State-Dependent Sticky Expectations: Evidence and Theory*

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Abstract

We document novel stylized facts regarding updating of households' inflation expectations. Using two RCTs where signals in the form of professional's inflation forecasts have different perceived levels of precision, we show that households' react more to information with higher levels of precision, in line with Bayesian updating. However, in contrast to Bayesian updating, they respond differently to these signals in the decision to update expectations (extensive margin) and not in the size of the adjustment (intensive margin). The extensive margin also displays a pronounced asymmetry: Households more frequently update their expectations when the signal is above the prior compared to when the signal is below the prior. We propose a model where households' inflation expectations exhibit state-dependent inattentiveness to inflation signals. In times of high uncertainty elevated inflation expectations may persist due to the increased information processing costs of uncertain inflation signals and relatively smaller welfare losses of not adjusting expectations when signals are below priors (disinflations) compared to when signals are above priors (accelerating inflation).

Motivation

"Once consumers took notice of rising inflation, their inflation perceptions responded quickly but reduced more sluggishly when inflation started to fall." Christine Lagarde, ECB's President, March 12, 2025.

- How do households update their inflation expectations?
- Bayesian updating vs. rational inattention
- Implications for the inflation dynamics

RCTs and two new stylized facts

- Two different RCTs, conducted using households in the U.S (December 2022) and in Germany using BOP-HH (July 2023)
- We provided information about professional's inflation forecasts with different perceived levels of precision

→ Households update their beliefs less often when receiving an uncertain signal in RCTs

→ They update them asymmetrically depending on the position of the signal

Extensive margin matters!

	Overall		Extensive		Intensive	
	(1)	(2)	(3)	(4)	(5)	(6)
π^e_{prior}	0.7299***	0.9846***	-0.0003	-0.0140***	0.2149***	0.4559***
	(0.0159)	(0.0063)	(0.0022)	(0.0039)	(0.0139)	(0.0701)
Mean Only	-1.8307***	1.1757***	0.4641***	0.3075***	0.1968	1.2801***
	(0.1823)	(0.1878)	(0.0371)	(0.0685)	(0.2765)	(0.4029)
Large Band	-1.2101***	0.1210	0.2582***	0.0721	0.2030	1.8714***
	(0.1796)	(0.1192)	(0.0372)	(0.0678)	(0.2984)	(0.4306)
Small Band	-1.6819***	1.7791***	0.4646***	0.2887***	0.3671	1.6181***
	(0.1883)	(0.2227)	(0.0370)	(0.0671)	(0.2734)	(0.3984)
Placebo	-0.3457**	-0.1745*	0.1171***	0.0746	-0.7907**	-0.4253
	(0.1645)	(0.1028)	(0.0335)	(0.0639)	(0.3309)	(0.4629)
Mean Only $\times\pi^e_{prior}$		-0.3659***		0.0194***		-0.2456***
		(0.0367)		(0.0063)		(0.0740)
L. Band $\times\pi^e_{prior}$		-0.0324**		0.0223***		-0.3296***
		(0.0139)		(0.0063)		(0.0748)
Sm. Band $\times\pi^e_{prior}$		-0.4827***		0.0220***		-0.2681***
		(0.0423)		(0.0062)		(0.0740)
Placebo $\times\pi^e_{prior}$		0.0082		0.0042		0.0647
		(0.0096)		(0.0061)		(0.0849)
Constant	2.3644***	0.1577	0.0180	0.1092	1.4535	1.0651
	(0.6030)	(0.2304)	(0.0980)	(0.1034)	(0.9189)	(0.9595)
N	1605	1467	1609	1609	727	733
R^2	0.720	0.935	0.182	0.197	0.364	0.414

Asymmetries in the extensive margin

	Overall		Extensive		Intensive	
	Above	Below	Above	Below	Above	Below
	(1)	(2)	(3)	(4)	(5)	(6)
$\lvert\pi^e_{t\lvert t-1} - z_t\rvert$	0.2631***	-0.5513***	0.0200***	0.1602***	0.1016***	-0.5322***
	(0.0237)	(0.0600)	(0.0036)	(0.0261)	(0.0194)	(0.0871)
Large Band	0.6884***	0.0318	-0.2365***	-0.0495	0.1852	0.2203
	(0.2293)	(0.1362)	(0.0465)	(0.0786)	(0.2140)	(0.2253)
Small Band	-0.0260	0.6114***	-0.0102	0.0712	0.0882	0.9216***
	(0.2073)	(0.1674)	(0.0477)	(0.0704)	(0.1648)	(0.2547)
Constant	3.6919***	1.7487***	0.3180*	-0.3313	3.3323***	1.4404
	(1.0530)	(0.5602)	(0.1652)	(0.2399)	(0.5491)	(0.9398)
N	723	240	733	244	415	145
R^2	0.195	0.399	0.133	0.261	0.104	0.331

- RCT results imply the extensive margin drives the results
- Households more frequently update their expectations when the signal is above the prior compared to when the signal is below the prior
- How can we model the extensive margin?

