"*Costly Interpretation of Asset Prices*" Xavier Vives & Liyan Yang

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Costly Interpretation of Asset Prices

Motivation:

- *Data is only information after it has been analyzed*: *investors need to extract information from market prices*
- But, in contrast, to standard *RE* models *it takes time*, *effort and resources to uncover price information*

Question: *What if interpreting price information is costly*
Can limited sophistication explain asset price puzzles?

This paper: Proposes a novel model of investor sophistication
Shows how costly interpretation helps resolve *asset price puzzles*

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Big Picture: *Interpretation is Hard*

Market Information:

- *Most economic indicators* are the result of market outcomes
- *GDP Statistics, firm demand, household income, asset prices...*
- *Interpretation of fluctuations in market outcomes?*

But *what limits the interpretation of market information?*

$\Longrightarrow$ that interpretation is complicated and arduous

Xavier and Liyan show how *costly interpretation of market information*

limits people's sophistication $\Rightarrow$ *creates disagreement and trade*

$\Rightarrow$ *helps makes market outcomes noisy*

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A Simple Example

Basic Setup:

- Simplified two-period *mean-variance asset price model*
- *Risky asset* with terminal payoff $V = v + \xi$ and a *riskless asset*
- *(1)* Sophistication acquisition at cost c; *(2)* Observe $s_i = v + \varepsilon_i$ and $s_p = v + \alpha u$ (*if soph.*) or $s_{ip} = s_p + x_i$, $x_i = u + e_i$ (*if not*) and trade

Equilibrium Characterization:

1. *Demand for Asset:* $D_i = (\mathbb{E}_i[V] - p)\,\mathbb{V}_i[V]^{-1}$
2. *Market Equilibrium:* $\int_0^1 D_i(p; s_p, s_{ip})\,di = 0$
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Asset Price Implications

Equilibrium Asset Price:

$$p = \alpha_0 v + \alpha_1 u, \quad s_p = v + \frac{\alpha_1}{\alpha_0} u$$

- *Informativeness*: $\alpha = \alpha_1 / \alpha_0$
- *Sophistication*: $d\alpha / d\mu < 0$

Asset Price Implications:

- *Momentum*: $\mathbb{C}ov(V - p, p) > 0$
- *Excess volatility*: $\mathbb{V}[V - p] > \mathbb{V}[\xi]$
- *Excess volume*: $\int_0^1 |D_i(p; s_p, s_{ip})| > 0$

All Moments (Eventually) Decrease with *Sophistication*!

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A Closer Look at Volume

Volume of Trades:

$$Q = \sqrt{\frac{2}{\pi}} \frac{Dispersion}{Risk}$$

- *Overall risk decreases in* μ
- *Dispersion (can be) non-monotone in* μ

Empirical Tripartite Relationship:

- *Volume resembles dispersion*
- *Positive relationship between dispersion and risk*
- *... But also occasionally for some markets a negative*

Limited Sophistication Resolves the Tripartitie Relationship!

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Complementarity, Multiplicity and Welfare

Sophistication:

$$\Phi(\mu) \equiv W_u(\alpha(\mu)) - W_s(\alpha(\mu)) - c$$

- $\Phi(0) \leq 0: \ \mu^\star = 0, \quad \Phi(1) \geq 0: \ \mu^\star = 1$
- $\Phi(\mu^\star) = 0: \ \mu^\star \in (0,1)$

Multiple Equilibra: *Strategic complementarity in acquisition*

Non-Monotone Welfare:

$$W^\star = \mu^\star W_s(\mu^\star) + (1-\mu^\star) W_s(\mu^\star)$$

- *Benefits: less misaligned prices*
- *Cost: acquisition costs and trade*

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A Bird's Eye View

The Paper is Overall:

- *Compelling, clear and consequential*
- Creates *clean insights about limited sophistication*
- About more than certain asset price puzzles:
  How *people* form beliefs in complex setups? Overturn *NK Puzzles?*

Comments:

1. *Asset Managers and Sophisticated Markets*
2. *A Dynamic Constraint*: *Higer-Order Beliefs*
3. *Occam's Razor vs Limited Sophistication?*

