
Discussion of Bonomo, Carvalho, Garcia, Malta

“Persistent Monetary Non-neutrality in an Estimated Model with Menu Costs and Partially Costly Information”

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The views expressed here are ours, and they do not necessarily reflect the views of the Bank of Canada.

Two facts challenge macro

1. Price inertia at macro level

- ▶ persistent real effects of monetary shocks

2. Price flexibility at micro level

- ▶ large/frequent product price changes
- ▶ Chari, Kehoe, McGrattan (2000), Golosov-Lucas (2007): individually optimal prices are efficient in allocating consumption and output
- ▶ Theories of incomplete adjustment of individual prices:
 - ▶ Imperfections in the goods market or factor markets
 - ▶ Imperfect or incomplete information by firms that adjust prices

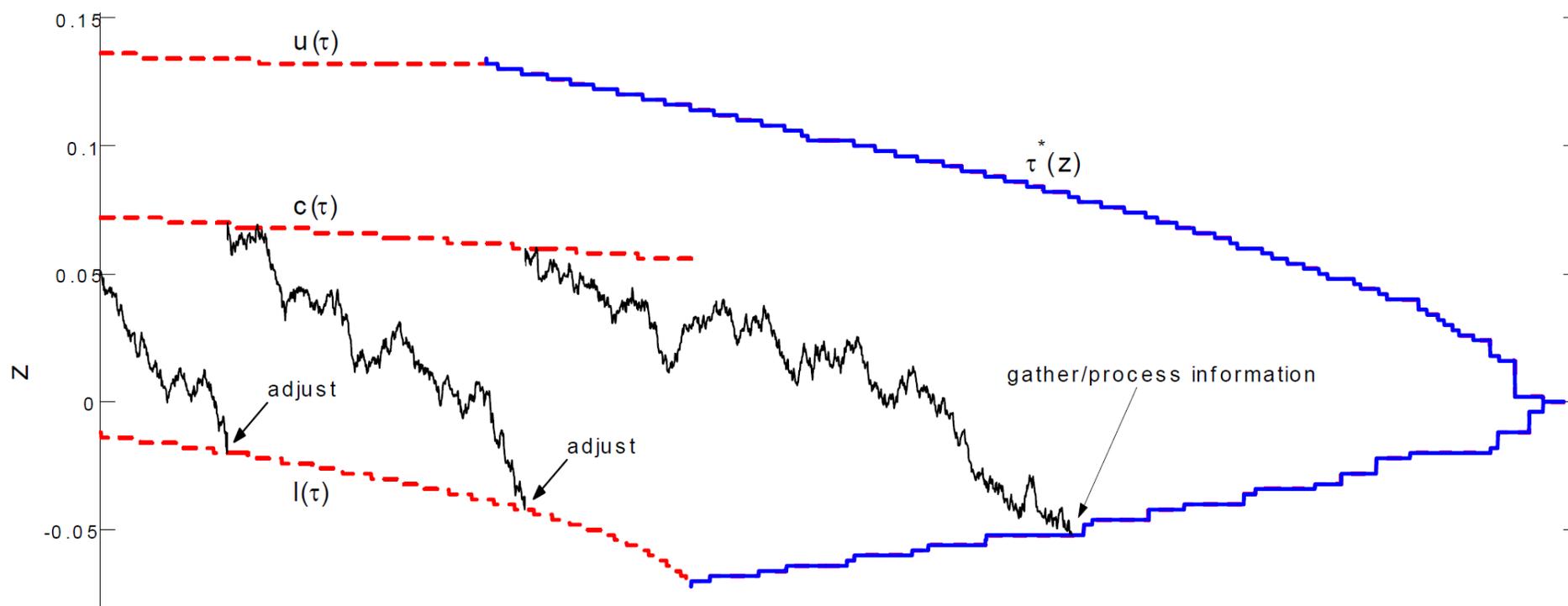
Papers that focus on costly info story

- ▶ Propose a model of costly price and information adjustments
- ▶ When matched to moments from micro price data, model identifies and quantifies the two costs
 - ▶ Richer models have better chance of drawing insights from rich data
- ▶ Establish implications for aggregate price inertia
 - ▶ Usually, more significant information costs imply more inertia
- ▶ This paper takes the same route

