Discussion of

"Behavioral Sticky Prices" by Sergio Rebelo, Miguel Santana, and Pedro Teles

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Overview

- Vast majority of sticky-price models focus on firm frictions
    - (random) menu costs, information costs, cognitive limitations of price-setters $\Longrightarrow$ inefficient relative price dispersion and output gap, welfare losses from inflation

- This paper refocuses our attention on consumer frictions and firms' strategic responses to these frictions
    - increasingly relevant in age of AI pricing, big data
    - here: price rigidity arises from firms' incentives to prevent buyers from reconsidering how much to demand at different prices
        - reconsideration introduces stochasticity in demand that firm can't respond to

Overview

$\Longrightarrow$ Asymmetric rigidity with faster price increases than decreases (rockets and feathers), state-dependent nominal frictions

$\Longrightarrow$ Deflation can mitigate impact of consumers' cognitive frictions

(though I wonder if inflation could lead to faster learning via more repricing)

My Discussion

1. Model and Intuition
2. Implications and Extensions

Basic Idea

- CES consumers allocate expenditure across varieties subject to cognitive constraint
- Consumers do not know optimal demand function $\boldsymbol{c}(\boldsymbol{p}; C)$
- Only know optimal demand for a vector of reference prices $\boldsymbol{p}_0$
  - learned from experience (*e.g.*, averaged across many states) or passed down (model-free)
- Away from $\boldsymbol{p}_0$: have to stop and think about how much to buy – and that is costly
  - consistent with evidence that people avoid effortful reasoning - especially when intuitive or heuristic responses are available $\longrightarrow$ balancing cognitive cost against expected benefit

Formalization

Based on Ilut & Valchev (2023) Consumption-Saving Model

- Reasoning about the demand function for each variety i: akin to Bayesian updating of an unknown policy function using costly mental signals

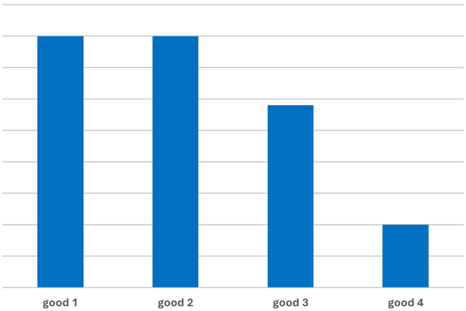
- Consumers treat $c_i(\cdot)$ as a random function and place a Gaussian Process prior over it
- Prior: defines the space of functions consumer thinks are plausible
- Posterior: narrows that space given signal (reasoning)
- Cost of signal: proportional to entropy reduction

- Cued: only reason when there is a price change; no stochasticity w/o reasoning

Learning

- Across goods: basic reverse water filling solution (independence, symmetry)

prior uncertainty

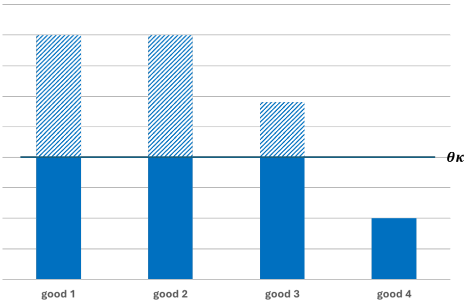


- Consider heterogeneous prior uncertainty
- Perhaps some goods are new or rarely purchased
- Others are frequently bought, staples, goods with more volatile prices, etc., so have triggered more frequent reconsideration

Learning

- Across goods: basic reverse water filling solution (independence, symmetry)

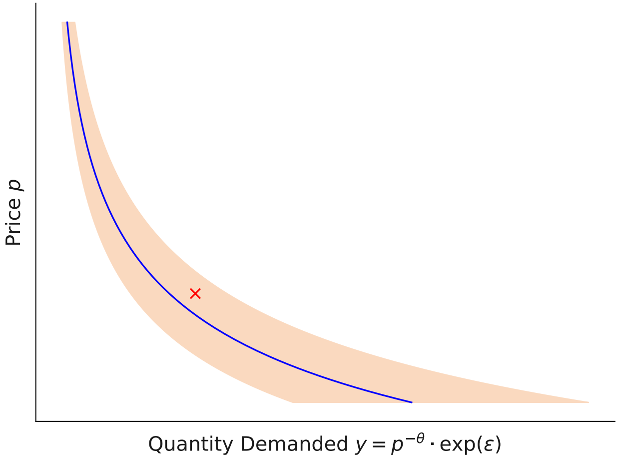
posterior uncertainty



- Choose posterior uncertainty to minimize expected loss
- Allocate attention to high uncertainty goods
- Posterior variance is the same across those goods, unchanged for goods with low prior uncertainty
- Attention threshold: EOS θ, reasoning cost κ