Sophisticated Markets

Financial Markets:

- *Returns to scale in information collection*
- *Returns to scale in trading on information*

Asset Managers: *... arise as a result of the RTS in collecting and trading on information (Admanti and Pfleiderer, 1988 AER)*

Asset Managers Create Sophisticated Markets

$$S = \mu + (1 - \mu)\delta$$

- *Asset manager choice amplifies asset price puzzles?*
- *Grossman/Stiglitz with asset managers (Pedersen, 2016)*

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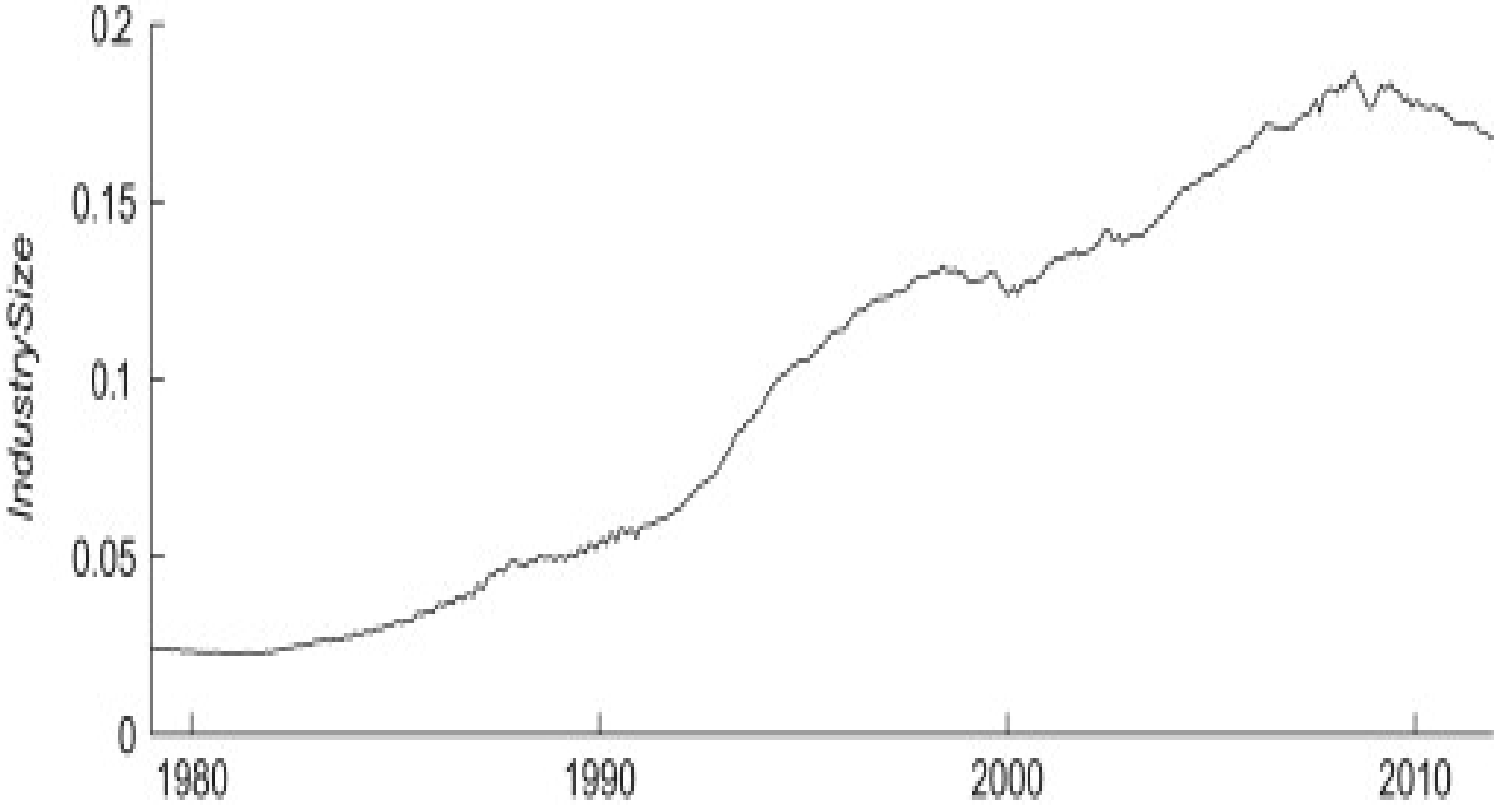
Efficient/Inefficient Markets?



