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 $(z, \tau)$-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 $(z', \tau') = (c(\tau), \tau)$

- Information acquisition: if $\tau = \tau^*(z)$, set $(z', \tau') = (z + \sigma_c \sqrt{\tau^*(z)} \epsilon, 0)$
  where $\epsilon$ is an i.i.d. draw from $N(0, \sigma^2_c \tau^*(z))$
Case 1: individual shocks given by $W_{c,t}$

- Alvarez, Lippi, Paciello (2011, 2015): if small $\mu$ 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 $\mu$ 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 $E(f_{t}^{2})$
- 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 $\mu$?
  - 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 (Golosov-Lucas 2007)
  - No invariant distribution of firms over $(z, \tau)$?
  - Consider mean-reverting processes instead of Wiener?

- Additional layer (future research)
  - Information externality: price adj affecting $\tau$ (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