SELECTIVE INATTENTION TO INTEREST RATES

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MOTIVATION

- Households' macro expectations suggest they are very uninformed on **average**

    - Level of expectations is often systematically biased <small>Weber et al. 22</small>

    - Substantial dispersion in expectations across people <small>Mankiw et al. 04</small>

    - Errors in their expectations are predictable ex-ante <small>Bordalo et al. 20</small>

- Motivated adding information frictions to quantitative macro models <small>Auclert et al. 20</small>

    $\Rightarrow$ **Average** expectation is slow-moving and under-reacts <small>Coibion-Gorodnichenko 12, 15</small>

    $\Rightarrow$ Aggregate responses to shocks are "hump-shaped", like in data <small>Christiano et al. 05</small>

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- Introspection: macro expectations much more important for "**big**" decisions
    - These **big** decisions also tend to occur less frequently
    - Example: interest rates important when **buying a house**, but less so for groceries

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- **Question**: Do HHs **select** into paying attention based on **types** of decisions?

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- **Question**: Do HHs **select** into paying attention based on **types** of decisions?

- **If yes**, how do the macro implications of this **selection** differ?

  - Belief heterogeneity $\Rightarrow$ **average** may not be the relevant object Miller 77, Afrouzi et al. 24

Is there selective inattention to interest rates based on **durables purchases**?

"decision-making" (DM)

1. Use existing surveys to study how interest rate expectations differ based on DM
   - Benefit: high-quality data on expectations
   - Cost: imprecise identification of **DM status** + hard to isolate attention

Is there selective inattention to interest rates based on **durables purchases**?

<u>"decision-making" (DM)</u>

1. Use existing surveys to study how interest rate expectations differ based on DM

2. Conduct a new survey to identify how macro attention changes based on DM
   - Benefit: better identify **DM status** + elicit information acquisition directly
   - Cost: hard to study accuracy in expectations given one cross-section

~~Is there selective inattention to interest rates based on durables purchases?~~ ✓

How does selective inattention affect **aggregate responses** to interest rates?

1. Use existing surveys to study how interest rate expectations differ based on DM

2. Conduct a new survey to identify how macro attention changes based on DM

DM in model

3. Develop incomplete markets model with $\overbrace{\text{durables}}$ + rational inattention to rates
   - Use patterns in IA from survey to discipline information cost parameter
   - Compare **model IRFs** to level and volatility of rates with exogenous inattention

     DM ⊥ beliefs ⇒ no selection

PREVIEW OF KEY TAKEAWAYS

- Data: Households are selectively inattentive to interest rates
  - IA is concentrated around durables purchases, where beliefs are more accurate

- Model: **Like** exogenous inattention, selective inattention generates:
  1. Slow-moving aggregate beliefs
  2. Dampened responses of non-durable consumption to interest rates

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    1. Shifts the **composition** of spending responses to rate cuts towards durables
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Takeaway: Aggregate inattention hides substantial selection into attention that can be measured, modeled, and has different implications!

▸ Literature

- **Sample**: repeated cross-section of $\sim$ 8K respondents in 2014-2023

- Variables of interest:

  1. **Nowcasts** of current average 30-year fixed mortgage rate
  2. **Forecasts** of one-year ahead mortgage rate and inflation
  3. **DM status** based on distance from past or (intended) future home purchase

- Construct errors using 30-year fixed rate in Freddie Mac PMMS and CPI

- Run the following regression:

$$\log |\text{Error}_{it}| = \sum_s \beta_s \cdot \mathbf{1} \left(\text{DM Status}_{it} = s \right) + \text{Controls}_{it} + \delta_t + \epsilon_{it}$$

Mortgage Rate
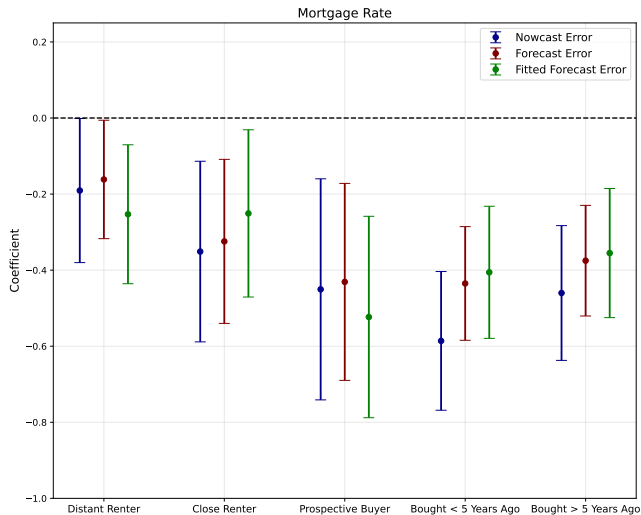
Errors of prospective buyers $\approx$ **40% lower** than those with no purchase plan

Mortgage Rate
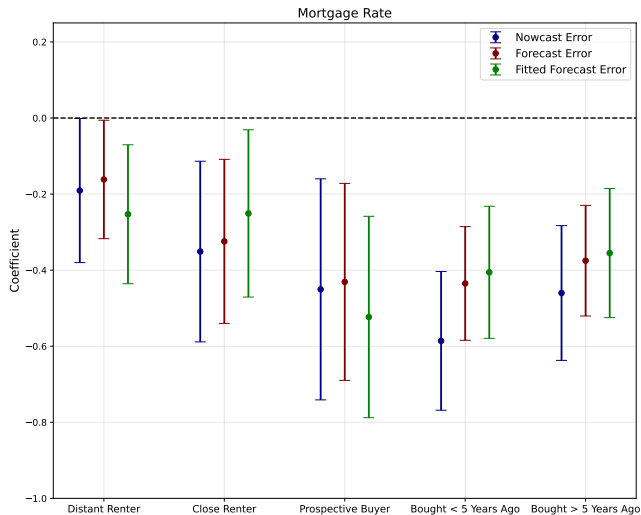
$\approx$ **2x** difference between individuals in top and bottom terciles of income or education

Mortgage Rate
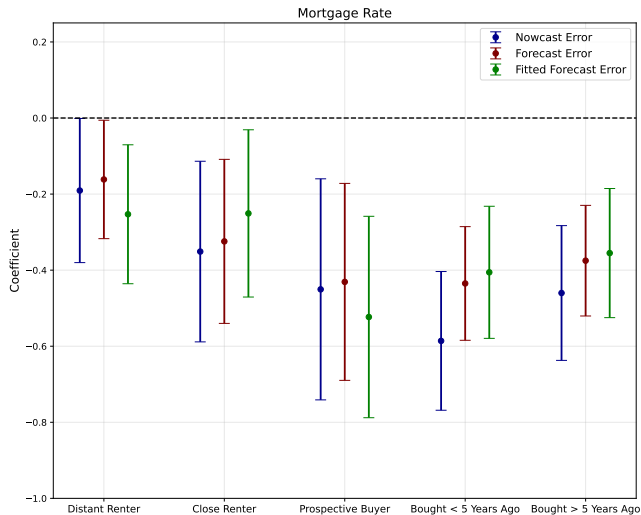
Almost all of forecasting gain comes from nowcasting improvement

SURVEY 2/2: ECB SURVEY OF CONSUMER EXPECTATIONS

- **Sample**: **panel** of $\sim$ 130K individuals in 2020-2024 from six largest countries
  - Restriction: only include individuals who rented at some point in survey
  - Note: quarterly frequency $\Rightarrow$ short panel

- Variables of interest:
  1. **Forecasts** of one-year ahead mortgage rates, inflation, GDP, and unemployment
  2. **DM status** based on distance from mortgage application

- Construct errors based on country-specific realizations

- Run the following regression:

$$\log |\text{Error}_{it}| = \sum_s \beta_s \cdot \mathbf{1}\left(\text{DM Status}_{it} = s\right) + \text{Controls}_{it} + \textbf{Tenure}_{it} + \delta_t + \lambda_{\mathbf{i}} + \epsilon_{it}$$
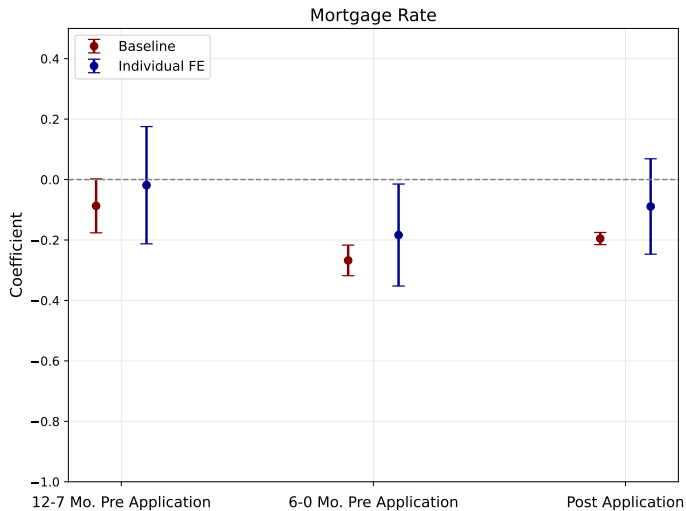
Mortgage rate forecast errors fall by about **20%** pre-application