Source: Pastor et al (2015, JFE)

Bai et al (2013) and Rosch et al (2015) $\Longrightarrow$ *More Efficient Financial Markets*

A Dynamic Constraint

CARA-Normal Framework:

- Tractable, clear exposition
- ... but ultimately a static representation

Beauty-Contests and Higher-Order Beliefs?

A Dynamic Extension:

- *Further puzzles:* bubbles? underresponse?
- *Higher-order beliefs:* know what others know

Higher-Order Beliefs *Increase* Investor Sophistication?

Occam's Razor vs Limited Sophistication

A Plethora of Explanations:

- Sparsity, rational inattention, salience, level-k...
- Learning, extrapolation, robust control, *receiver noise*

Correct Framework?

Occam's Razor:

- *Limited-RE simpler than RE*
- *Regression vs sophistication acquisition*?

A *Simple* Model of Limited Sophistication?

Final Remarks

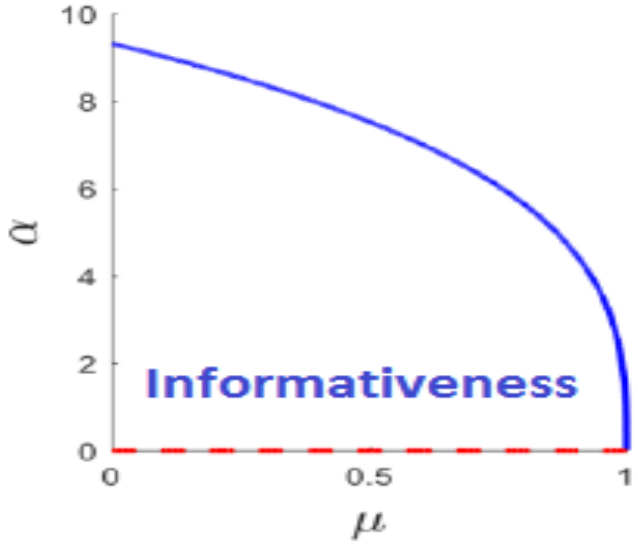
Conclusion:

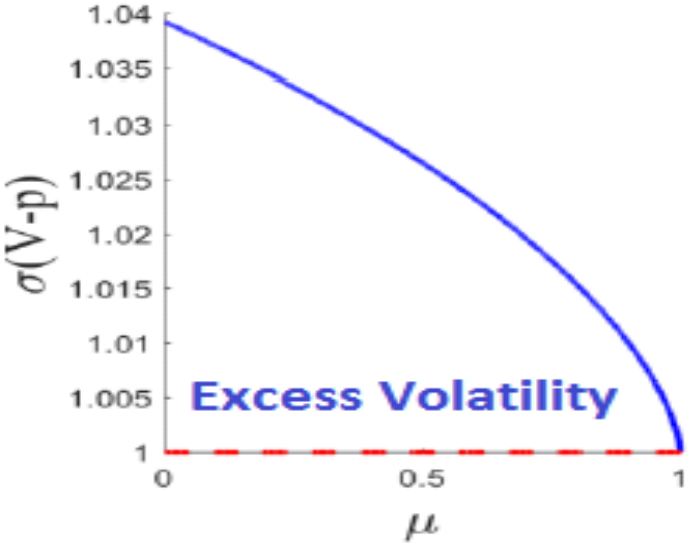
- Since **Lucas (1972)** and **Grossman and Stiglitz (1980)** focus on how people infer **information** from **market prices**
- Yet, the presence of **finite (mental) resources** implies that people **commit errors** in their inference process
- **Xavier and Liyan** turn our attention to the **critical role played** by these **inference errors** for *realistic asset price dynamics*
- **.... sizable upside potential**