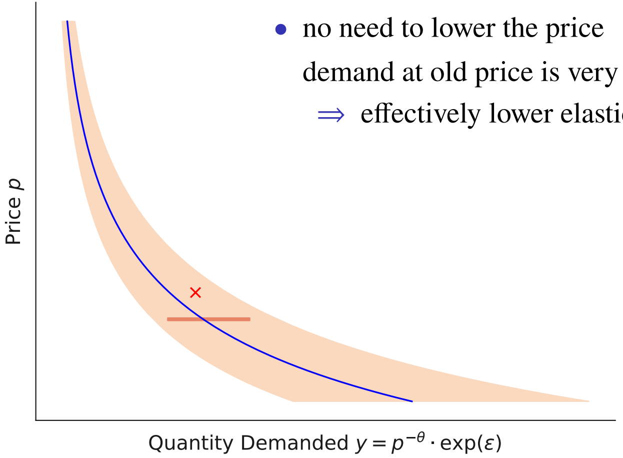
Noisy Demand Illustration

x *demand at old price*



Noisy Demand - Feather Case

posterior at new, optimally lower price



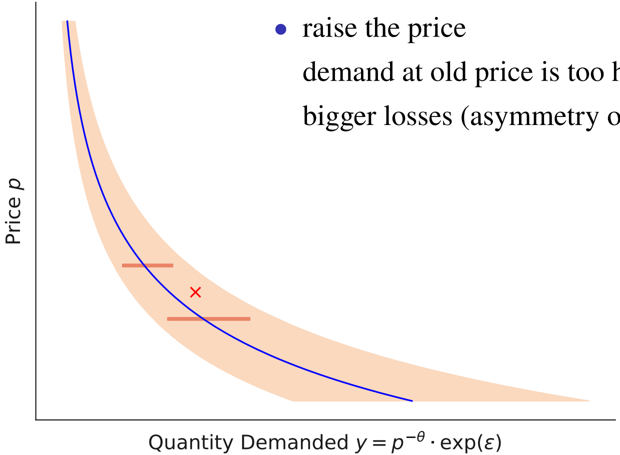
- no need to lower the price

  demand at old price is very close to optimal

  $\Rightarrow$ effectively lower elasticity; higher markup

Noisy Demand - Rocket Case

posterior at new, optimally higher price



- raise the price

  demand at old price is too high, markup too low

  bigger losses (asymmetry of profit function)

Selection in Price Adjustment

Orthogonal to Prior Price

	Prior Demand	
New Cost	Low	High
Low	reoptimize	stay
High	reoptimize	reoptimize

$\longrightarrow$ Threshold rule on prior demand: mg cost-demand trade-off

$\Longrightarrow$ State-dependent markups and nominal rigidity!

Potential Challenges & Extensions

- Currently local learning: only reason about demand at observed price no generalization from observed price to nearby prices
- Each consumer gets different ε_i draws across goods, but all consumers get the same ε_i draw for a given product
- May face challenge generating enough small price changes, large $std(|\Delta p|)$

Concluding Remarks

- Very neat model in which pricing frictions arise from firms' strategic response to consumers' bounded rationality
- Framework delivers very interesting, testable heterogeneous rigidity and asymmetries across types of goods and types of shocks
- Shows strong state dependence in pass-through of shocks to inflation
- Opens the door to quantification, analysis of responses to shocks, heterogeneity

References

Cover, Thomas M (1999), *Elements of information theory*, John Wiley & Sons.

Ilut, Cosmin & Rosen Valchev (2023), "Economic agents as imperfect problem solvers," *The Quarterly Journal of Economics* 138(1): 313–362.