Inflation

Inflation

GDP

Unemployment Rate

Respondents using Credit
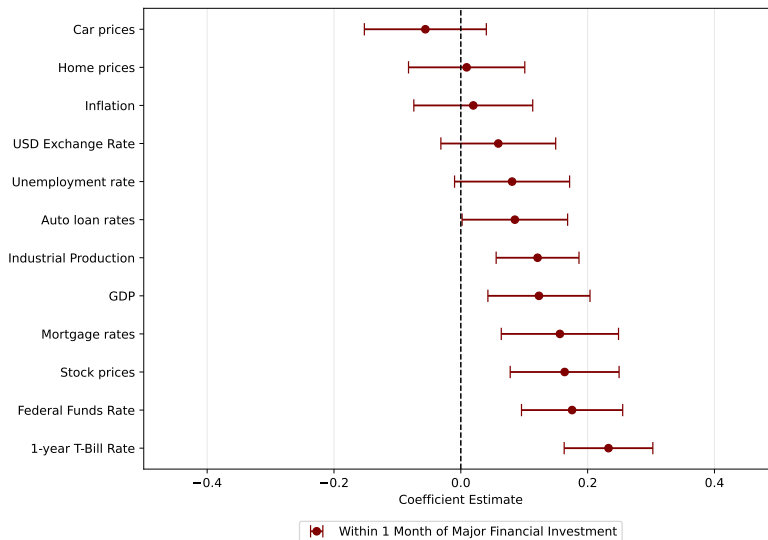
▸ Survey Description
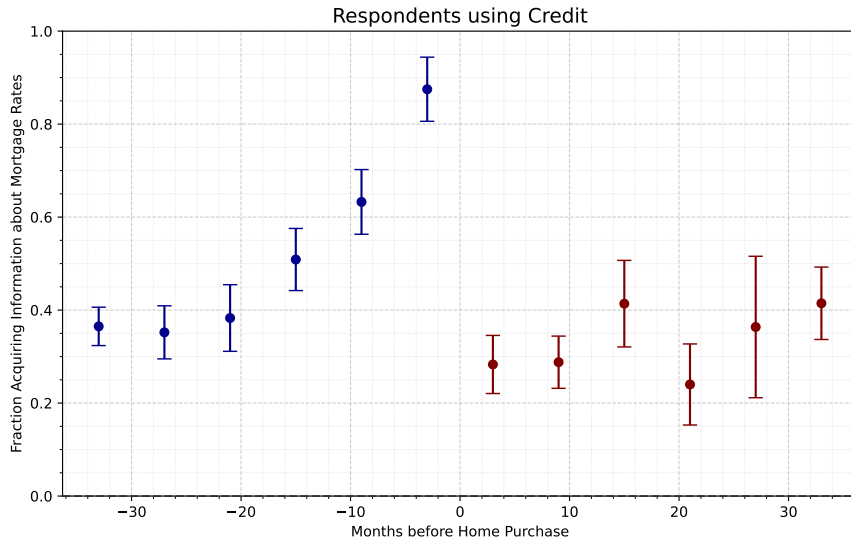
$$\text{Info. Acquisition}_i = \sum_d \beta_d \cdot \mathbf{1}\left(\text{Home Distance}_i = d\right) + \text{Controls}_i + \text{Other Distances}_i + \epsilon_i$$
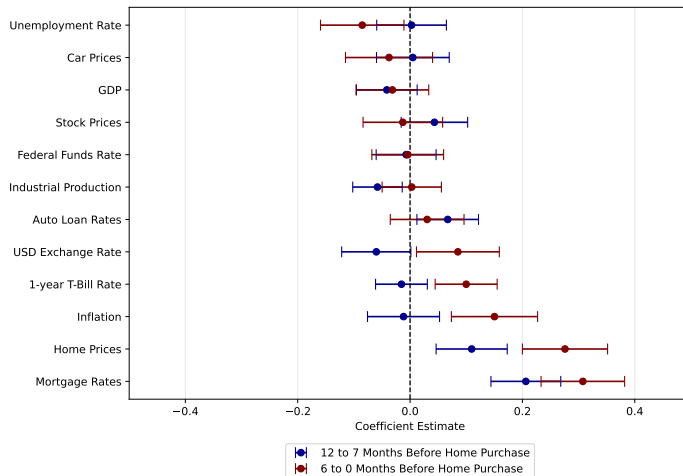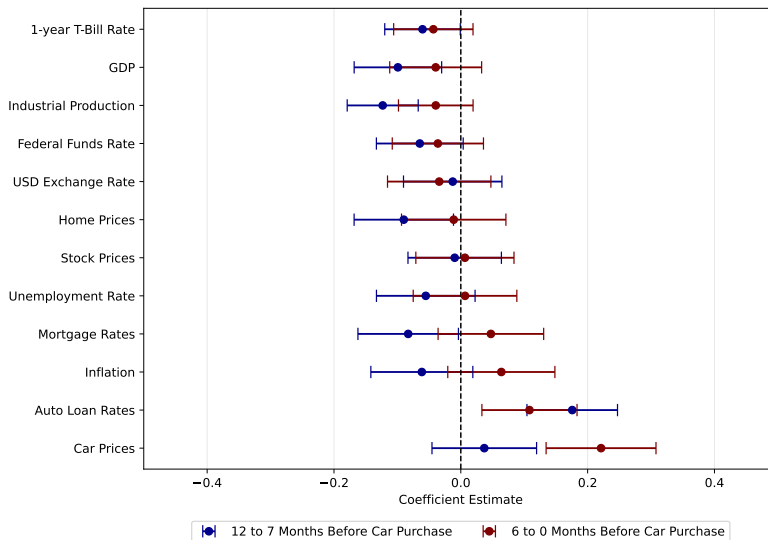
- Information acquisition (IA) is primarily about the current values of variables ●

- Primary source of information is internet search ●

- No difference in IA based on mortgage type or refinancing plans ●

- Positive effect of decision-making due to job relocations on IA ●

- IA is directly associated with belief accuracy and uncertainty ●

- Similar improvement in belief accuracy for home purchases to SCE ●

- Reductions in subjective uncertainty for home purchases ●

TAKING STOCK: 5 FACTS

1. Households close to **durables** purchases have more **accurate** macro expectations

2. Improvement in expectation accuracy is largest for **interest rates**

3. Decision-makers' beliefs are less **dispersed** and **uncertain**

4. Households concentrate **information acquisition** around durables purchases

5. Households' information acquisition is about **decision-relevant variables**

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Next: what are the macroeconomic implications of this **selective inattention**?

Bewley-Huggett-Aiyagari

$\underbrace{\text{Partial equilibrium incomplete markets model}}_{\text{household block of McKay-Wieland 2021}} + \text{durables} + \underbrace{\text{dynamic info. acquisition}}_{\text{rational inattention}}$

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

Decision-Making

Given beliefs, HHs choose non-durables **c**
and durables **d**′ subject to:

- Income risk $+$ collaterized borrowing

- Stochastic interest rate *r*

- Depreciation of durables stock

- Durables adjustment costs

- Operating $+$ maintenance costs

- Match-quality shocks (e.g. job change)

MODEL OVERVIEW

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Rich model of how beliefs about $r \longrightarrow$ **c**, **d'**

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Information Acquisition

HHs receive signals of endogenous precision about current r = rational inattention

- Cost of signals $= \omega \times$ mutual info.

- Benefit of signals = better choice of **c**, **d**′

- Interest rate is persistent $\Rightarrow$ prior beliefs are state variables

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Endogenous beliefs about r that come from dynamic information acquisition

- Households do not observe the **current** interest rate, r, but know DGP

- Define households' idiosyncratic information set by $\mathcal{I}$

DECISION-MAKING PROBLEM, GIVEN BELIEFS

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$$\mathbf{c}(\mathbf{x}), \mathbf{d}'(\mathbf{x}) = \arg\max_{c, d'} U\Big(c, m(d')\Big) + \beta \cdot \mathbf{E}V\Big(\mathbf{x}' \mid \mathcal{I}\Big)$$

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$$c + b' + d' = y + [\exp(r) + \tau_b \mathbf{1}_{b<0}]\, b + (1 - \delta)\, d - A(d, d'),$$

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$$\mathbf{A(d, d')} = \begin{cases} \underbrace{\nu \cdot d}_{\text{op. costs}} & \text{if } d' = \underbrace{(1 - \delta)d}_{\text{depreciation}} + \underbrace{\delta \cdot \chi \cdot d}_{\text{maint. costs}} \\ \underbrace{\nu \cdot d}_{\text{op. costs}} + \underbrace{f \cdot (1 - \delta)d}_{\text{fixed adj. cost}} & \text{else} \end{cases}$$

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$$\mathbf{m}(d') = d' \times \max\Big\{\xi, \mathbf{1}_{d' \neq (1-\delta+\delta\cdot\chi)d}\Big\}, \quad \xi \sim \text{Bern}(\overline{\xi}) = \text{match-quality shock}$$

$\xi = 0 \Rightarrow$ have to adjust for **exogenous** reasons (e.g. job relocation)

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- $\log y$ follows AR1 + observed by households

- r follows an AR1 that households correctly perceive

- Simplifying assumption: HHs can only acquire **Gaussian** signals about **current** r
  - $\Rightarrow$ Prior beliefs in each period can be summarized by: $r \sim N(\mu, \Sigma)$

- Simplifying assumption: HHs can only acquire **Gaussian** signals about **current** r

- Households choose signal variance Σ_e, anticipating choices of **c** and **d**':

$$V(\mathbf{x}) = \max_{\Sigma_e} \mathbf{E}\Big[U(\mathbf{c}, m(\mathbf{d}')) + \beta V(\mathbf{x}') \mid \mathbf{x} \Big]$$

INFORMATION ACQUISITION PROBLEM TO DETERMINE BELIEFS

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

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

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- **c**, **d**′ maximize objective with **belief errors**
  - Lower $\Sigma_e \Rightarrow \widehat{\mathbf{E}}(r) \longrightarrow r \Rightarrow$ **errors** $\longrightarrow 0 \Rightarrow$ smaller utility loss from **c**, **d**′

CALIBRATED PARAMETERS

Parameter	Description	Value	Source
Internally-Calibrated			
β	Discount factor	0.9829	Asset-to-GDP ratio
ψ	Non-durables exponent	0.627	Durable-to-nondurable consumption ratio
f	Fixed cost	0.11	Adjustment probability
$1 - \overline{\xi}$	Match-quality shock probability	0.034	Share of adjustments from MQ shocks
ω	Marginal information cost	$10^{-3.741}$	Concentration in information acquisition
Externally-Calibrated			
γ	RRA (and inverse EIS)	2	.
ε	Durables elasticity of substitution	0.5	McKay and Wieland (2021)
$1 - \lambda$	Required downpayment	0.2	McKay and Wieland (2021)
δ	Depreciation rate	0.017	McKay and Wieland (2021)
χ	Maintenance share	0.35	McKay and Wieland (2021)
ν	Operating cost	0.012	McKay and Wieland (2021)
ρ_y	Income persistence	0.977	Flodén and Lindé (2001)
σ_ϵ	Income shock std. dev.	0.058	Flodén and Lindé (2001)
$\overline{r}$	Real rate mean	0.0143	10-Year Treasury Rate: 1961-2024
ρ	Real rate persistence	0.979	10-Year Treasury Rate: 1961-2024
σ	Real rate shock std. dev.	0.0014	10-Year Treasury Rate: 1961-2024
τ_b	Borrowing spread	0.4156%	30-Year Fixed Mortgage Rate: 1971-2024