Continuous-time price-setting problem

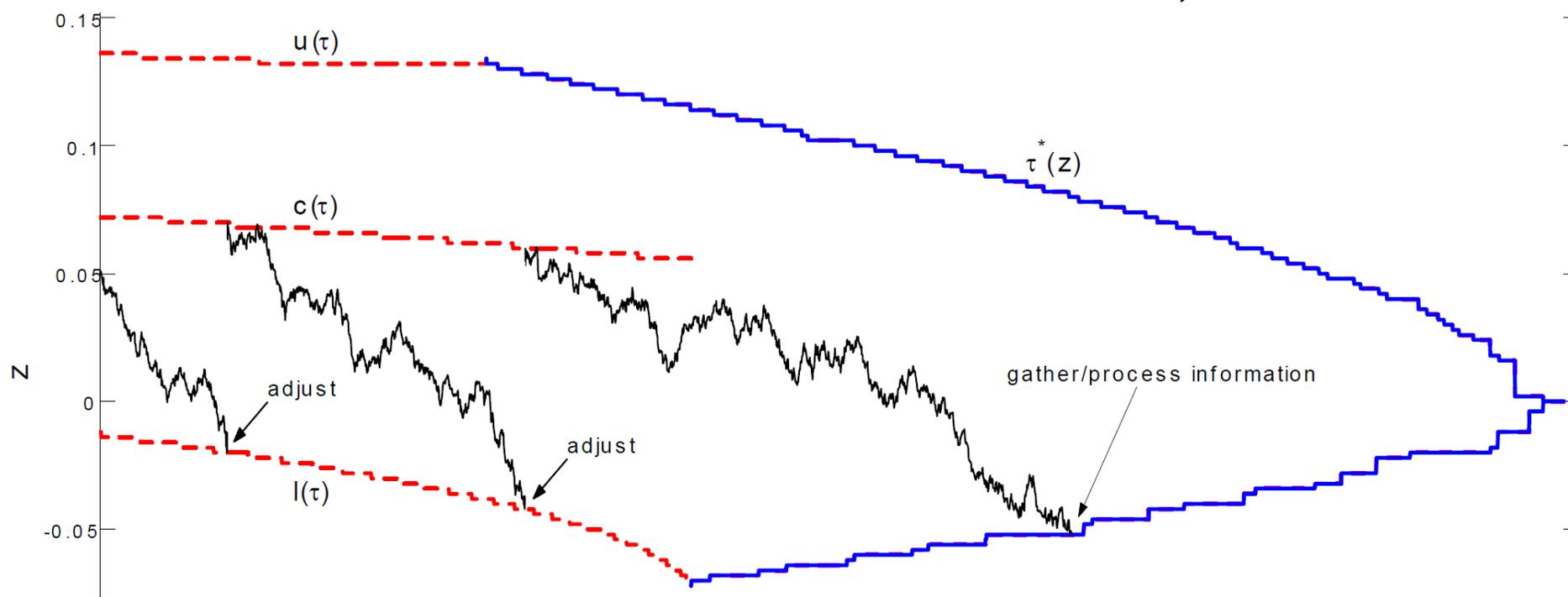
- ▶ Choose path of p_t to maximize firm value based on
 - ▶ law of motion $dp_t^* = \mu dt - \sigma_f dW_{f,t} - \sigma_c dW_{c,t}$, where W 's – Wiener
 - ▶ quadratic flow cost $E_t(p_t - p_t^*)^2 = (p_t - E_t p_t^*)^2 + Var_t(p_t^*)$
 - ▶ price adjustment cost K , information cost F
- ▶ Key feature: free and costly information ($W_{f,t}$ and $W_{c,t}$)
 - ▶ 2 competing cases: individual shocks are given by $W_{f,t}$ or $W_{c,t}$
- ▶ Rewrite cost $E_t(p_t - p_t^*)^2 = z_t^2 + \sigma_c^2 \tau$
- ▶ Solve 2-dimensional optimal stopping problem in (z, τ) -space
 - ▶ Continuous time and Wiener shocks give very tractable solution

