Selective Inattention

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Motivation

- Ample evidence that household expectations ≠ full information rational expectations
  - Deviations from FI: e.g. infrequent updating (Coibion & Gorodnichenko 2012, 2015)
  - Deviations from RE: e.g. overreaction to recent news (Bordalo et al. 2019, 2020)

- Conclusion: on average, households are very uninformed about macro variables

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- Conclusion: on average, households are very uninformed about macro variables
- However, average beliefs might not be the only relevant object
- Example: macro beliefs most relevant for infrequent decisions (e.g. buying a house)
  - ✓ These decisions are also important drivers of macroeconomic aggregates

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⇒ Beliefs of decision-makers might matter, in addition to average beliefs

This paper

- **Our questions**:
  1. How do "big" decisions affect patterns in households' information acquisition (IA)?
  2. Do these IA patterns translate into macroeconomic expectations?
  3. What are the implications for the propagation of macro shocks?

- Focus on two types of **durables** decisions: buying a house + buying a car
  - *Micro*: some of the most important macro-dependent HH decisions
  - *Macro*: important drivers of consumption over the business cycle

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- Challenge: how to identify "decision-makers" + their info. acquisition & beliefs?

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- **What we do**:
  1. Conduct a new survey to identify IA and beliefs around durables adjustments
  2. Study IA in an incomplete markets model calibrated using survey evidence
  3. Use the model as a laboratory to study implications for IRFs to macro shocks

Main results

1. Macro IA is concentrates in timing and frequency around durables decisions
   - IA is primarily about to current values of decision-relevant variables
2. Increased IA around durables decisions $\Rightarrow \uparrow$ accuracy of macro beliefs
   - ~35% reduction in nowcast *and* forecast errors
3. In response to interest rate shocks, the selective inattention in the data implies
   - Dampened responses of average beliefs, like with exogenous inattention
   - Dampened responses of non-durable consumption, like with exogenous inattention
   - Responses of durable (and total) consumption **close to FIRE case**
   - Asymmetric effects due to interaction with long-term debt (not today)

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$\Rightarrow$ Impact of micro-level inattention for macro can be small when choices are infrequent

Related literature

- Subjective household expectations → *Tie beliefs to durables decisions*
  - Coibion & Gorodnichenko (2012, 2015), Gabaix (2019), Weber & al. (2022, 2023), D'Acunto & al. (2023, 2024)

Related literature

- Subjective household expectations → *Tie beliefs to durables decisions*
- Information acquisition in the field → *Focus on differences around decisions*
  - Coibion & al. (2018), Capozza & al. (2021), Link & al. (2023, 2024), Roth & al. (2022, 2024), Pfajar & Winkler (2024)

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- Subjective household expectations → *Tie beliefs to durables decisions*
- Information acquisition in the field → *Focus on differences around decisions*
- Models of durable adjustments → *Enrich with dynamic information acquisition*
  - Caballero (1990, 1993), Berger & Vavra (2015), Cui & al. (2017), Berger & al. (2018), McKay & Wieland (2021, 2022), Gavazza & Lanteri (2021), Beraja & Zorzi (2024)

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- Rational inattention → *Nest in model with durable and non-durable consumption*
  - Woodford (2001), Sims (2003), Mackowiak & Wiederholt (2009) Zhong (2022), Hebert & Woodford (2023), Mackowiak & al. (2023), Afrouzi & al. (2024), Ahn & al. (2024)

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- Rational inattention → *Nest in model with durable and non-durable consumption*
- Inattention & sticky info as a source of macro sluggishness → *Impact is much smaller in lumpy adjustment models*
  - Gabaix & Laibson (2001), Mankiw & Reis (2002), Alvarez & al. (2011, 2013), Carroll & al. (2020), Auclert & al. (2020), McKay & Wieland (2021)

Plan

Survey description (brief)

We design and conduct a cross-sectional survey of U.S. households via Lucid

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Survey innovations

- Direct measure of households' distance from durable adjustments
  - Primary home purchase
  - Car purchases
- Elicit measures of information acquisition other than forecasting performance
  - Coibion et al. 2018, Roth et al. 2022
- Note: both absent in existing surveys (e.g. SCE, Michigan Survey of Consumers)

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Main blocks

1. Home decision-making: expected distance from purchase & actions taken in preparation

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Main blocks

1. Home decision-making
2. Other decisions: distance from car purchase & other major financial decisions

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Main blocks

1. Home decision-making
2. Other decisions
3. Information acquisition: amount of macro info searched & demand for expert info

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Main blocks

1. Home decision-making
2. Other decisions
3. Information acquisition
4. Macro expectations: beliefs about interest rates and inflation

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2. Other decisions
3. Information acquisition
4. Macro expectations
5. Background & financial situation: household's balance-sheet using short version of SCF

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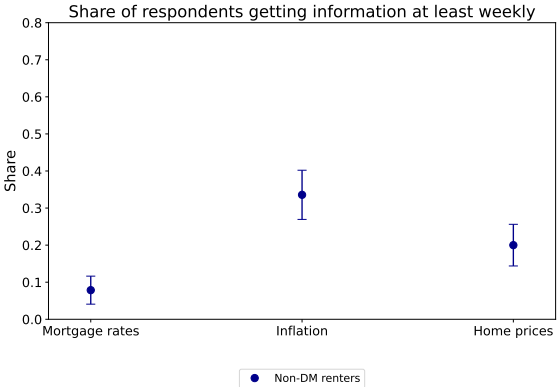
1. Home decision-making
2. Other decisions
3. Information acquisition
4. Macro expectations
5. Background & financial situation