▶ Welfare Loss
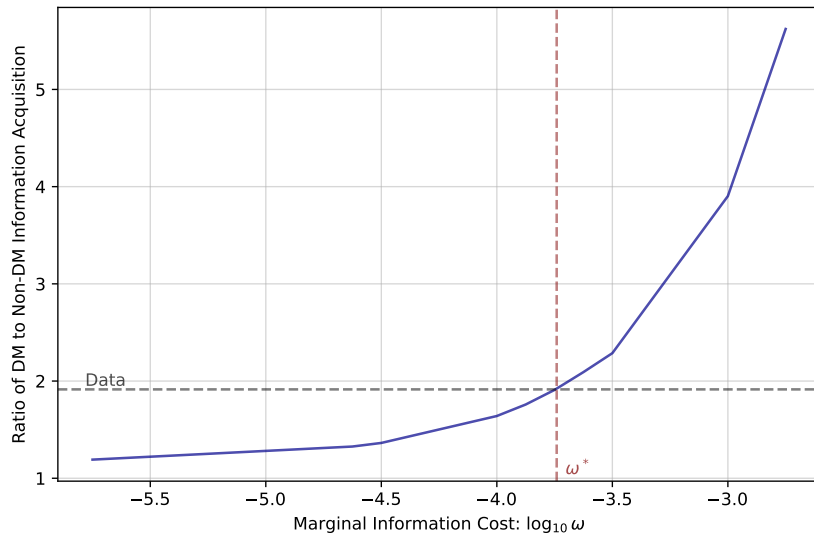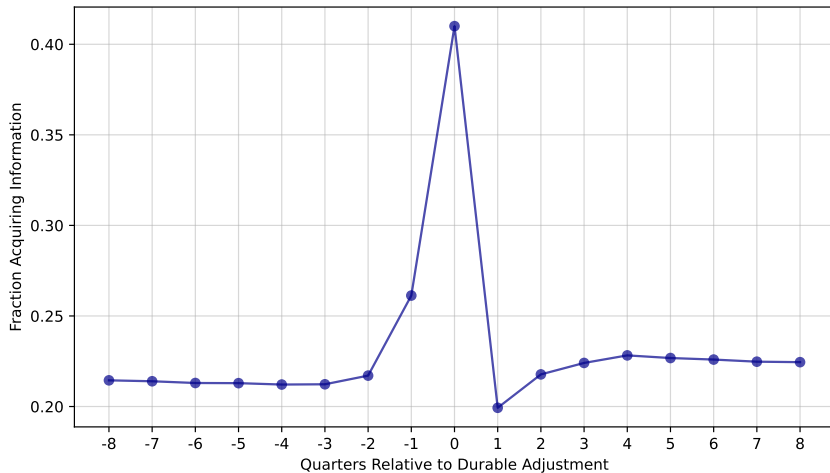
Households acquire information in **all** periods...

▸ Durables Share ▸ Information Acquisition sS ▸ Nowcasts
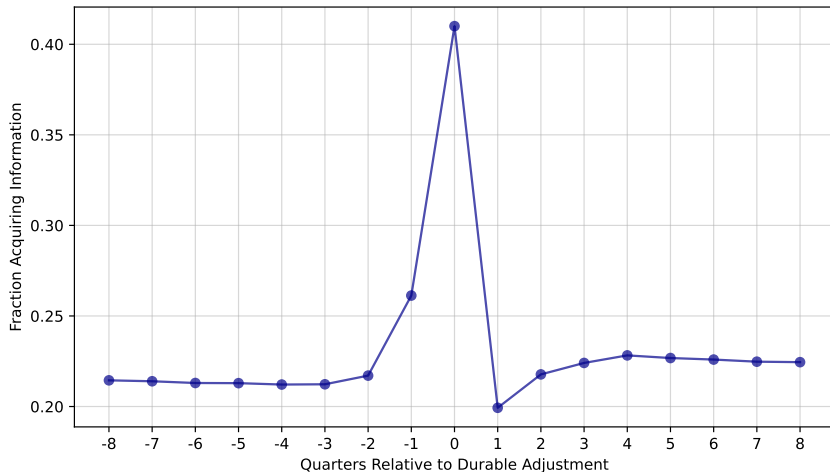
... but this information acquisition is **concentrated** around durables adjustments

▸ Durables Share   ▸ Information Acquisition sS   ▸ Nowcasts
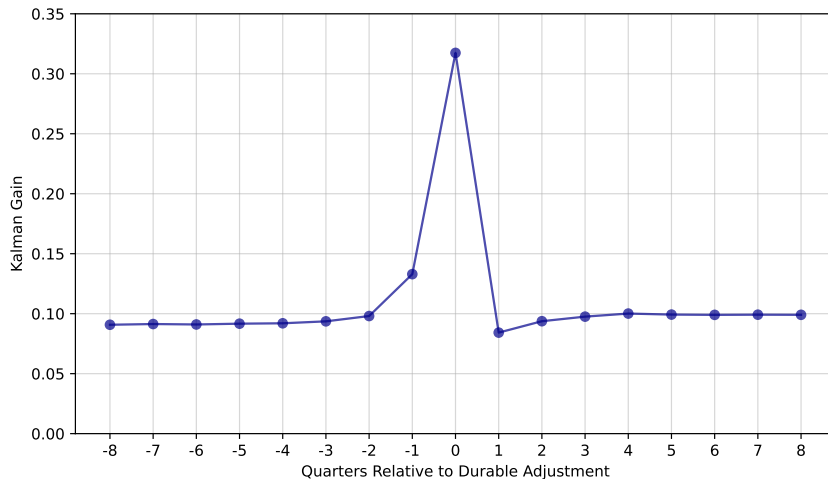
Increase in information acquisition is even larger on **intensive** margin

▸ Durables Share   ▸ Information Acquisition sS   ▸ Nowcasts
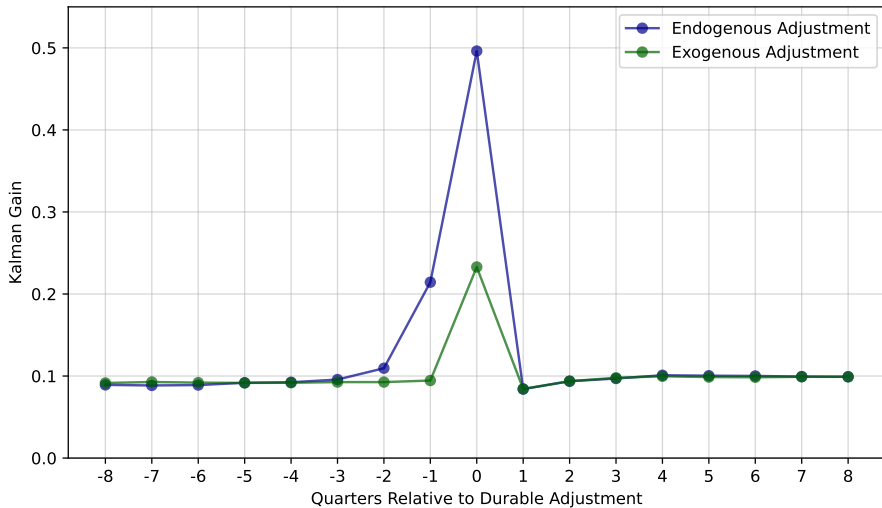
Information acquisition increases in anticipation of **state-dependent** adjustments...
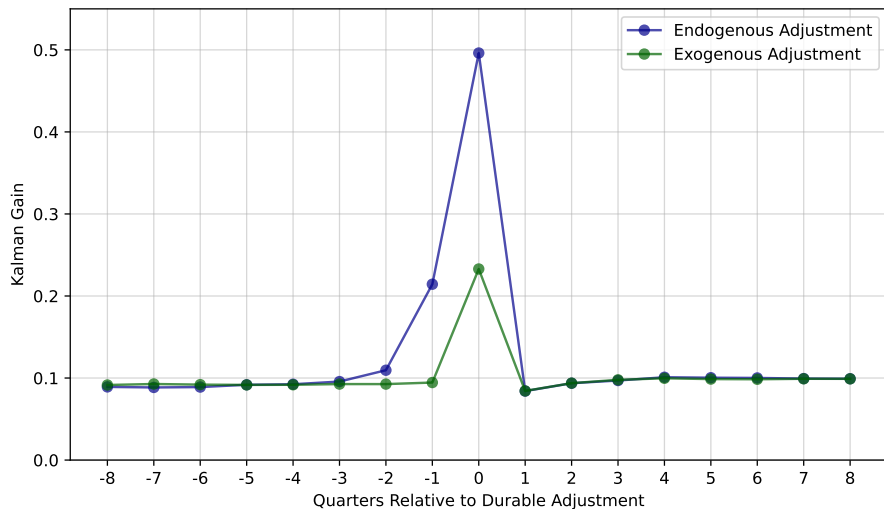
... but is concentrated around the choice for **time-dependent** adjustments Afrouzi et al. 24

