The Effect of Inflation Uncertainty on Household Spending

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HOW DOES INFLATION UNCERTAINTY AFFECT SPENDING?

An *increase* in uncertainty about one-year ahead inflation causes:

- an *increase* in expected inflation,
- a *decrease* in expected income, and a *strong decrease* in planned spending,
- an *increase* in income risk & perceived risk of job loss,
- an *increase* in uncertainty about five-year ahead inflation.

⇒ Higher inflation uncertainty causes an increase in precautionary savings because of uncertainty about adverse supply shocks (and/or the central bank's reaction).

The Effect is Theoretically Ambiguous

We start with household i's standard inter-temporal Euler equation:

$$u'\left(\frac{C_{i,t}}{P_t}\right) = \beta_i \hat{\mathbb{E}}_{i,t}[R_{t+1} u'\left(\frac{C_{i,t+1}}{P_{t+1}}\right)]$$

Approximating the Euler equation to a second order and rewriting shows:

$$\underbrace{\Delta\hat{\mathbb{E}}_{i,t}(C_{i,t+1})}_{\text{Expected Consumption Growth}} \approx \underbrace{\hat{\mathbb{E}}_{i,t}(\pi_{t+1})}_{\text{Expected Inflation}} - \underbrace{\tilde{\sigma}^2_{\{c,\pi,r,\}}(\sigma^2_\pi)}_{\text{Uncertainty about Inflation, Consumption and Interest Rates}} + \underbrace{\tilde{R}_{t+1}(\sigma^2_\pi)}_{\text{Expected Interest Rate (Function of Inflation Uncertainty)}}$$

Hence, effect of inflation uncertainty on consumption growth depends on $\frac{\delta\tilde{\sigma}^2_{\{c,\pi,r,\}}}{\delta\sigma^2_\pi} \overset{?}{>} \frac{\delta\tilde{R}_{t+1}(\sigma^2_\pi)}{\delta\sigma^2_\pi}$.

The Experiment

We implement an RCT in a population-representative, rotating panel survey of 6,000 British households conducted by the Bank of England/NMG. The experiment involves four distinct modules:

1. Prior elicitation: expected 1y price growth (probabilistic).
2. Information treatment: 4 equally sized groups - 3 groups receive quantitative & qualitative information about professional forecasters' expectations & disagreement, 1 control group.
3. Posterior elicitation: expected 1y inflation (probabilistic).
4. Expectation elicitation: planned spending, expected income, perceived job loss risk, expected interest rate, expected 5y inflation.

The Information Treatments

Level treatment: ***Professional forecasters expect lower inflation*** *than one year ago. The average forecast for inflation over the next year is 2 percent.*

Uncertainty treatment: ***Professional forecasters are less uncertain about inflation*** *than one year ago. The highest forecast for inflation over the next year is 2.1 percentage points higher than the lowest forecast.*

Joint treatment: ***Professional forecasters expect lower inflation*** *than one year ago. The average forecast for inflation over the next year is 2 percent.* ***Professional forecasters are also less uncertain about inflation*** *than one year ago. The highest forecast for inflation over the next year is 2.1 percentage points higher than the lowest forecast.*

The Treatment Effects

Information treatments successfully move posterior expectations (downwards)

Table 1. Treatment Effect on **Expected Inflation**

	(1) $\hat{\mathbb{E}}^{post}_{i,t}\pi_{t+1}$ b/se
$\hat{\mathbb{E}}^{prior}_{i,t}\pi_{t+1}$	0.68***
	(0.02)
Level Treatment $\times\hat{\mathbb{E}}^{prior}_{t}\pi_{t+1}$	-0.27***
	(0.03)
Uncertainty Treatment $\times\hat{\mathbb{E}}^{prior}_{i,t}\pi_{t+1}$	-0.14***
	(0.03)
Joint Treatment $\times\hat{\mathbb{E}}^{prior}_{i,t}\pi_{t+1}$	-0.31***
	(0.02)
R^2	0.532
N	4,273

Table 2. Treatment Effect on **Inflation Uncertainty**

	(1) $\hat{\mathbb{E}}^{post}_{i,t}\sigma_{\pi_{t+1}}$ b/se
$\hat{\mathbb{E}}^{prior}_{i,t}\sigma_{\pi_{t+1}}$	0.95***
	(0.01)
Level Treatment $\times\hat{\mathbb{E}}^{prior}_{i,t}\sigma_{\pi_{t+1}}$	-0.05***
	(0.02)
Uncertainty Treatment $\times\hat{\mathbb{E}}^{prior}_{i,t}\sigma_{\pi_{t+1}}$	-0.09***
	(0.02)
Joint Treatment $\times\hat{\mathbb{E}}^{prior}_{i,t}\sigma_{\pi_{t+1}}$	-0.10***
	(0.02)
R^2	0.853
N	4,179