Today: results from a pilot, full-sample collection ongoing

Frequency of macro IA depends on decision-making stage



- **Non-DM renters**: no intention to buy a house within 5 years

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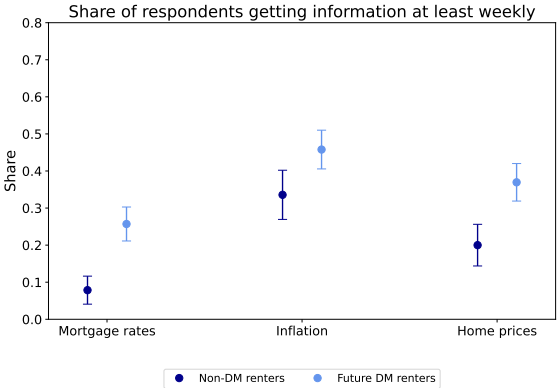

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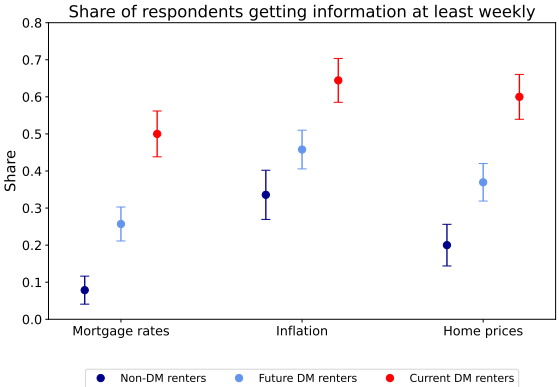
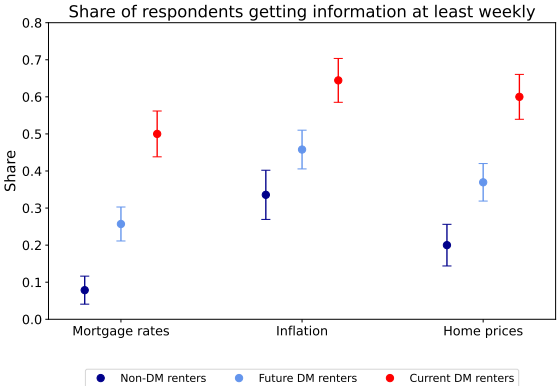
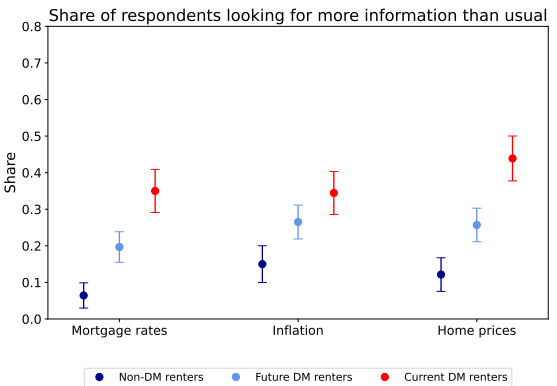


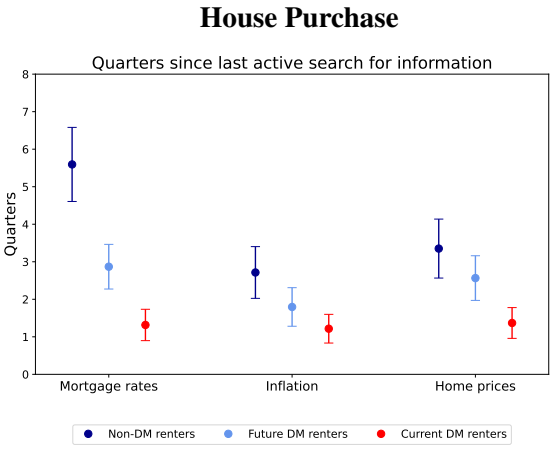
- **Non-DM renters**: no intention to buy a house within 5 years
- **Future DM renters**: intend to buy a house in 2-5 years
- **Current DM renters**: intend to buy within 2 years (or currently buying)