RESPONSES TO INTEREST RATE CUTS
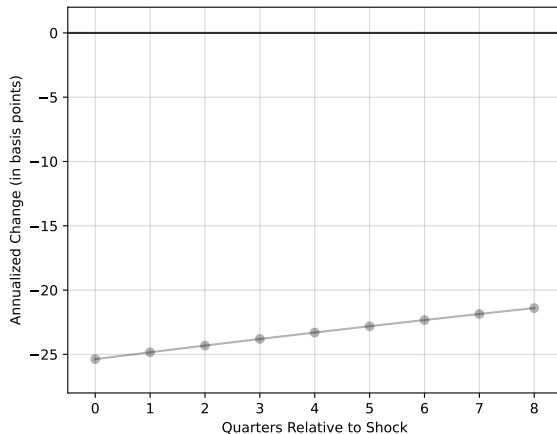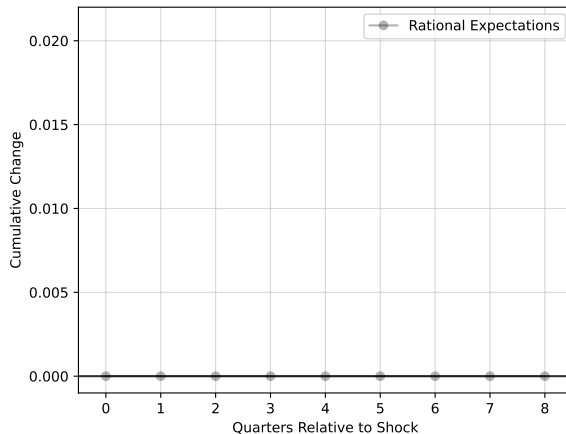
Rational expectations: households observe current interest rate
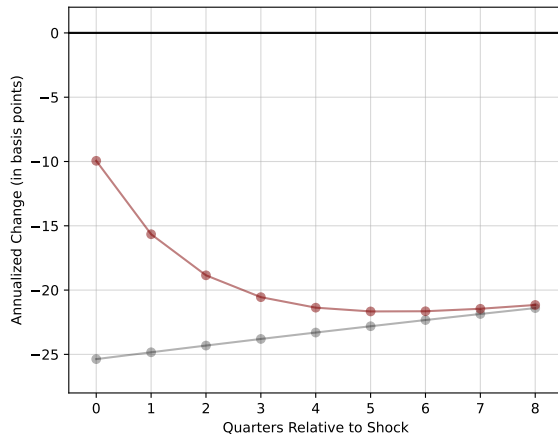
▶ Decomposition
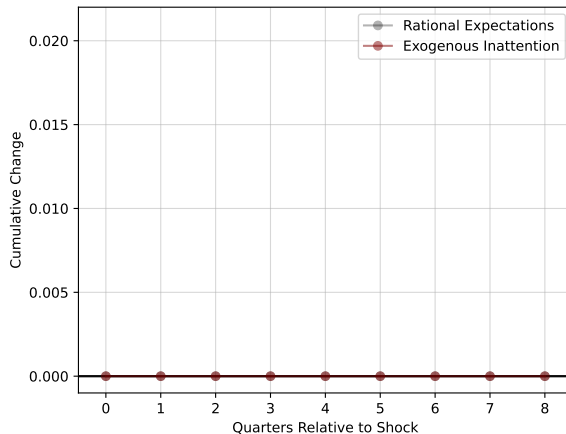
Exogenous inattention: constant *G* set to match CG 15 coefficient in baseline model
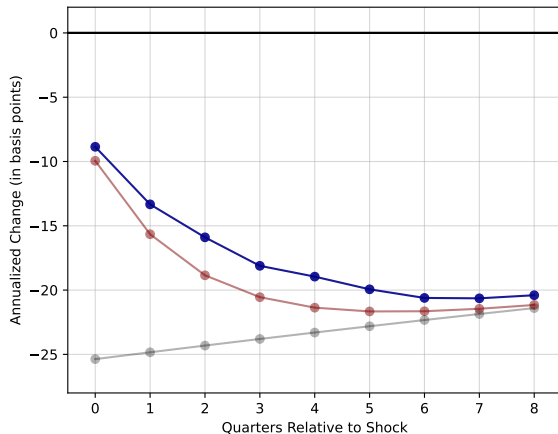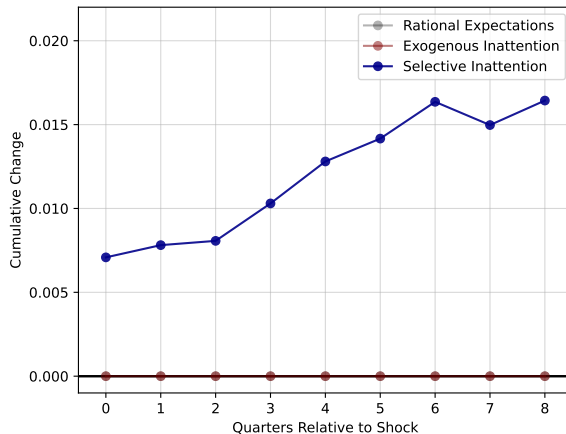
▸ Decomposition

Selective inattention: baseline model with endogenous information acquisition

▶ Decomposition
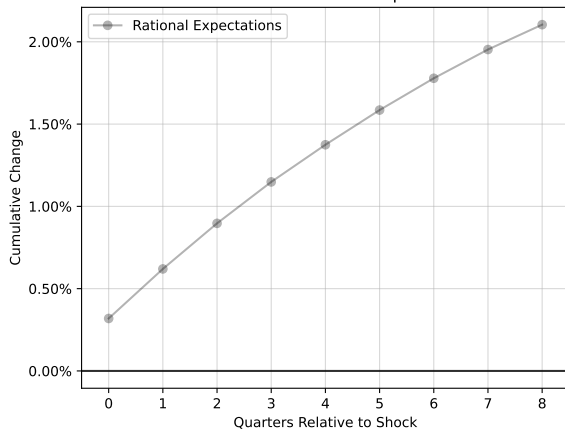
Non-Durable Consumption

Durable Expenditure

Non-Durable Consumption

Durable Expenditure

Legend:
- Rational Expectations
- Exogenous Inattention
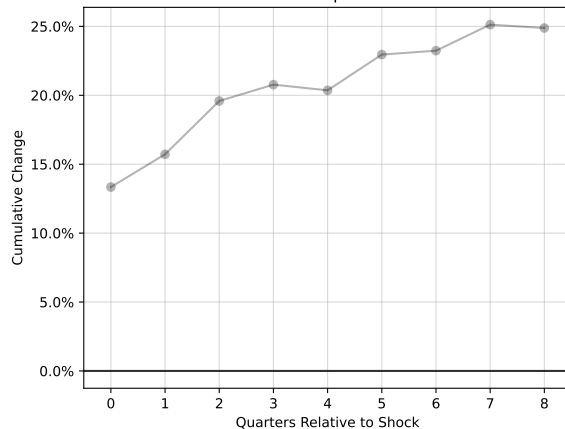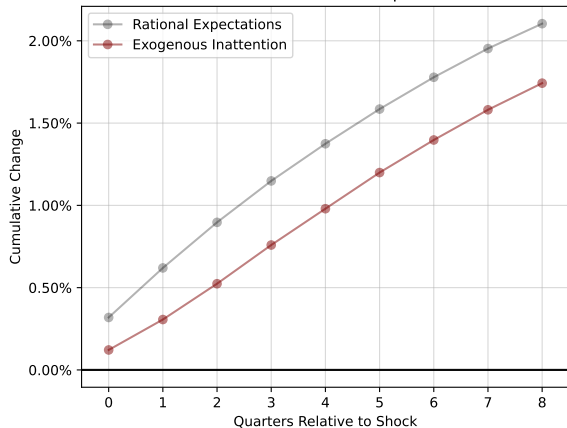
▸ Incorporating GE Effects   ▸ Non-Linearity

Non-Durable Consumption / Durable Expenditure
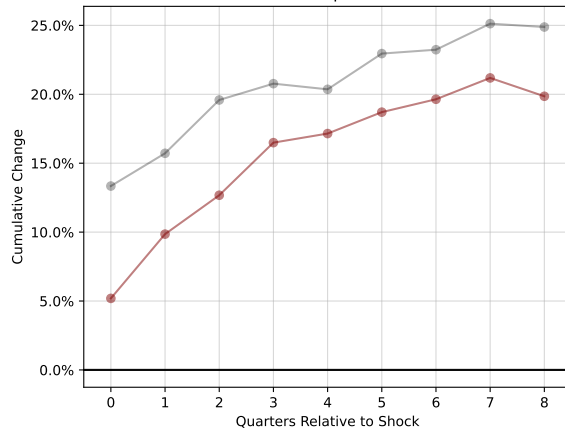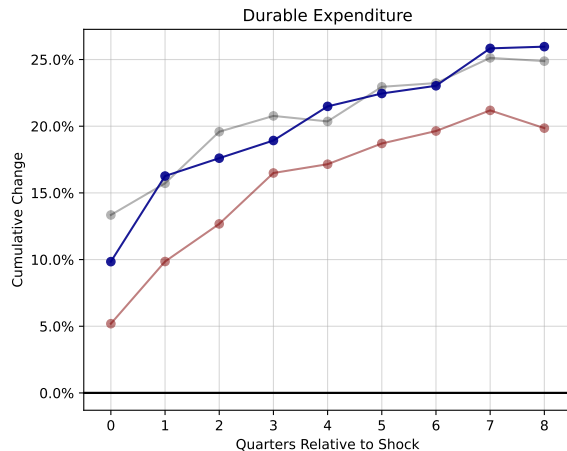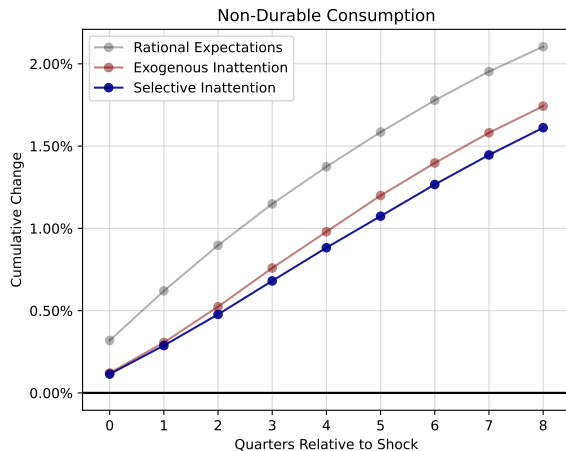
Non-durable response is dampened like with **exogenous inattention**...

▸ Incorporating GE Effects ▸ Non-Linearity
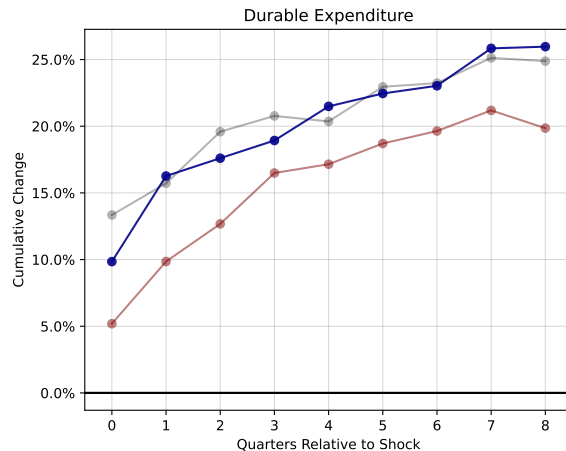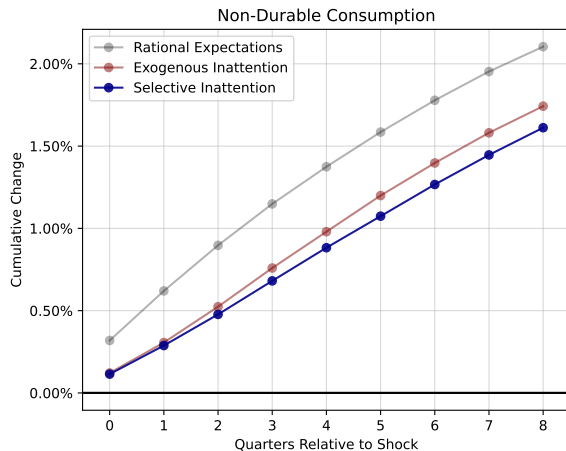
... but **durable** response is larger, closer to **rational expectations**!

