

# The Effect of Inflation Uncertainty on Household Spending

Johannes J. FISCHER [Deutsche Bundesbank]; Christoph HERLER; [Bank of England]; Philip SCHNATTINGER [Bank of England]

## 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:

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

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

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

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

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

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

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)<br>$\hat{\mathbb{E}}_{i,t}^{post} \sigma_{\pi_{t+1}}$<br>b/se | (2)<br>$\hat{\mathbb{E}}_{i,t}^{post} \pi_{t+1}$<br>b/se |
|----------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------|
| $\hat{\mathbb{E}}_{i,t}^{post} \pi_{t+1}$          | 0.08***<br>(0.02)                                                 |                                                          |
| $\hat{\mathbb{E}}_{i,t}^{post} \sigma_{\pi_{t+1}}$ |                                                                   | 0.75**<br>(0.32)                                         |
| 1 <sup>st</sup> -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:

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

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)<br>$\ln \hat{\mathbb{E}}_{i,t} Y_{i,t+1}$<br>b/se | (2)<br>$\ln \hat{\mathbb{E}}_{i,t} C_{i,t+1}$<br>b/se |
|----------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| $\hat{\mathbb{E}}_{i,t}^{post} \pi_{t+1}$          | 0.25**<br>(0.11)                                      | 2.02<br>(2.12)                                        |
| $\hat{\mathbb{E}}_{i,t}^{post} \sigma_{\pi_{t+1}}$ | -0.56**<br>(0.22)                                     | -20.14***<br>(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.

## 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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