Frequency of macro IA depends on decision-making stage





Timing of macro IA is concentrated around decision-making stage



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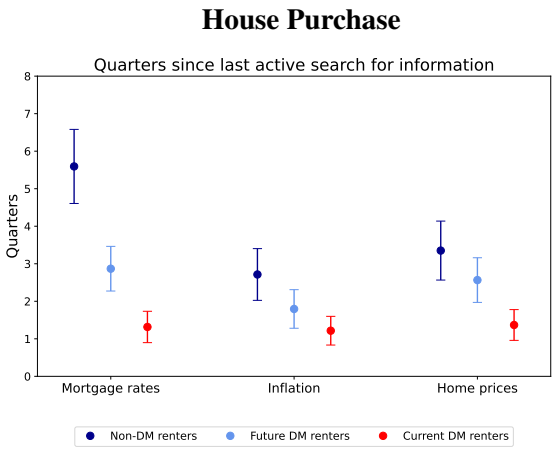
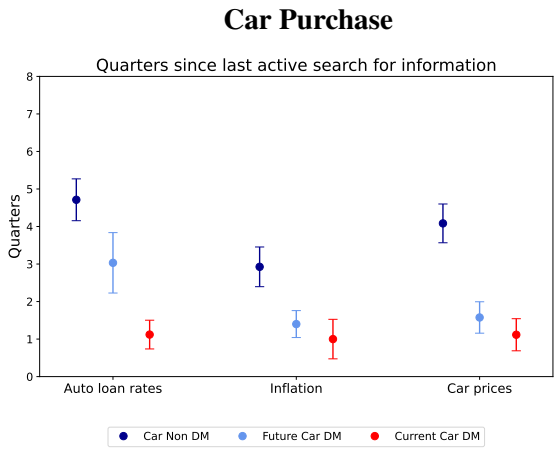
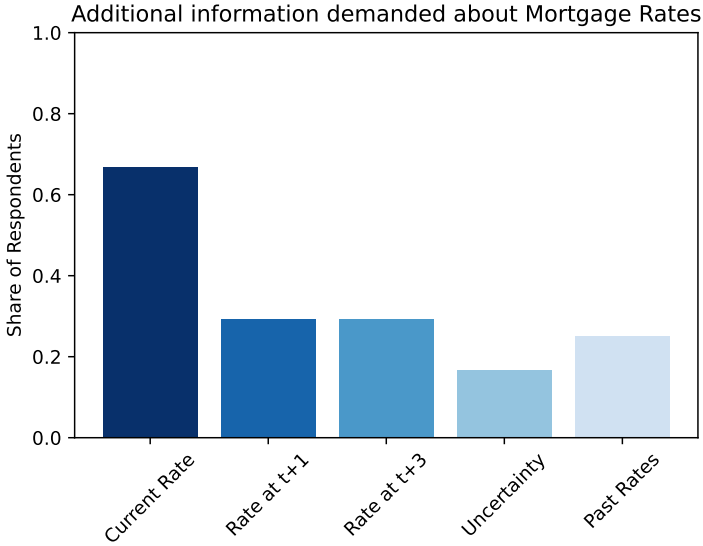




Macro IA is primarily about current values of variables



Endogeneity of decision-making and beliefs

- Concern: decision-making is endogenous to macro beliefs
- Solution: IV = changes in family composition + job relocations
  - ✓ Likely to be influenced by factors other than macro beliefs

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	(1)	(2)	(3)	(4)
	Mortgage rates weekly		Mortgage rates more	
Current DM	0.31***	0.61***	0.20***	0.36**
	(0.04)	(0.20)	(0.04)	(0.18)
Estimator	OLS	IV	OLS	IV
Observations	569	569	569	569
Controls	Yes	Yes	Yes	Yes

▸ Open-Ended

Macro beliefs more accurate as decision-making approaches

Our Survey

	(1)	(2)
	Nowcast error rates	Forecast error rates
Future DM	-1.30	-1.79
	(1.37)	(1.42)
Current DM	-3.64**	-4.87***
	(1.52)	(1.64)
Observations	496	496
R^2	0.25	0.25
Controls	Yes	Yes

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NY Fed SCE

	(1) Nowcast error rates	(2) Forecast error rates
Future DM	-0.63	-0.66
	(0.54)	(0.55)
Current DM	-2.61***	-2.86***
	(0.57)	(0.57)
Observations	8839	8839
R^2	0.14	0.15
Controls	Yes	Yes

Taking stock

As households get closer to durable choices

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$$\Downarrow$$

Macro information is acquired more frequently

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Macro beliefs become more accurate

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?

Plan

Model setup

$$\underbrace{\text{Partial equilibrium incomplete-markets durables model}}_{\text{McKay \& Wieland 21}} + \underbrace{\text{dynamic info. acquisition}}_{\approx \text{ rational inattention}}$$

Model setup

Partial equilibrium incomplete-markets durables model + dynamic info. acquisition

Durable adjustments

Given beliefs, households choose non-durable c
and durable consumption d subject to:

- Idiosyncratic income risk
- Stochastic one-period interest rate r
- Depreciation and maintenance costs
- Durables adjustment costs
- Match-quality shocks

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Endogenous (S,s) adjustments + exogenous
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Endogenous (S,s) adjustments + exogenous match-quality adjustments

Information acquisition

Households have imperfect information about current r and receive a signal of endogenous precision each period

- Cost of signal = $\omega \times$ mutual info.
- Benefit of signal = better choice of (c, d)
- Interest rate follows AR(1) $\Rightarrow$ prior mean and variance are state variables

$\Downarrow$

Dynamic info. acquisition with normal signals (special case of RI)

Household problem, given beliefs

- Belief wedges that lead to suboptimal $\mathbf{c}$ and $\mathbf{d}'$:

$$\Delta_b = b\left[\exp \widehat{\mathbf{E}}(r) - \exp(r)\right], \quad \Delta_r = \rho_r\left[\widehat{\mathbf{E}}(r) - r\right]$$