▸ Incorporating GE Effects   ▸ Non-Linearity

Aggregate Expenditure
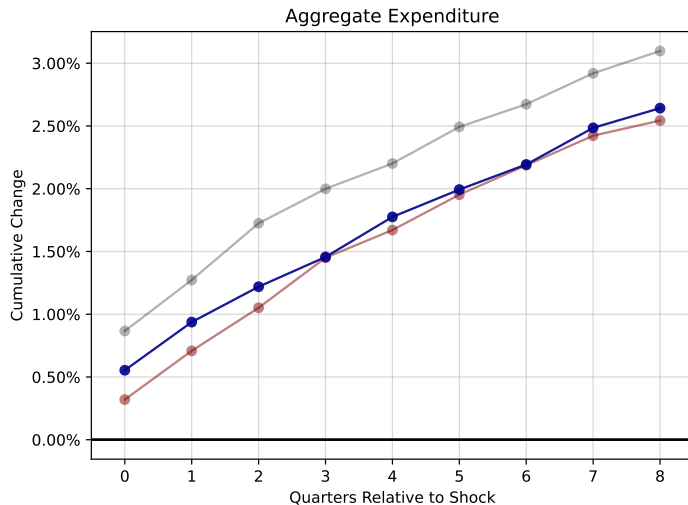
Shift in **composition** of spending to durables $\Rightarrow$ GE effects through $\frac{p_d}{p_c}$ Barsky et al. 07

EFFECTS OF CHANGES IN INTEREST RATE VOLATILITY

Non-Durable Consumption

Durable Expenditure
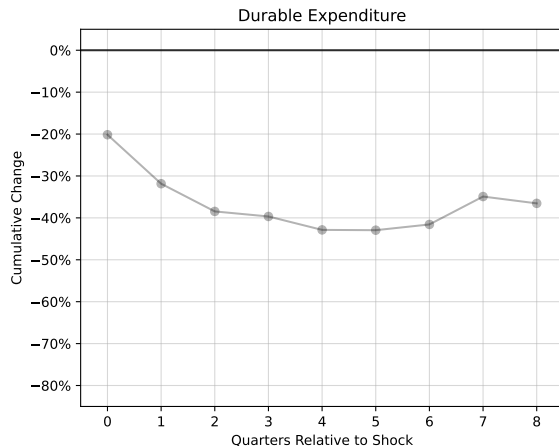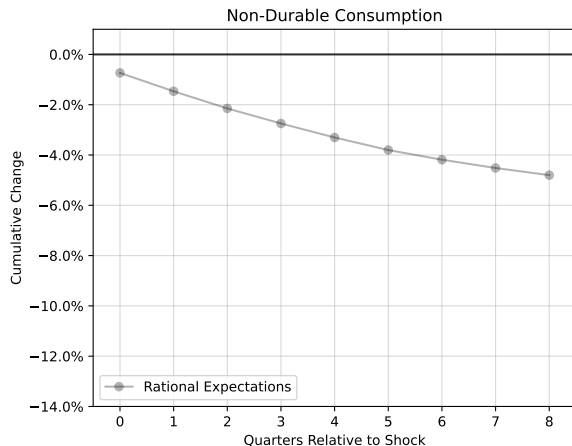
Increase in volatility $\Rightarrow$ spending falls due to precautionary motives...
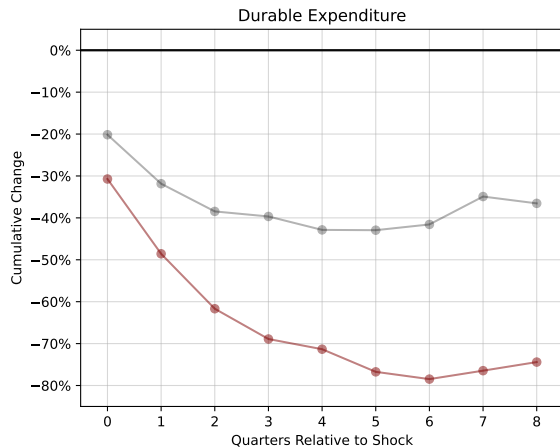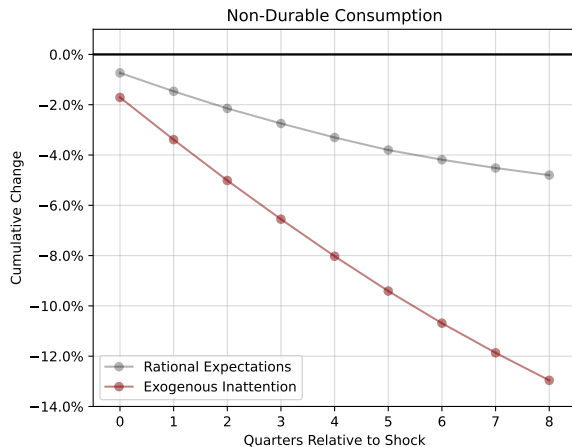
... which is stronger with **exogenous inattention** because of additional uncertainty

Non-Durable Consumption

Durable Expenditure
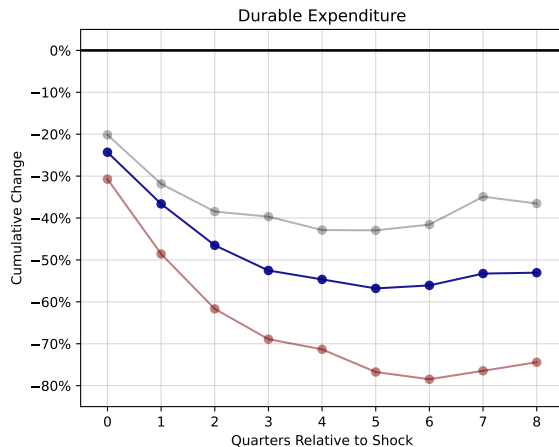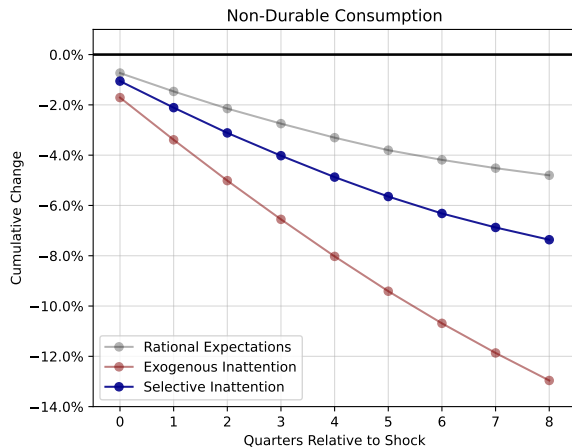
Selective inattention undoes over 50% of this fall due to ↑ info. acquisition!
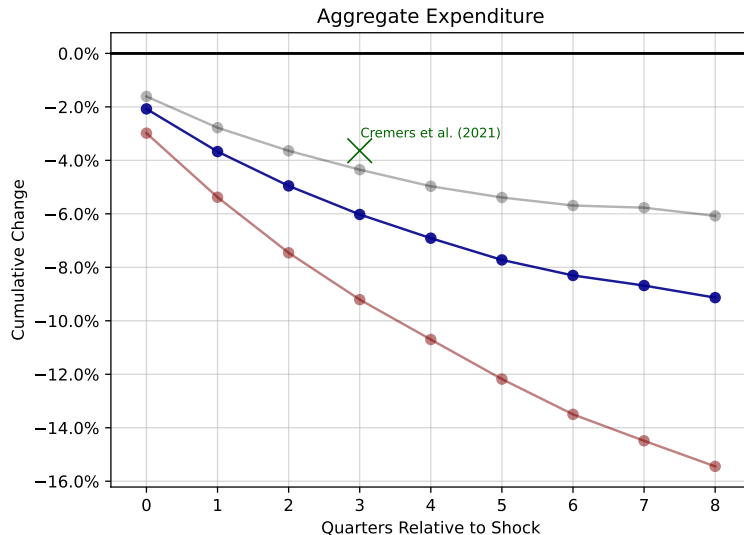
Aggregate Expenditure

Cremers et al. (2021)

▸ State-Dependence of Rate Cuts

- Households are selectively inattentive to interest rates
  - IA is concentrated around durables purchases, where beliefs are more accurate

- **Like** exogenous inattention, selective inattention generates:
  1. Slow-moving aggregate beliefs
  2. Dampened responses of non-durable consumption to interest rates

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- **Unlike** exogenous inattention, selective inattention:
  1. Shifts the **composition** of spending responses to rate cuts towards durables
  2. **Accelerates** the impact of larger rate cuts
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CONCLUSION

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Takeaway: Aggregate inattention hides substantial selection into attention that can be measured, modeled, and has different implications!

THANK YOU!

tdesilva@stanford.edu

`www.timdesilva.me`

RELATED LITERATURE AND CONTRIBUTION

- Household expectation formation → *aggregate inattention masks **selection***
  Coibion & Gorodnichenko (2012, 2015), Bordalo et al. (2020), D'Acunto et al. (2023), ...

- Household expectation formation → *aggregate inattention masks **selection***

- Models of durable adjustments → ***endogenize** info. acquisition + inattention*

  Caballero (1990), Barsky et al. (2007), Berger & Vavra (2015), McKay and Wieland (2021), Gavazza & Lanteri (2021), Beraja & Wolf (2022), Beraja & Zorzi (2024)

RELATED LITERATURE AND CONTRIBUTION

- Household expectation formation → *aggregate inattention masks **selection***

- Models of durable adjustments → ***endogenize** info. acquisition + inattention*

- Rational inattention → *add to a **non-quadratic** decision problem with 2 actions*
  Sims (2003), Mackowiak & Wiederholt (2009, 2015), Zhong (2022), Hebert & Woodford (2023), Mackowiak et al. (2023), Afrouzi et al. (2024)

RELATED LITERATURE AND CONTRIBUTION

- Household expectation formation → *aggregate inattention masks **selection***

- Models of durable adjustments → ***endogenize** info. acquisition + inattention*

- Rational inattention → *add to a **non-quadratic** decision problem with 2 actions*

- Exogenous inattention as a source of macro sluggishness → *selective inattention generates **decision-specific** dampening* generates

  Lucas (1972), Gabaix & Laibson (2001), Mankiw & Reis (2002), Angeletos & Lian (2016), Carroll et al. (2020), Auclert et al. (2020), McKay & Wieland (2021), Beraja & Wolf (2022), Cochrane (2025), ...

