Discussion of How (Not) to Identify Demand Elasticities in Dynamic Asset Markets

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Overview

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My discussion:

1. Which definition is useful for applications?
2. Estimated elasticity informs underlying policy-invariant structural parameters
   - In many reasonable settings, estimated elasticity is also policy-invariant
   - Illustrate this point using the model in this paper

Point 1: Two Definitions of Elasticity

True elasticity

Holding future prices constant:

$$\partial_{p_t} \log \tilde{\theta}(p_t, \mathbb{E}_t[p_{t^+}], X_t)$$

Estimated elasticity

Letting future prices adjust:

$$\partial_{p_t} \log \theta(p_t, X_t)$$

where $\theta(p_t, X_t) \equiv \tilde{\theta}(p_t, \mathbb{E}_t[p_{t^+}](p_t), X_t)$

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But a definition is useful only in the context of its application
Which definition do applications actually need?

What Research Questions Does DSAP Seek to Address

An incomplete list of applications of DSAP:

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All study responses to **persistent** demand shifts and price changes

$\Rightarrow$ The estimated elasticity—demand response to persistent price changes—is the appropriate object for these applications!

The Relevance of True Elasticity

- Recall the definition:

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- Can we estimate it to inform the structural model?
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An internal tension: Arguing for the near impossibility of estimating true elasticity, it diminishes it relevance

Point 2: But the Estimated Elasticities Depend on Shock Persistence

- **Setup.** Instrument z_t identifies the elasticity:

$$\frac{d \log \theta(p_t)\ /dz_t}{dp_t/dz_t} \equiv \frac{d \log \tilde{\theta}(p_t,\ \mathbb{E}_t[p_{t+}](p_t))\ /dz_t}{dp_t/dz_t}$$

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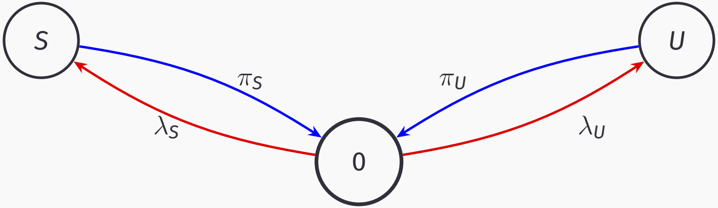
- Next slides: illustrate these point using this paper's model

The Paper's Model, with Small Modifications

- Single asset; three states $\{0, S, U\}$; continuous trading without event date



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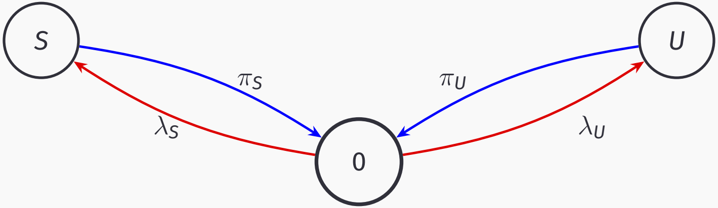

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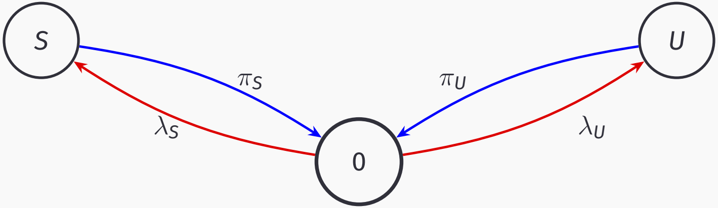

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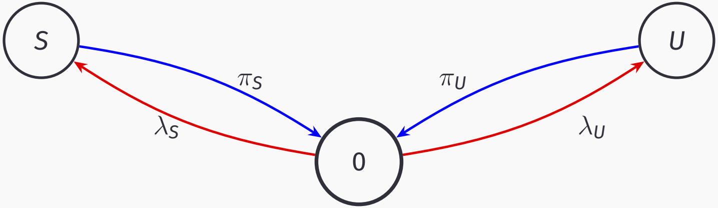
- But they differ in **persistence**: π_s is the reversion rate back to state 0



Identify Elasticity From the Price Shift

- Suppose the state jumps from 0 to $s \in \{S, U\}$, and investors observe s
- The econometrician estimates the elasticity:

$$\eta(s) = -\frac{\log \theta_{t^+} - \log \theta_{t^-}}{p_{t^+} - p_{t^-}}$$

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- Around the Merton benchmark, elasticity is proportional to the reversion rate π_s:

$$\eta_s = \pi_s \bar{\eta}$$

where $\bar{\eta}$ is a shock-independent structural parameter. In this model $\bar{\eta} = \frac{1}{\mu - r_f}$

- The estimated elasticity is larger with the more transitory shock:

$$\eta_S > \eta_U \iff \pi_S > \pi_U$$

- This seems problematic: different instruments estimate different elasticities!

Estimated Elasticities as Portable Estimates

But it doesn't mean we can't use the estimated elasticity for inferences!

- Suppose the econometrician only observes the S jump and estimates η_S
- She wants estimate the elasticity to a U jump. Under this model, we can solve

$$\eta_U = \pi_U \bar{\eta} = \eta_S \frac{\pi_U}{\pi_S}$$

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An analogy of Marginal propensity to consume (MPC) from the macro literature:

- MPC itself is not a structural parameter; it is also horizon-dependent
- But through the lens of a given model, it pins down the underlying parameters
- It is considered as a central moment in modern macroeconomics

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The estimated elasticity is shock-invariant, if investors do not observe the shock

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where $\bar{\pi} \equiv \omega_0\pi_S + (1-\omega_0)\pi_U$ is the posterior-weighted average reversion rate

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- The estimated elasticity is shock-invariant
- Investors cannot distinguish S from U, so they respond to the "average" shock

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- If a more structural model can fit better, just estimate the structural parameters
- Current state: few portfolio-choice models can match empirical moments well
- Draw another parallel to MPC from the macro literature:
  - Representative-agent models cannot match the high MPC estimated in the data
  - It inspires a new generation of consumption-saving models e.g. heterogeneous agent new keyesian (HANK), which becomes the modern workhorse
- Looking forward to empirics-theory synergy!

References I

Gabaix, X., & Koijen, R. S. J. (2021, June 28). ***In Search of the Origins of Financial Fluctuations: The Inelastic Markets Hypothesis* (w28967).** National Bureau of Economic Research. https://doi.org/10.3386/w28967