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- Given beliefs, households solve

$$\mathbf{c}, \mathbf{d}' = \underset{c,d'}{\arg\max}\, U(c, s(d')) + \beta \cdot \mathbf{E}\left[V\left(b' + \Delta_b, d', r' + \Delta_r, y', \xi', \mu', \Sigma'\right)\right]$$

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$$c + b' = y + \exp(r)b - A(d, d')$$

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$$b' + \min\{\Delta_b, 0\} \geq 0$$

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$$c + b' = y + \exp(r)b - A(d, d')$$

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$$A(d, d') = \begin{cases} d' - \underbrace{(1-\delta)d}_{\text{depreciation}} + \underbrace{F_d d}_{\text{fixed cost}} & \text{if } d' \neq (1 - \delta(1-\chi))d \\ \underbrace{\delta\chi d}_{\text{maintenance costs}} & \text{else} \end{cases}$$

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$$s(d') = \xi \times \mathbf{1}_{d'=(1-\delta(1-\chi))d}, \quad \xi \sim \text{Bern}(1-\overline{\xi}) = \text{match-quality shock}$$

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- $\log y$ and r follow AR1 processes
  - Households know DGPs $\Rightarrow$ imperfect information only about **current** rate

Information acquisition problem to determine beliefs

- Households prior from previous period: $r \sim N(\mu, \Sigma)$

Information acquisition problem to determine beliefs

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- Choose variance of noisy *Gaussian* signal, anticipating choices of **c** and **d′**

$$V(b, d, r, y, \xi, \mu, \Sigma) = \max_{\Sigma_s} \mathbf{E}\left[U(\mathbf{c}, s(\mathbf{d}')) + \beta V\left(b', \mathbf{d}', r', y', \xi', \mu', \Sigma'\right)\right]$$

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$$G = \frac{\Sigma}{\Sigma + \Sigma_s}$$

$$\widehat{\mathbf{E}}(r) = (1-G)\mu + G(r+s), \quad s \sim N(0, \Sigma_s)$$

$$\mu' = (1-\rho_r)\bar{r} + \rho_r \widehat{\mathbf{E}}(r)$$

$$\Sigma' = \rho_r^2 \Sigma (1-G) + \sigma_\eta^2$$

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$$G = \frac{\Sigma}{\Sigma + \Sigma_s}$$

$$\widehat{\mathbf{E}}(r) = (1 - G)\mu + G\left(r + s\right), \quad s \sim N(0, \Sigma_s)$$

$$\mu' = (1 - \rho_r)\bar{r} + \rho_r \widehat{\mathbf{E}}(r)$$

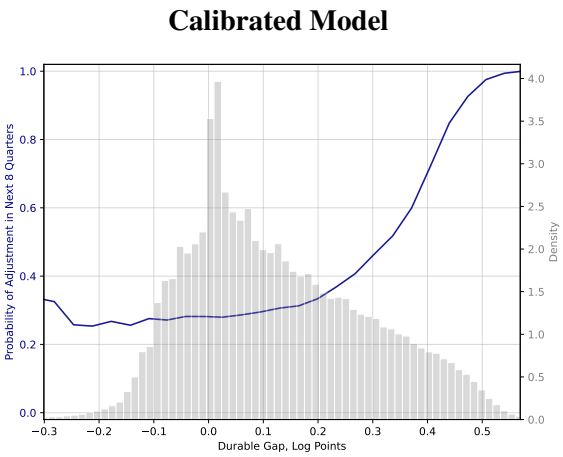
$$\Sigma' = \rho_r^2 \Sigma (1 - G) + \sigma_\eta^2$$

- $\mathbf{c}, \mathbf{d}'$ maximize: $U(c, s(d')) + \beta \cdot \mathbf{E}\left[V\left(b' + \Delta_b, d', r' + \Delta_r, y', \xi', \mu', \Sigma'\right)\right]$
  - Benefit of $\downarrow \Sigma_s \Rightarrow \Delta_b, \Delta_r \to 0$ smaller utility loss from $\mathbf{c}, \mathbf{d}'$

Calibrated parameters

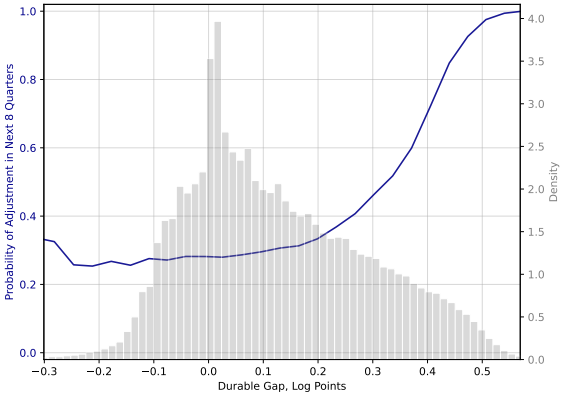
Parameter	Description	Value	Source
Internally-Calibrated			
β	Discount factor	0.9827	Net Assets/GDP = 0.87
ψ	Non-durables exponent	0.624	d/c ratio = 2.64
F_d	Fixed cost	0.11	Quarterly adjustment probability = 0.0475
$\overline{\xi}$	Match-quality probability	0.035	Fraction of adjustments due to MQ = 0.75
ω	Information cost	$10^{-4.098}$	Average forecast error of DMs
Externally-Calibrated			
σ	Inverse EIS	2	
ρ	Durables elasticity of substitution	0.5	McKay & Wieland (2021)
δ	Depreciation rate	0.017	McKay & Wieland (2021)
χ	Maintenance share	0.35	McKay & Wieland (2021)
ρ	Income persistence	0.91	Floden and Lindé (2001)
σ_ϵ	Income shock std. dev.	0.216	Floden and Lindé (2001)
μ	Real rate mean	0.0143	10-Year Treasury
ρ_r	Real rate persistence	0.979	10-Year Treasury
σ_η	Real rate shock std. dev.	0.0014	10-Year Treasury