Solve for optimal price and info adjustment



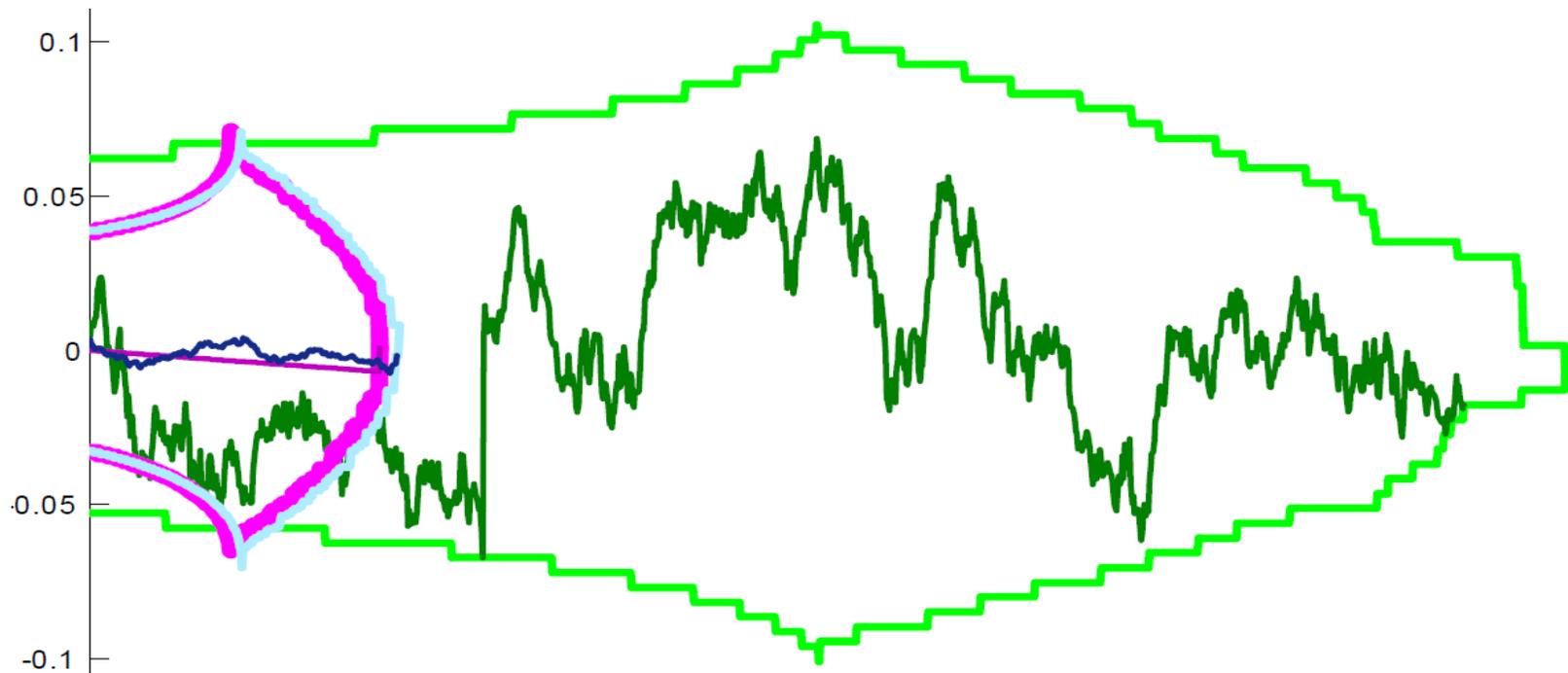
- ▶ Price adjustment: if $z > u(\tau)$ or $z < l(\tau)$, set $(z', t') = (c(\tau), \tau)$
- ▶ Information acquisition: if $\tau = \tau^*(z)$, set $(z', t') = (z + \sigma_c \sqrt{\tau^*(z)} \varepsilon, 0)$ where ε is an i.i.d. draw from $N(0, \sigma_c^2 \tau^*(z))$