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- Macro models with endogenous household inattention → *inattention determined by **type of decision** that households make*

  Alvarez et al. (2011, 2013), Broer et al. (2022), Guerreiro (2023), Ahn et al. (2024)

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- Household expectation formation → *aggregate inattention masks **selection***

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- Macro models with endogenous household inattention → *inattention determined by **type of decision** that households make*

- Effects of (interest rate) uncertainty → *depends on **endogeneity of inattention***
  Sandmo (1970), Bloom (2014), Bloom et al. (2020), Cremers et al. (2021), Ilut et al. (2024)

◄ Back

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

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Survey Innovations

- Direct measure of distance from durable adjustments

    - Primary home purchase
    - Car purchases

- Measures of information acquisition other than forecasting performance

    - Last active search for information about key variables

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Main Blocks

1. Home decision-making: distance from primary home purchase

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

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Main Blocks

1. Home decision-making

2. Other decisions: distance from car purchase $+$ other major financial decisions

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

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Main Blocks

1. Home decision-making
2. Other decisions
3. Information acquisition: time since last search + type/source of info searched

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

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Main Blocks

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

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

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Main Blocks

1. Home decision-making
2. Other decisions
3. Information acquisition
4. Macro expectations
5. Background & financial situation: info on household's balance-sheet using SCF format, demographics, job relocations

- Eliciting our main measure of information acquisition

  Step 1: In the last 3 years, did you actively search for information about any of the following economic variables in the U.S.?

  By "active search" we mean a deliberate effort to find information which could include searching online, reading news articles or reports, talking to a financial advisor or broker, or any other intentional effort to gather information.

  Step 2: How many months ago did you last actively search for information about mortgage rates?

- Eliciting households' distance from the primary home purchase

  Owners: How many months ago did you finalize the purchase of your current primary residence?

  Renters: How many months from now do you expect the closing on your primary residence purchase?

  By "closing", we mean signing the final documents to officialize the purchase.

Mortgage Rates — Auto Loan Rates. Fraction Acquiring Information by category (Current, 1-Year Ahead, 3-Year Ahead, Uncertainty, Past Values) for All Respondents and Decision-Makers (Home / Car).
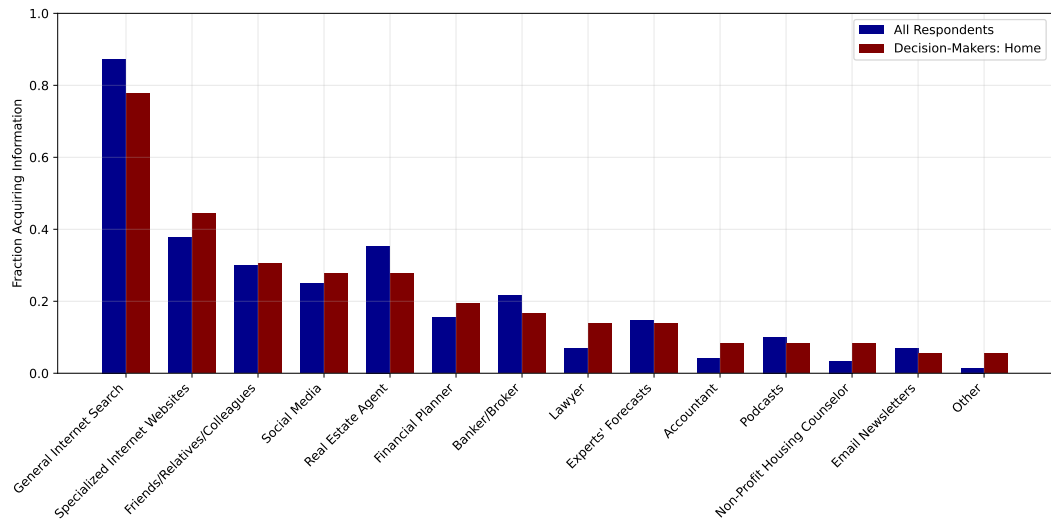
▶ Investment Decisions   ◀ Back: IA   ◀ Back: Additional Results

Treasury Bill Rates

Legend: All Respondents / Decision-Makers: Investment

Y-axis: Fraction Acquiring Information (0.0 to 1.0)

X-axis categories: Current, 1-Year Ahead, 3-Year Ahead, Uncertainty, Past Values
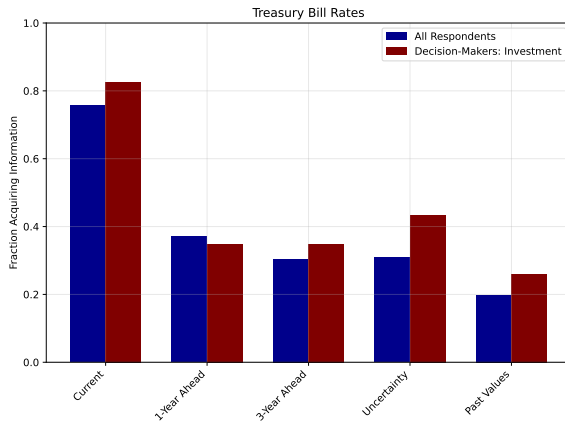
◄ Back

ENDOGENEITY OF DECISION-MAKING

- Concern: decision-making is **endogenous** to information acquisition and beliefs
- Solution: **IV** = anticipated moves due to job relocations

Dependent Variable: Information Acquisition

Variable	OLS	First Stage	IV	OLS	First Stage	IV
Home Decision-Maker	0.30***		0.89***	0.30***		0.96***
	(0.07)		(0.34)	(0.06)		(0.34)
Job Relocation		0.23***			0.23***	
		(0.07)			(0.07)	
N	787	787	787	787	787	787
Controls				✓	✓	✓
F-stat		10.51			3.57	
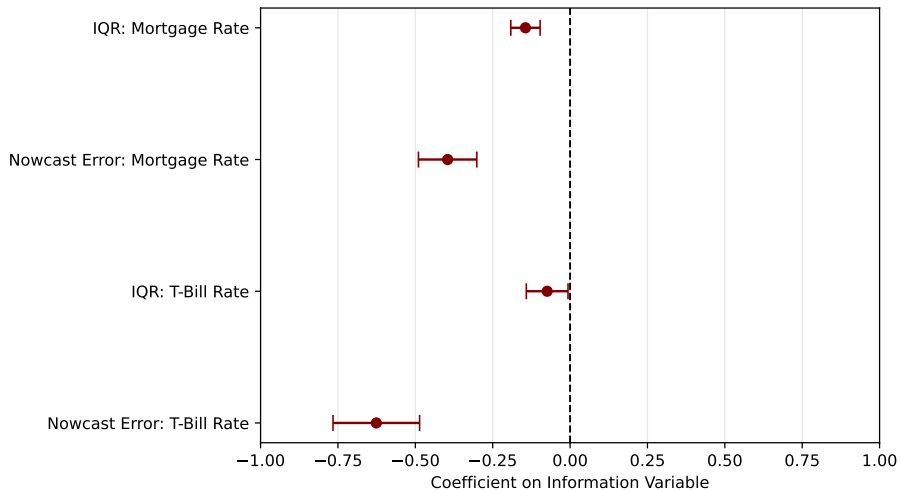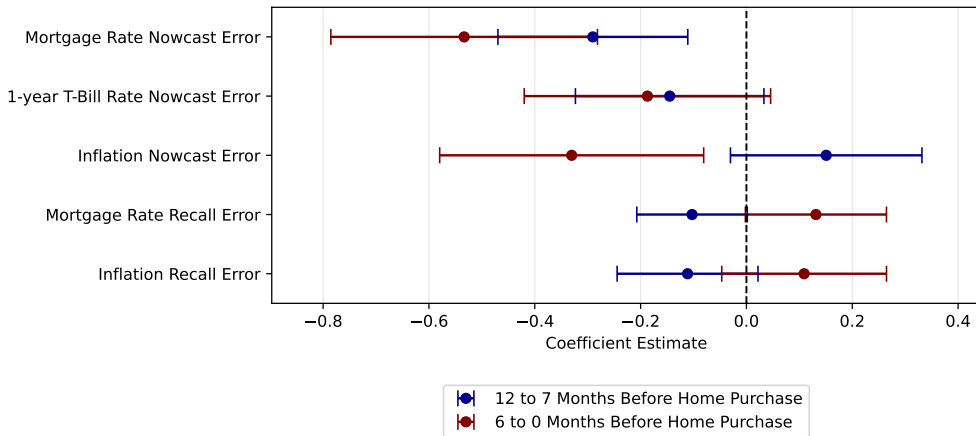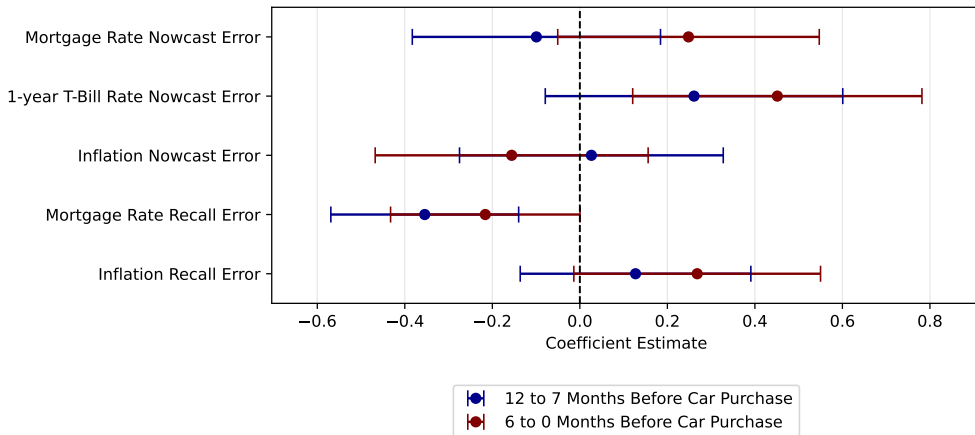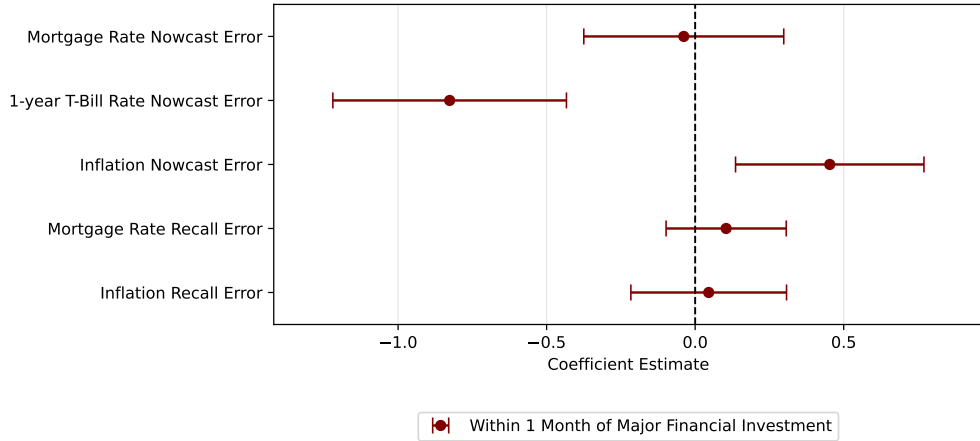
◄ Back