Adjustment probability as a function of durables gap

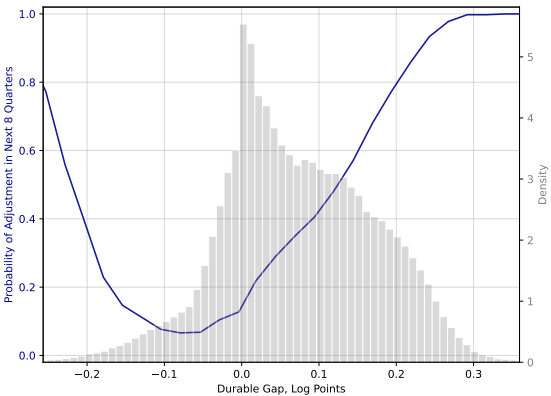


Adjustment probability as a function of durables gap

Calibrated Model



No Match-Quality Shocks



Calibrating information cost

Two options:

1. Use forecast errors of decision-makers (today)
   - Benefit: directly measured
   - Cost #1: FEs of DMs in model sensitive to exact timing
   - Cost #2: in data, forecasts have "behavioral" elements absent from model

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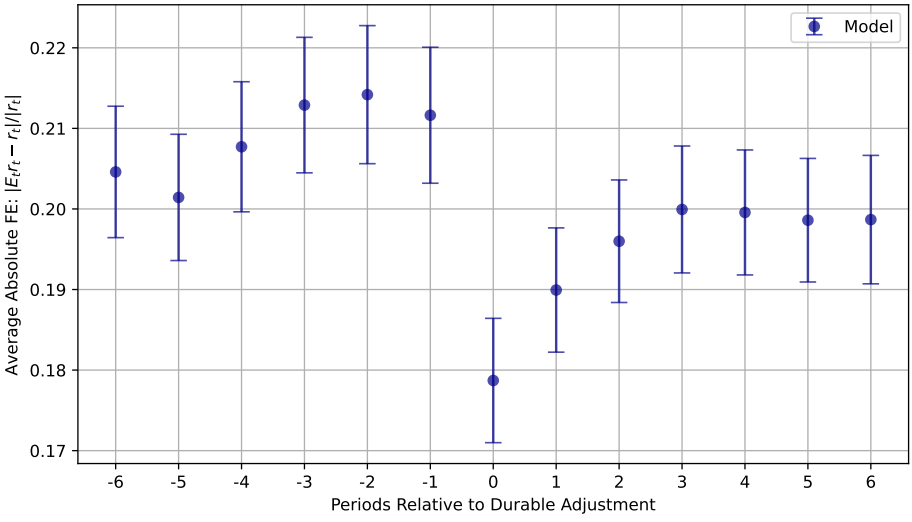
Example question (in progress): Economists and professional forecasters frequently publish special reports providing insights on current and future interest rates in the United States. These reports include exclusive interviews with experts, unique model predictions, and detailed forecasts for interest rates, such as mortgage and auto loan rates. Generally, these reports are not publicly available and require a fee for access.

How much would you be willing to pay today to access one of these special reports with information on current and future interest rates in the U.S.? [Incentivized price list]

Forecast errors around durables choices



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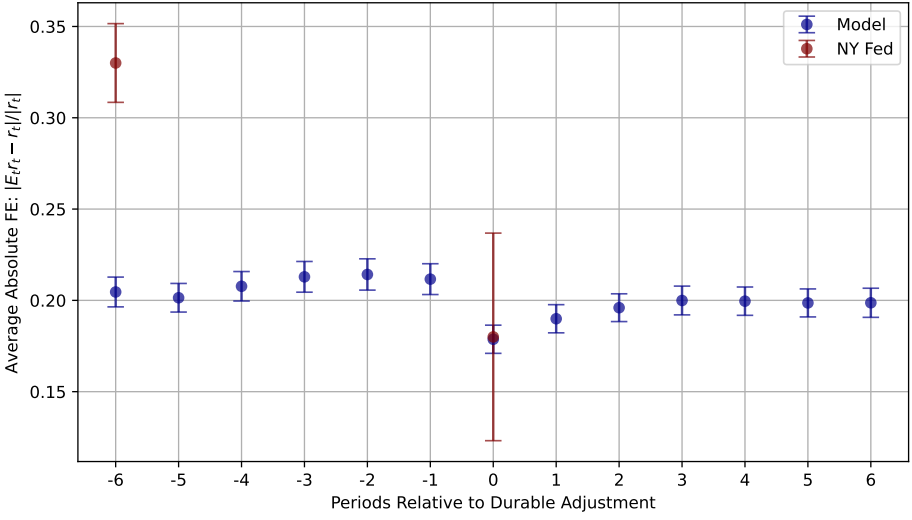