Case 1: individual shocks given by $W_{c,t}$



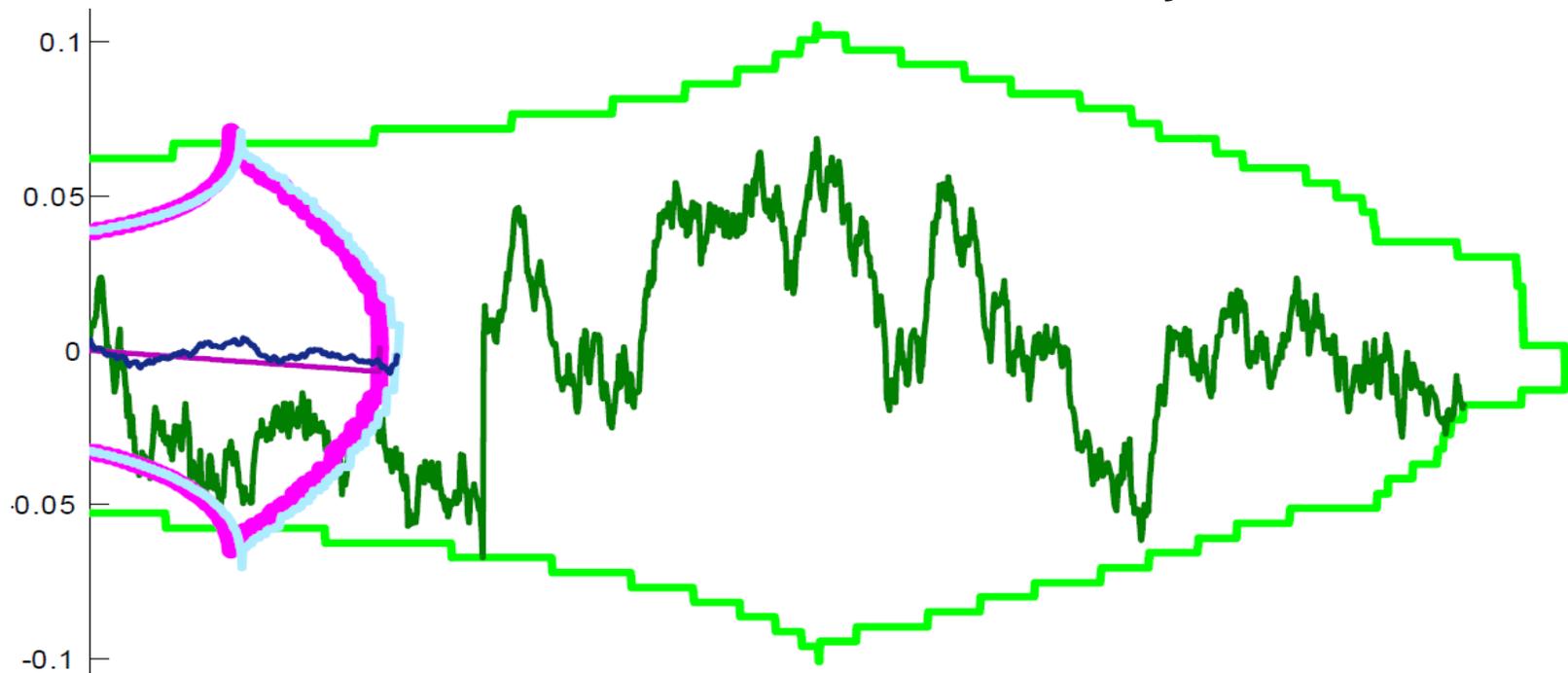
- ▶ Alvarez, Lippi, Paciello (2011, 2015): if small μ and no new information between reviews \rightarrow only informed price changes