Within 1 Month of Major Financial Investment

◂ Back

- Natural question: how large are welfare losses from selective inattention?

- Compute two welfare metrics in **basis points** of lifetime consumption
  1. **Static**: loss from not having full-information in **current** period, ignoring info. cost
  2. **Dynamic**: loss from not having full-information in **all** periods, ignoring info. cost

WELFARE LOSS FROM INATTENTION

- Natural question: how large are welfare losses from selective inattention?

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  1. **Static**: loss from not having full-information in **current** period, ignoring info. cost
  2. **Dynamic**: loss from not having full-information in **all** periods, ignoring info. cost

- Losses are **small**, but still have aggregate effects! Akerlof-Yellen 85 Maćkowiak-Wiederholt 15

	Static	Dynamic
Mean	0.03	2.17
Median	0.02	1.9

STEADY-STATE SUMMARY STATISTICS

	Mean	SD	P10	P50	P90
Assets/Income: b/y	3.51	4.93	-0.91	1.91	10.27
Durable/Non-Durables: d'/c	2.55	0.40	1.99	2.58	3.01
Durables Gap	0.14	0.17	-0.05	0.11	0.38
Acquired Information	0.23	0.42	0.00	0.00	1.00
Kalman Gain: G	0.10	0.21	0.00	0.00	0.40
Kalman Gain Conditional on IA	0.46	0.21	0.30	0.40	0.80
Normalized Nowcast Error: $|\hat{\mathbb{E}}(r) - r|/|r|$	0.28	8.00	0.02	0.10	0.32
Normalized Prior Variance: Σ/σ_r^2	0.33	0.17	0.13	0.30	0.57
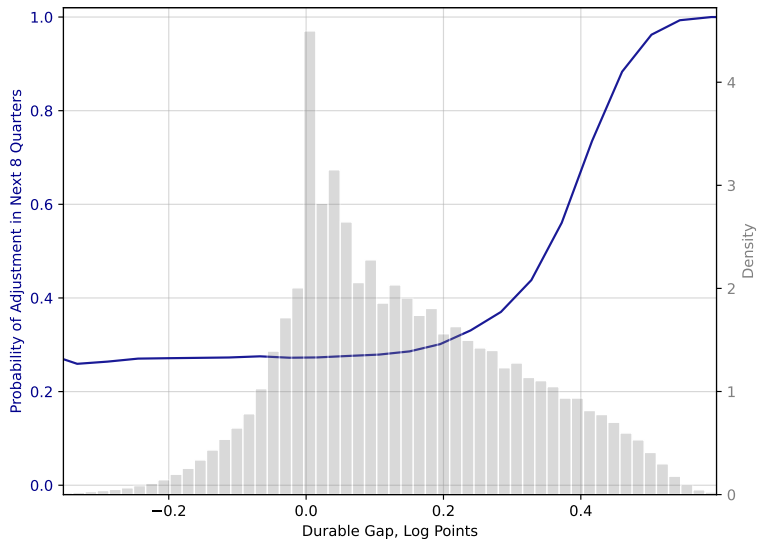
Baseline: $\psi = 0.63$
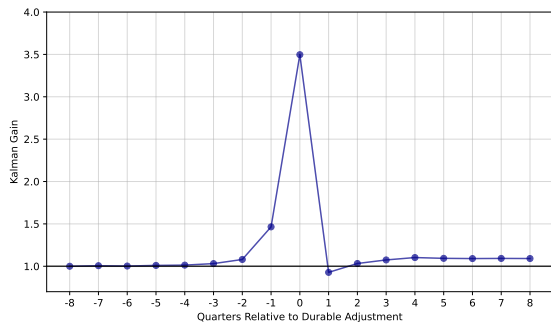
Low Durables Share: $\psi = 0.99$
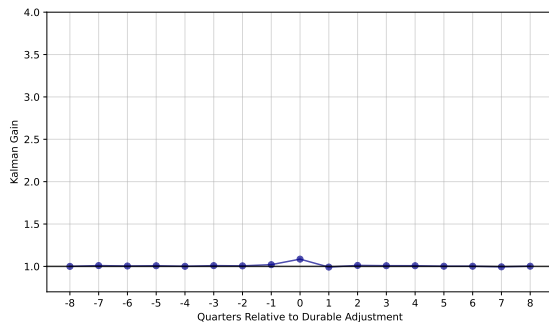
◂ Back
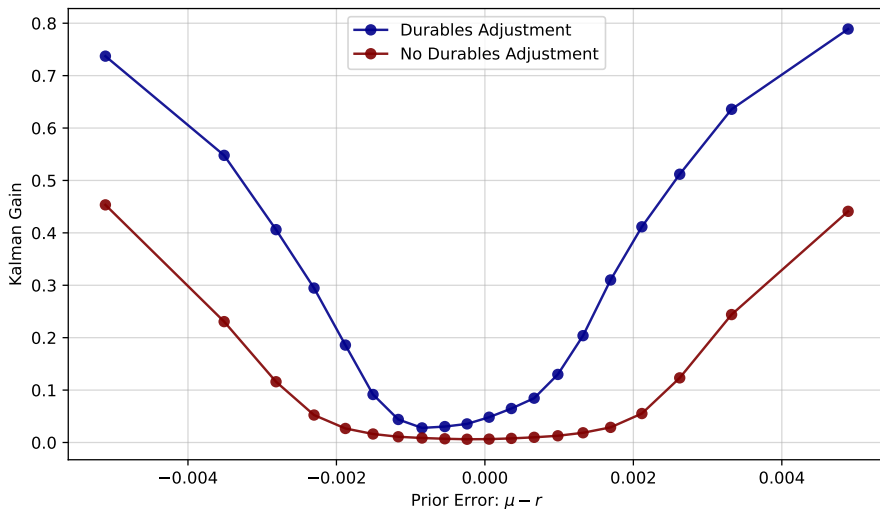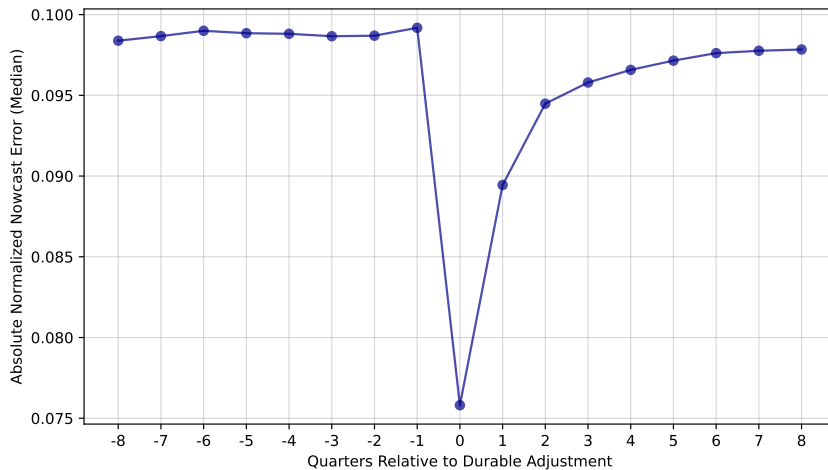
◀ Back

Forecast errors remain lower **post-choice** because beliefs are a "stock" not "flow"
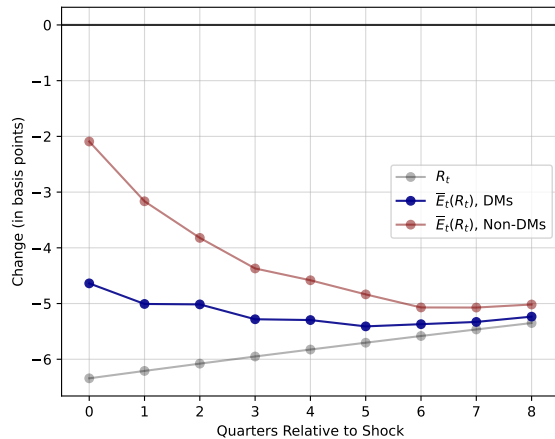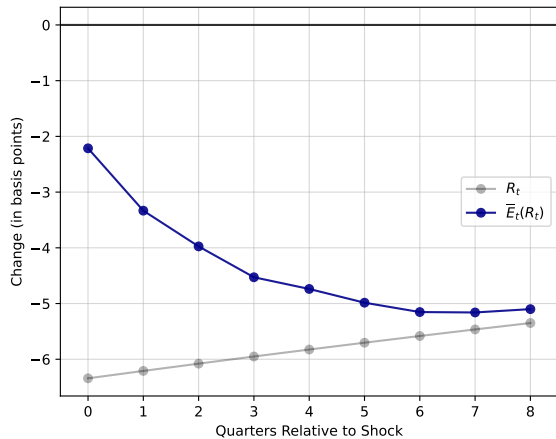
◀ Back