Modeling the extensive margin

A rational inattention model with the extensive margin where processing information and updating beliefs is costly.

- Optimal information policy similar to Woodford (2008), Morales-Jimenez and Stevens (2025)
- Given prior belief π^e and wealth a, household chooses random binary signal to update beliefs $\Lambda(\pi^e, a)$ subject to information cost:

$$\theta D\left(\Lambda(\pi^e, a)\,||\,\bar{\Lambda}\right)$$

- Information problem: $V_\Lambda(\pi^e, a) = \max_\Lambda \left\{\Lambda(V(\pi') - \kappa) + (1-\Lambda)V(\pi^e) - \theta D(\Lambda||\bar{\Lambda})\right\}$
- Probability of updating is an increasing function of $|\pi^e - \pi'|$
- Information cost and reference distribution $\bar{\Lambda}$ can be associated with a signal precision

Example: 2-period rational inattention model

Given π^e, the household chooses consumption c and assets a':

$$\max_{c,a'} \frac{c^{1-\sigma}}{1-\sigma} + \beta\frac{\tilde{c}^{1-\sigma}}{1-\sigma} \text{ s.t. } c + a' = w;\;\; (1+\pi^e)\tilde{c} = w + (1+i)a';\;\; a' \geq -\frac{w}{1+i}. \tag{1}$$

Value from their consumption-savings choice given prior π^e

$$V(\pi^e) = \frac{c^{1-\sigma}}{1-\sigma} + \beta\frac{(c')^{1-\sigma}}{1-\sigma}, \tag{2}$$

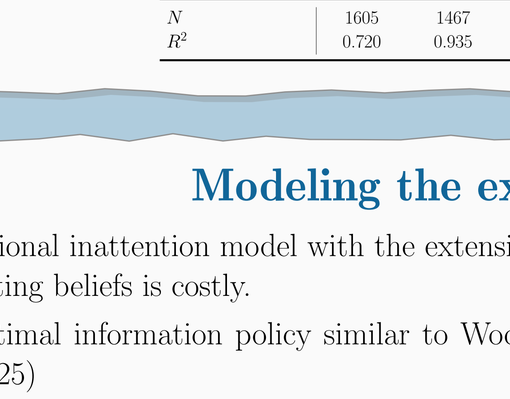
where c solves (1) and

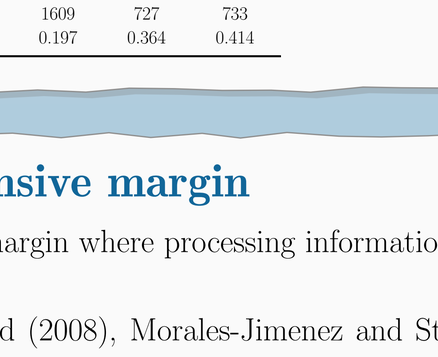
$$c' = \frac{(1+i)(w-c) + w}{1+\pi'}.$$

Optimality condition for Λ:

$$\Lambda(\pi^e) = \frac{\frac{\bar{\Lambda}}{1-\bar{\Lambda}}\exp\left\{\frac{1}{\theta}\left[V(\pi') - \kappa - V(\pi^e)\right]\right\}}{1 + \frac{\bar{\Lambda}}{1-\bar{\Lambda}}\exp\left\{\frac{1}{\theta}\left[V(\pi') - \kappa - V(\pi^e)\right]\right\}}. \tag{3}$$

Asymmetries in the probability of updating expectations



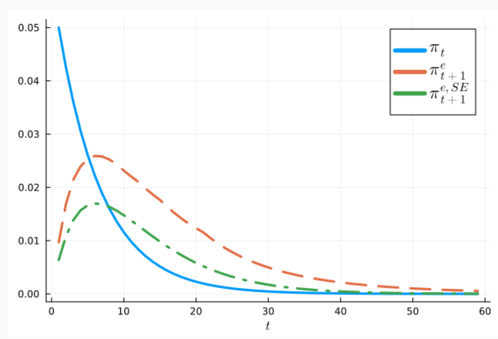


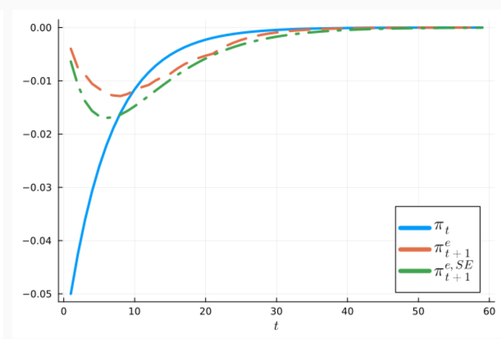
Note: The left-hand panel displays the updating in the 2-period model and the right-hand panel displays the updating in the infinite horizon model.

State-dependent inattentiveness and the "last half mile"

The intuition behind asymmetries:

- The welfare loss from over consuming due to too low inflation expectations is higher than the loss from under consuming due to higher inflation expectations.
- Alternative explanation for the "last half mile" effect after a surge in inflation





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