Case 1: individual shocks given by $W_{c,t}$ (red lines)



- ▶ Alvarez, Lippi, Paciello (2011, 2015): if small μ and no new information between reviews \rightarrow only informed price changes
 - ▶ Frequent reviews (4.6 per year) to match frequent price changes
 - ▶ Volatile shocks to match large abs size of price changes
 - ▶ Menu cost determines conditional state-dependence, match $E(ft_t^2)$
- ▶ Aggregate response close to time-dependent model
- ▶ If $W_{f,t}$ aggregate \rightarrow same result since calibration is unaffected

Case 2: individual shocks given by $W_{f,t}$ (green lines)



- ▶ New info between reviews due to freely observed shock $W_{f,t}$
- ▶ Firms use price adjustments to respond to $W_{f,t}$
 - ▶ Frequent “uninformed” price changes (75% of all price changes)
 - ▶ Volatile $W_{f,t}$ shocks to match large price changes
 - ▶ 3 times less frequent reviews (1.4 per year)
- ▶ 3 times more persistent IRFs after monetary shock

Takeaways so far

- ▶ How information is acquired matters for joint price and information adjustment behavior
- ▶ ... and for aggregate implications
- ▶ Matching conventional price moments may not be sufficient for identifying the adjustment and info costs

1. Need to further explore model implications

- ▶ Study intermediate case: some of idiosyncratic info can be free
 - ▶ Pasten and Schoenle (2016): economies of scope in information cost for multiproduct firms
- ▶ Characterize interaction of price and info adjustments
 - ▶ Comparative statics
 - ▶ How important is the drift μ ?
 - ▶ Look for testable predictions
- ▶ Explain how calibration targets identify parameters
 - ▶ ALP derive that mapping analytically – try same calibration as in ALP?

2. Need to further explore micro data

- ▶ Exploit industry characteristics
 - ▶ Variation in the curvature of the objective: food vs services
 - ▶ Variation in volatility: higher volatility associated with higher frequency of price changes in BCGM and lower in ALP
- ▶ Distribution of spell durations or hazard rates
 - ▶ Spikes stem from information updating: may not be a powerful test
 - ▶ Heterogeneity of price spells: V-shaped hazard rates? Do short spells respond to old inflation? Do short (long) price changes look state-(time-) dependent?
- ▶ Survey evidence: reviews more frequent than price changes?
 - ▶ Some reviews are less costly than others? E.g., multiproduct retailers
 - ▶ Behavior of firms' expectations helps differentiate models with information rigidities: do stable forecasts imply longer price spells?

3. Clarify responses to monetary shocks

- ▶ p_t^* exogenous \rightarrow no GE feedback
 - ▶ Difficult to gauge importance of selection effect (Goloso-Lucas 2007)
 - ▶ No invariant distribution of firms over (z, τ) ?
 - ▶ Consider mean-reverting processes instead of Wiener?
- ▶ Additional layer (future research)
 - ▶ Information externality: price adj affecting τ (Gorodnichenko 2010)
 - ▶ Strategic interactions (Hellwig and Veldcamp 2009)

Summary

- ▶ Insightful paper with important contribution to literature
- ▶ How information is acquired matters for joint price and information adjustment behavior, and for aggregate response
- ▶ Matching conventional price moments may not be sufficient for identifying the adjustment and info costs
- ▶ Need a bit more work to validate the model and quantify information cost