
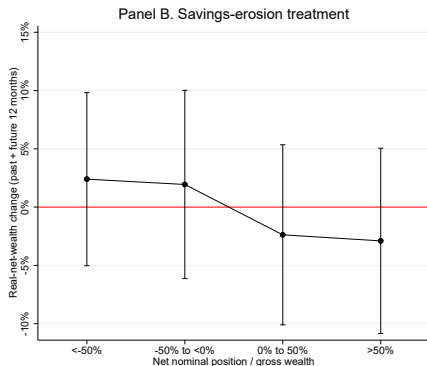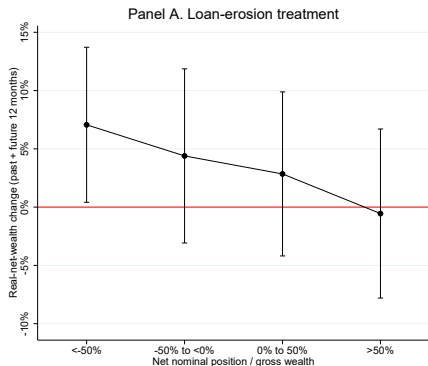
⇒ Perceived wealth effects stronger for those more exposed

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Treatment effects on planned spending

$$posterior_i = const + \beta \, I\{treat\ loan_i\} + \gamma \, prior\ rnw_i + controls_i + error_i$$

Dependent variable:	Planned spending				
	Groceries	Restaurants	Leisure	Clothing	Durables
	(1)	(2)	(3)	(4)	(5)
Panel A. Reduced form					
Treat: loan erosion	−0.007	0.110***	0.108**	0.042	0.069
	(0.043)	(0.041)	(0.042)	(0.042)	(0.043)
Controls for prior beliefs	Y	Y	Y	Y	Y
Controls for demographics	Y	Y	Y	Y	Y
Observations	2,088	2,088	2,088	2,088	2,088
R-squared	0.04	0.16	0.12	0.10	0.09
Avg. Y	0.00	0.00	0.00	0.00	0.00

- Groceries spending unaffected
- Treatment effect strongest for nondurable spending (11% of SD)

Changes in perceived real net wealth and spending

- Total effect of perceived real-net-wealth changes on spending?

- Exploit loan-treatment-induced variation in perceived wealth

- Estimate following model:

  $spend_i = \beta \ posterior \ rnw_i + \gamma \ prior \ rnw_i + controls_i + error_i$

- We instrument for *posterior rnw*$_i$ with loan treatment

Changes in perceived real net wealth and spending

$$spend_i = \beta \; posterior \; rnw_i + \gamma \; prior \; rnw_i + controls_i + error_i$$

Dependent variable:	Planned spending				
	Groceries	Restaurants	Leisure	Clothing	Durables
	(1)	(2)	(3)	(4)	(5)
Panel B. Instrumental variable					
RNW change	−0.010	0.037*	0.041**	0.015	0.027
	(0.017)	(0.019)	(0.020)	(0.017)	(0.019)
Controls for prior beliefs	Y	Y	Y	Y	Y
Controls for demographics	Y	Y	Y	Y	Y
Observations	2,065	2,065	2,065	2,065	2,065
1st stage F-stat	10.31	10.31	10.31	10.31	10.31
Avg. Y	0.00	0.00	0.00	0.00	0.00

⇒ Real-wealth changes mediate consumption-inflation sensitivity

Treatment effects on actual spending

$$posterior_i = const + \beta \, I\{treat \, loan_i\} + \gamma \, prior \, rnw_i + controls_i + error_i$$

DV:	Total			Nondiscretionary			Discretionary		
Window:	30	60	90	30	60	90	30	60	90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
T: loan	65.0*	192.6***	171.3**	−4.9	23.6	41.9	39.6	123.3***	131.3**
	(36.5)	(59.7)	(79.0)	(15.9)	(24.2)	(33.4)	(24.8)	(40.9)	(55.8)
N	1,465	1,513	1,477	1,431	1,414	1,405	1,451	1,488	1,497
R2	0.03	0.03	0.02	0.03	0.02	0.03	0.03	0.04	0.03
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Avg. Y	-267.0	-308.4	-22.8	-92.6	-46.6	58.7	-147.2	-222.9	-240.3

- Planned changes in spending translate into actual changes
- 6% increase in spending relative to average over prior 60 days
- MPC of 2.5–3% out of treatment-induced perceived wealth change

Other treatment effects: real-estate investment task

- Do more positive beliefs about nominal debt feed into loan choices?

- Survey participants engage in hypothetical real-estate investment

- Purchase real estate with equity and debt of up to €500k each

- Choose mortgage type as well

Other treatment effects: real-estate investment task

$$posterior_i = const + \beta \; I\{treat \; loan_i\} + \gamma \; prior \; rnw_i + controls_i + error_i$$

Dependent variable:	Price (€ k)	Equity (€ k)	Debt (€ k)	Debt/equity	FRM
	(1)	(2)	(3)	(4)	(5)
Treat: loan erosion	5.474	−9.829	17.770***	0.134***	0.073*
	(7.574)	(6.254)	(6.202)	(0.033)	(0.039)
Controls	Y	Y	Y	Y	Y
Avg. Y control group	542.79	280.25	260.48	1.19	2.22
Observations	2,082	2,088	2,088	2,082	2,088
R-squared	0.19	0.11	0.12	0.06	0.06

- Preferred purchase price does not differ across groups
- Loan treatment increases mortgage size, and hence leverage
- Loan treatment leads to stronger preference for FRM over ARM

Conclusion

- Households care and are well-informed about inflation

- Yet they know little about inflation-induced nominal-debt erosion

- Providing information on this erosion channel affects...
  - ▶ beliefs about nominal debt and own real wealth
  - ▶ consumption and debt financing in real-estate transaction

- Real wealth can hence mediate how households respond to inflation

- But limited awareness likely mutes consequences of redistribution

- Informative to HANK models in which Fisher channel is important
  - ▶ Unexpected inflation boosts economy b/c debtors have high MPC
  - ▶ Our results suggest role for info frictions & other deviations from FIRE
    (Laibson, Maxted, and Moll, 2023; Pfäuti and Seyrich, 2024)