Pass-through Between First and Second Moments

Does inflation uncertainty affect expected inflation? We estimate the effect of the uncertainty treatment relative to the control group as

$$\hat{\mathbb{E}}^{post}_{i,t}\pi_{t+1} = a_0 + b_1\hat{\mathbb{E}}^{post}_{i,t}\sigma_{\pi_{t+1}} + b_2\hat{\mathbb{E}}^{prior}_{i,t}\sigma_{\pi_{t+1}} + b_3\hat{\mathbb{E}}^{prior}_{i,t}\pi_{t+1} + \varepsilon_i$$

and instrument posterior uncertainty with an uncertainty treatment dummy & treatment dummy $\times$ prior uncertainty.

Table 3. Pass-through between expected inflation and inflation uncertainty

	(1) $\hat{\mathbb{E}}^{post}_{i,t}\sigma_{\pi_{t+1}}$ b/se	(2) $\hat{\mathbb{E}}^{post}_{i,t}\pi_{t+1}$ b/se
$\hat{\mathbb{E}}^{post}_{i,t}\pi_{t+1}$	0.08***	
	(0.02)	
$\hat{\mathbb{E}}^{post}_{i,t}\sigma_{\pi_{t+1}}$		0.75**
		(0.32)
1st-stage F-stat	108.531	19.727
N	2,302	2,291

Higher inflation uncertainty causes a significant *increase* in expected inflation (and vice versa, as suggested by Friedman, 1977).

Estimating the Response of Spending & Income

Estimate the effect of inflation uncertainty on planned spending & income as:

$$\hat{\mathbb{E}}_{i,t}\ln C_{i,t+1} = \alpha_0 + \beta_1\hat{\mathbb{E}}^{post}_{i,t}\pi_{t+1} + \beta_2\hat{\mathbb{E}}^{post}_{i,t}\sigma_{\pi_{t+1}} + \Gamma\mathbf{X}_{i,t} + \epsilon_i$$

where

- posterior expectations are instrumented with treatment dummies & treatment dummies $\times$ prior expectations,
- $\mathbf{X}_{i,t}$ contains: prior inflation expectations, prior inflation uncertainty, education level, age, sex, household size, liquidity status, log annual income, and perceived inflation.

Two-step estimation procedure following Coibion et al. (2024)

- Estimate first stage using Huber regression with survey weights,
- Estimate weighted IV regression, eliminating outliers with jackknife.

Table 4. Treatment Effect on Expected Income & Spending

	(1) $\ln\hat{\mathbb{E}}_{i,t}Y_{i,t+1}$ b/se	(2) $\ln\hat{\mathbb{E}}_{i,t}C_{i,t+1}$ b/se
$\hat{\mathbb{E}}^{post}_{i,t}\pi_{t+1}$	0.25**	2.02
	(0.11)	(2.12)
$\hat{\mathbb{E}}^{post}_{i,t}\sigma_{\pi_{t+1}}$	-0.56**	-20.14***
	(0.22)	(7.67)
F-stat (mean)	16.275	13.016
F-stat (unc)	10.061	6.560
95% CI (mean)	[0.06, 0.44]	[-1.70, 7.40]
95% CI (unc)	[-1.03, -0.17]	[-39.37, -6.82]
N	3,228	1,994

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. 95% CI refers to weak-instrument robust confidence intervals (in square brackets) for the respective variable constructed using conditional likelihood estimation.

Higher inflation uncertainty causes lower expected income and much lower planned spending

Drivers

An *increase* in uncertainty about one-year ahead inflation also causes:

- higher income uncertainty and perceived risk of job loss,
- higher expected nominal (but not real) interest rates,

Furthermore, the consumption response is

- robust to controlling for expected income & interest rates,
- robust to different measures of uncertainty,
- but not robust to controlling for income uncertainty.

Higher inflation uncertainty increases precautionary savings because it reflects uncertainty about adverse supply shocks (or the central bank's reaction).

The Usual Disclaimer & References

The views expressed here are those of the authors and do not necessarily reflect the official position(s) of the Bundesbank, the Eurosystem, the Bank of England or its committees.

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