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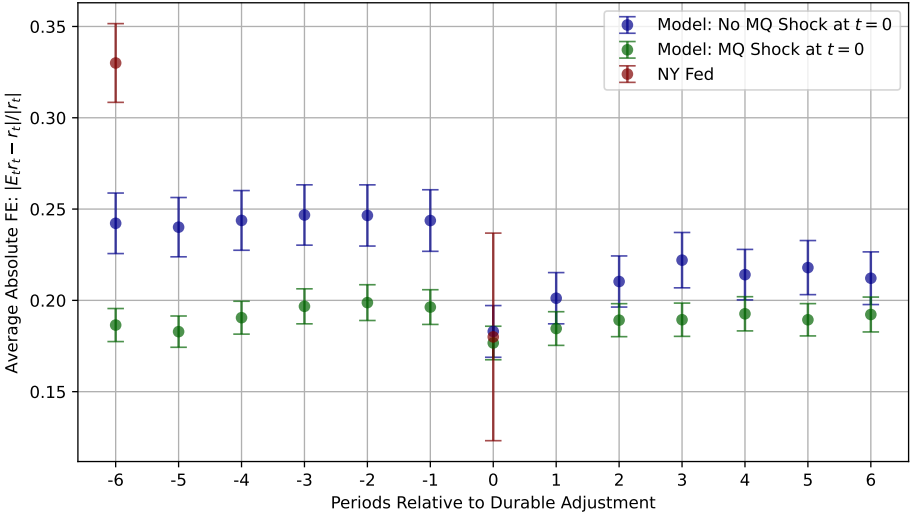

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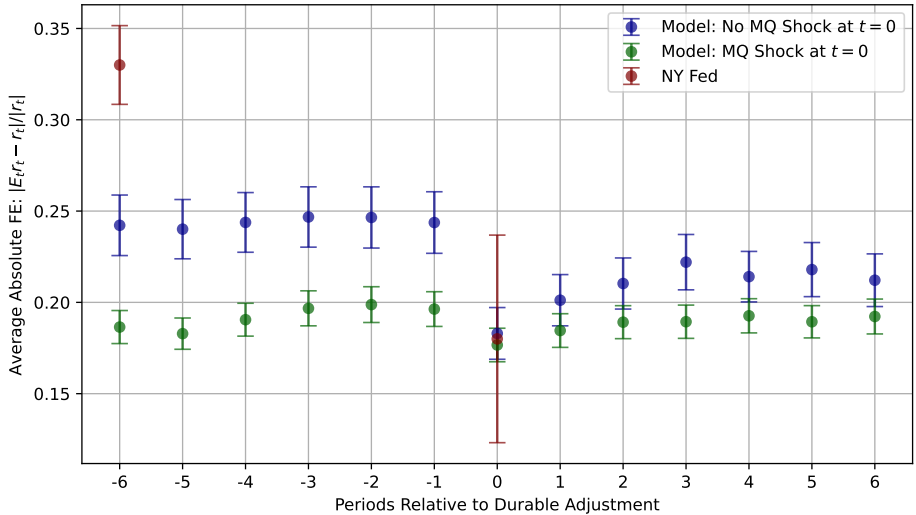
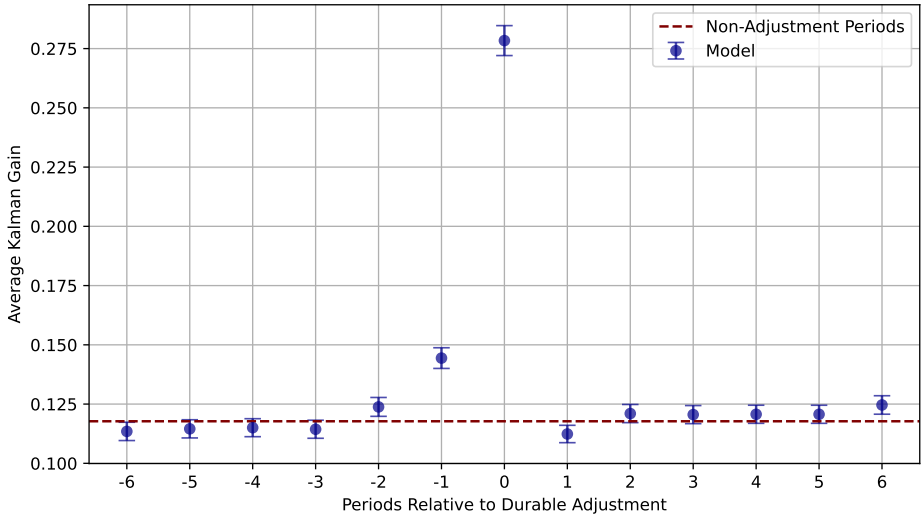
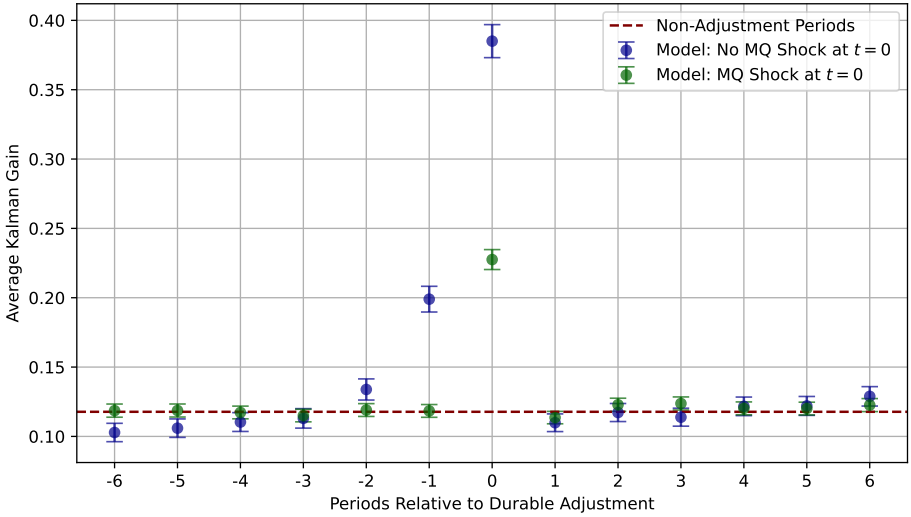