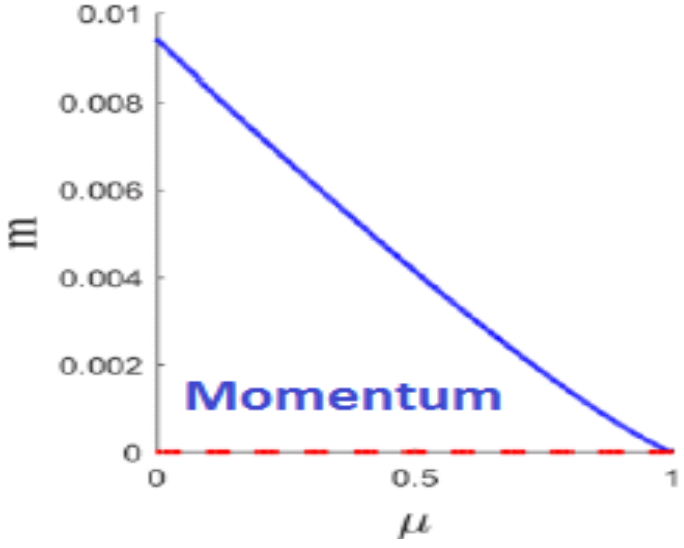
John Stuart Mill (1863): *Homo Economicus* $\neq$ *Homo Sapiens*

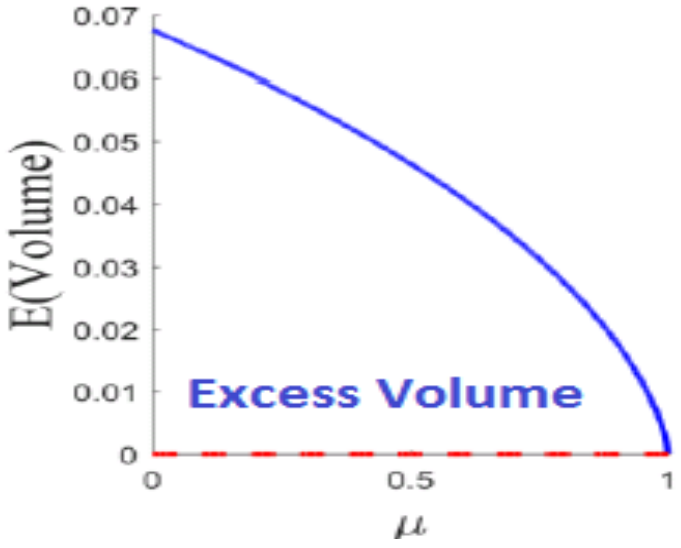
Thank you for your time and attention!

Asset Price Implications









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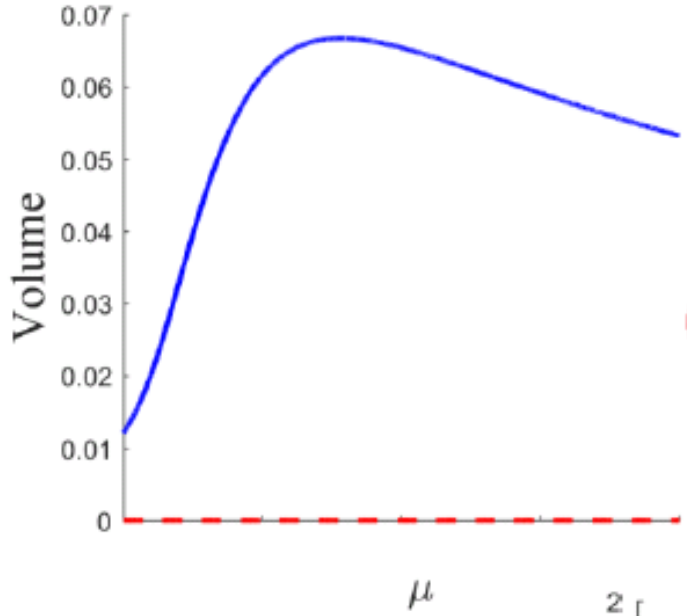

$$\text{Volume} \propto \frac{\text{Disagreement}}{\text{Risk}}$$