Interest Rate Nowcast

Kalman Gain
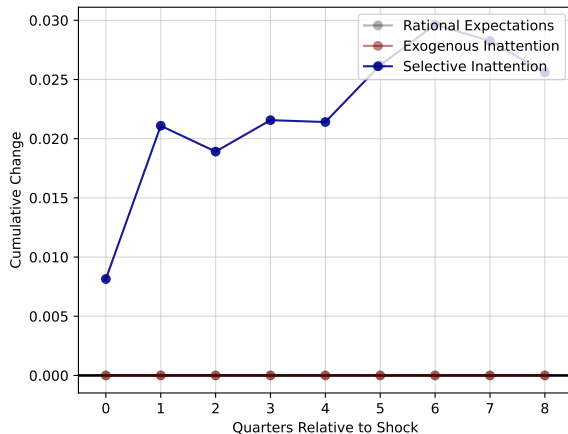
- Rational Expectations
- Exogenous Inattention
- Selective Inattention

◀ Back

Non-Durable Consumption / Durable Expenditure
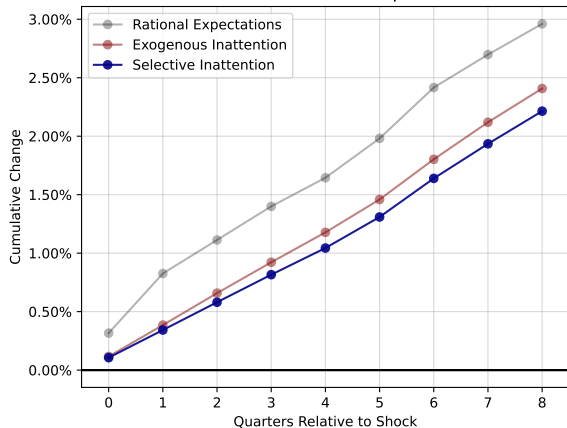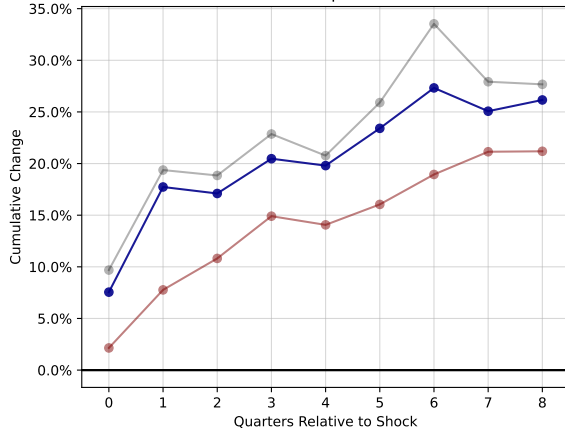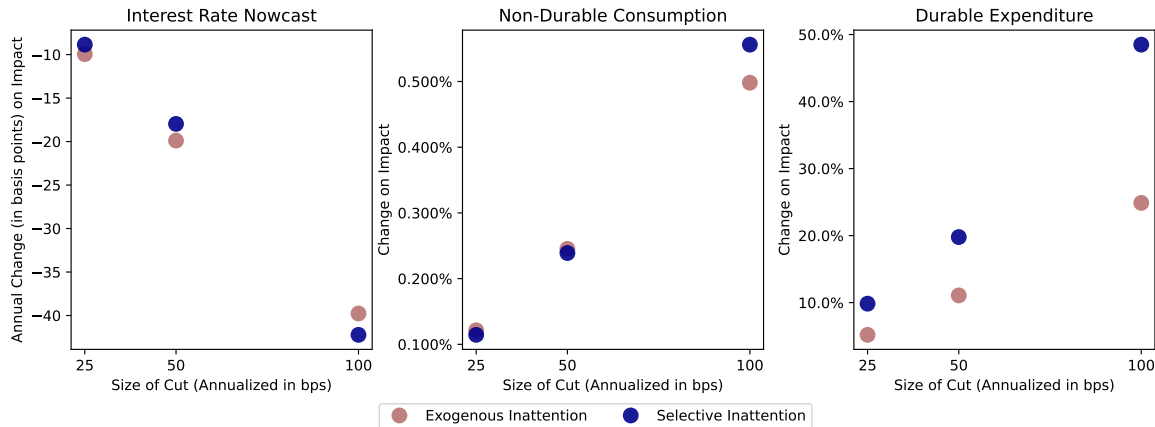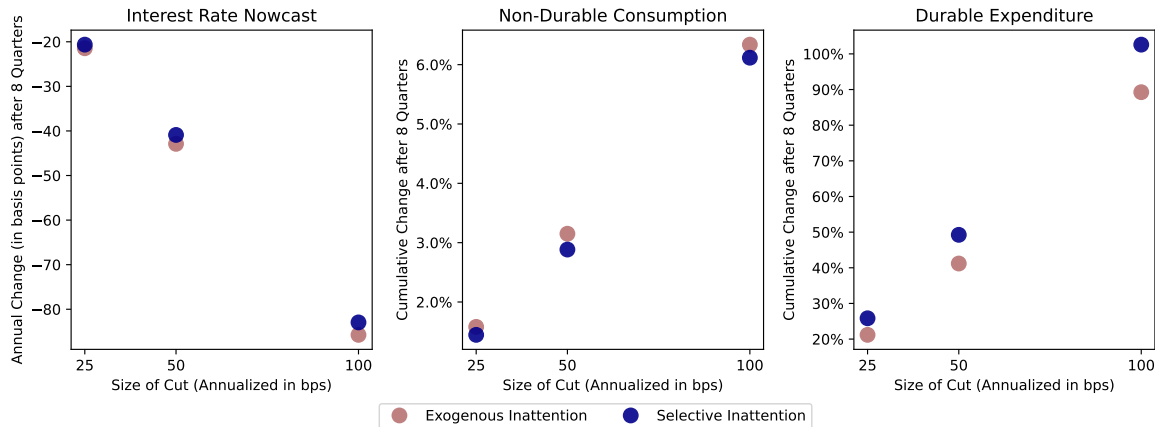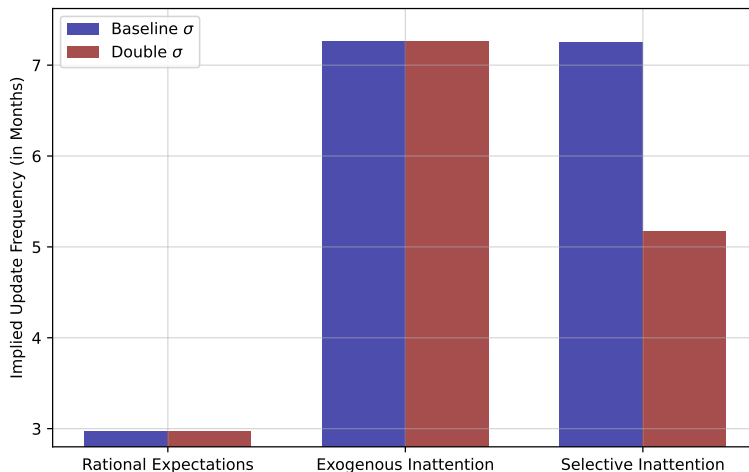
Increase in volatility $\Rightarrow$ more information acquisition $\Rightarrow$ **less** belief rigidity

◀ Back
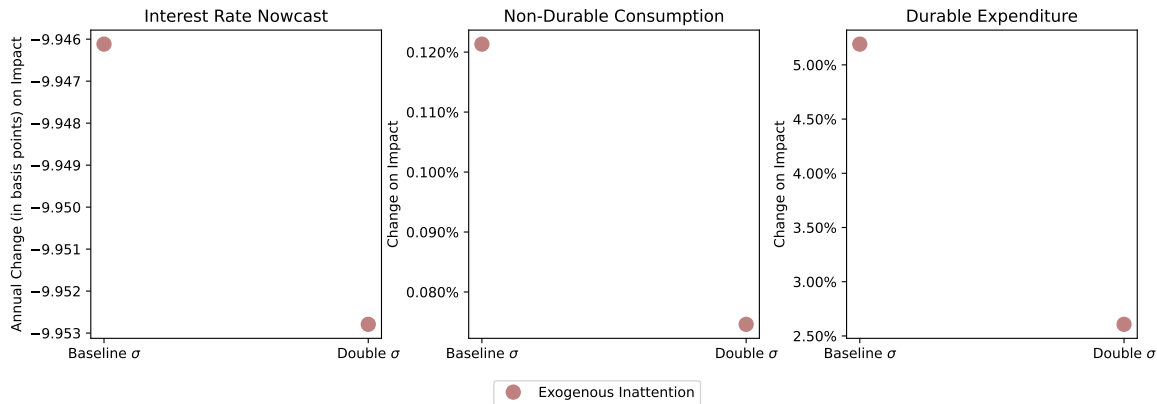
Increase in volatility $\Rightarrow$ consumption is less responsive to interest rates
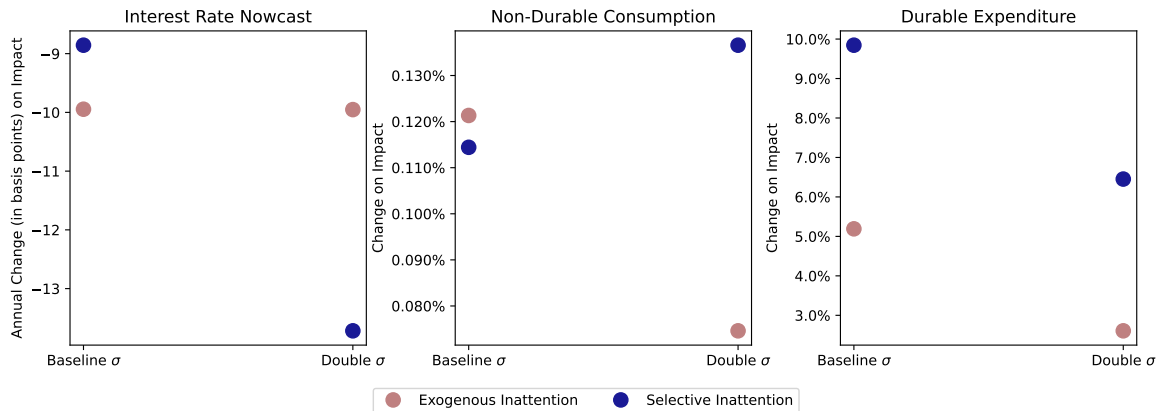
◂ Back

... but not with **selective inattention** because of increased info. acquisition!

◄ Back