Options to improve fit: cost function = $\omega \log(1 - G)^{\kappa}$, biases in expectations, ...?

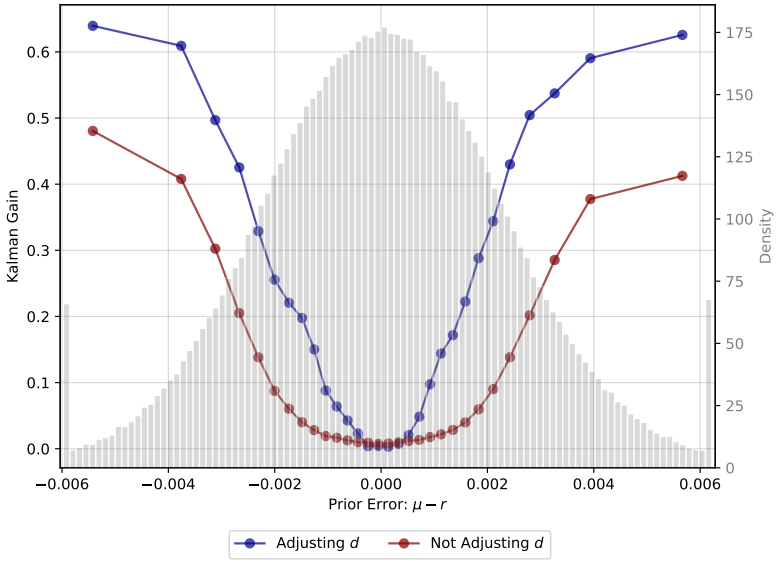
Information acquisition around durables choices



Information acquisition around durables choices



Information acquisition as a function of prior beliefs



Plan

Interest rate shock experiment

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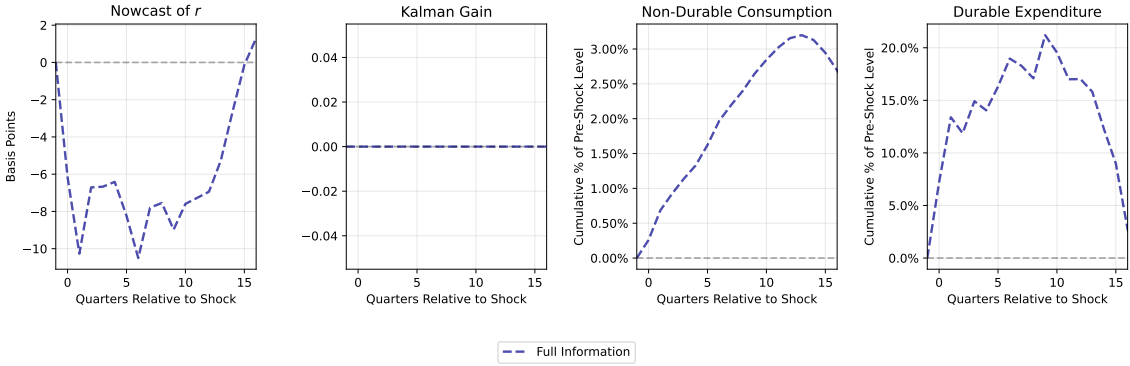
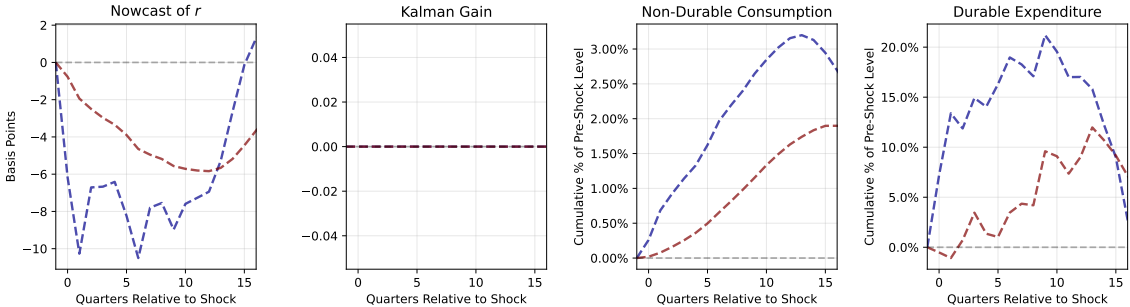
- Consider three models:
  1. Full information: $\omega = 0$
  2. Calibrated model with selective inattention
  3. Exogenous information: fix $G \approx 0.12$ = average in calibrated model
     - Matches commonly targeted evidence in Coibion & Gorodnichenko (2012)

Impulse responses to an interest rate shock



Impulse responses to an interest rate shock



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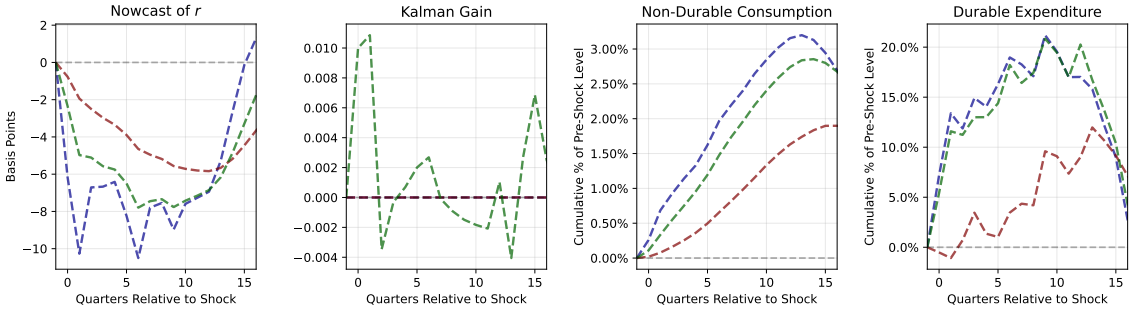

Adding long-term debt

- Extension in progress: durables financed with interest-only long-term debt
- This creates scope for **asymmetric** effects of interest rate changes
  1. $\downarrow r \Rightarrow$ effects similar to baseline model
  2. $\uparrow r \Rightarrow$ **fewer** durables adjustments because of more expensive financing ("lock-in") $\Rightarrow \downarrow$ information acquisition $\Rightarrow$ smaller passthrough to non-durable consumption
- 2. is one way of understanding the relatively small effects of recent rate increases

Plan

Conclusion

- Households are **selectively inattentive**:
  - They concentrate macro IA around big decisions, where macro beliefs are more accurate
- Information acquisition patterns in the data imply a shock propagation similar to full information case
  - Sluggish average beliefs $\not\Rightarrow$ sluggish macro propagation...
  - ... especially in contexts where choices are lumpy and infrequent

Conclusion

- Households are **selectively inattentive**:
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- Information acquisition patterns in the data imply a shock propagation similar to full information case
  - Sluggish average beliefs $\not\Rightarrow$ sluggish macro propagation...
  - ... especially in contexts where choices are lumpy and infrequent
- More generally, impact of micro-level inattention on macro aggregates can be small
  - Echoes finding by Afrouzi, Flynn & Yang 2024: firms are generally inattentive, *except* for those resetting their prices
- **Takeaway**: Beliefs of decision-makers matter, in addition to cross-sectional averages

Thank You!

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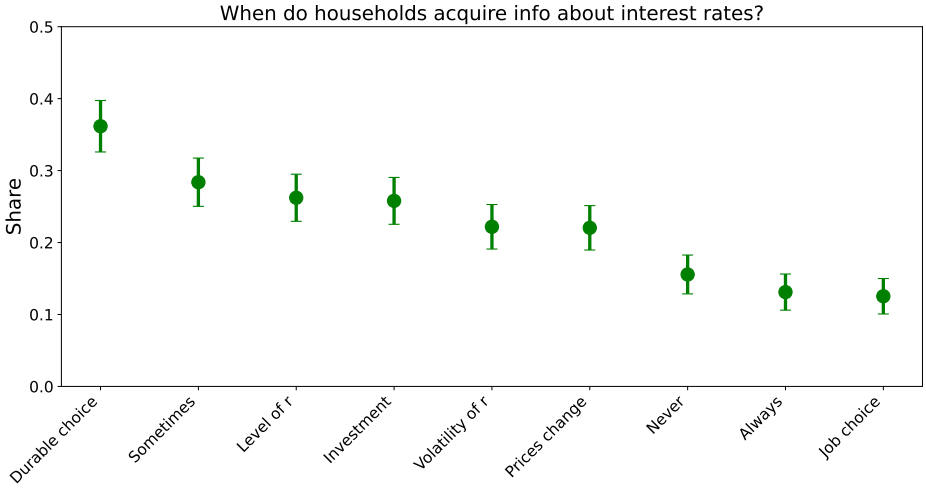
Durables adjustments are biggest driver of macro IA



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Distribution of Kalman Gains and FEs