"*Price Dispersion, Private Uncertainty and Endogenous Nominal Rigidities*" Gaetano Gaballo

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Sticky, Informative Prices

Motivation:

- *Imperfect information provides a rationale for sticky prices*: *the less firms know, the less they can adjust prices*
- But, *equilibrium* prices also reveal the "*dispersed bits of incomplete knowledge that we all possess" (Hayek, 1945)*

Question: *How can we maintain imperfect information?*
Does stickiness vanish with price dispersion?

This paper: Proposes a novel model of *nominal frictions*

Shows how *learning from prices creates stickiness without dispersion*

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Big Picture: *A Limit to Informativeness*

Market Information:

- *Most economic signals* are the result of market outcomes
- *GDP Statistics, household income, firm prices, asset prices...*
- *All combine and reveal dispersed information*

But *what limits the informativeness of market information?*

$\Longrightarrow$ that market outcomes are the result of complicated GE

Gaetano shows how *GE feedbacks can help limit the informativeness of market outcomes* $\Rightarrow$ *creates disagreement and misallocation*

$\Rightarrow$ *helps makes market outcomes persistent*

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A Simple Example

Basic Setup:

- Simplified two-period *CARA-Normal asset price model*
- *Risky asset* with terminal payoff $\theta \sim N(0,1)$ in *supply* $S = \alpha\theta$ and a *riskless asset* with normalized zero return
- *Stark* information structure: $p_i = p + \eta_i$, $\eta_i \sim N(0, 1/\tau_\eta)$

Equilibrium Conditions:

1. *Demand for Asset:* $D_i = (\mathbb{E}_i[\theta] - p)\,\mathbb{V}_i[\theta - p]^{-1}$
2. *Market Equilibrium:* $\int_0^1 D_i(p; p_i)\,di = S(\theta)$

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Equilibrium Characterization

Equilibrium Asset Price:

$$p_i = \bar{\mathbb{E}}[\theta] - \delta\theta + \eta_i \overset{!}{=} k_0\theta + \eta_i$$

- *Supply Offset*: $\delta = \alpha\bar{\mathbb{V}}[\theta - p]$
- *Informativeness*: $s_{ip} = \theta + (1/k_0)\,\eta_i$

Equilibrium Solution:

$$p_i = \frac{\tau_\eta k_0^2 - \alpha}{1 + \tau_\eta k_0^2}\theta + \eta_i \overset{!}{=} k_0\theta + \eta_i$$

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Dispersed Limit Equilibria

Fixed-Point Condition:

$$k_0 = \frac{\tau_\eta k_0^2 - \alpha}{1 + \tau_\eta k_0^2}$$

- *Third-order polynomial in* k_0
- *Decartes' Rule of Signs: one or three equilibria*

Multiple Equilibria: *Strategic complementarity*

Dispersed Limit Equilibria:

$$p = \bar{\mathbb{E}}[\theta] - \delta\theta = k_0\theta$$

- $\lim_{\tau_\eta \to \infty} k_0^1 = 1 \sim$ *full information*
- $\lim_{\tau_\eta \to \infty} k_0^{2,3} = 0 \sim$ *zero information!*

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Endogenous Nominal Stickiness

Equilibrium Selection:

$$\hat{\mathbb{E}}_i^n[\theta] \xrightarrow{n} \mathbb{E}^{DLE}[\theta] = 0$$

- *DLE locally learnable*
- *... and unique rationalizable outcome*

Economic Consequences:

- *Equilibrium price is sticky*
- *... and does not transmit information*
- *Equilibrium allocations $\neq$ first best*

Endogenous Equilibrium Stickiness!

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A Bird's Eye View

Model Setup:

- Monopolistic competitive *Lucas island model*
- Continuum of firms preset labor and capital
- Uncertain about money supply θ and preference shock ξ_i

Learning from Prices:

Allocative vs informational trade-off through R

$\Longrightarrow$ *little price dispersion makes monetary policy potent*

Comments:

1. *Allocative vs Informational Role*
2. *Symmetric Information: Another Candidate?*
3. *Natura Non Facit Saltus*

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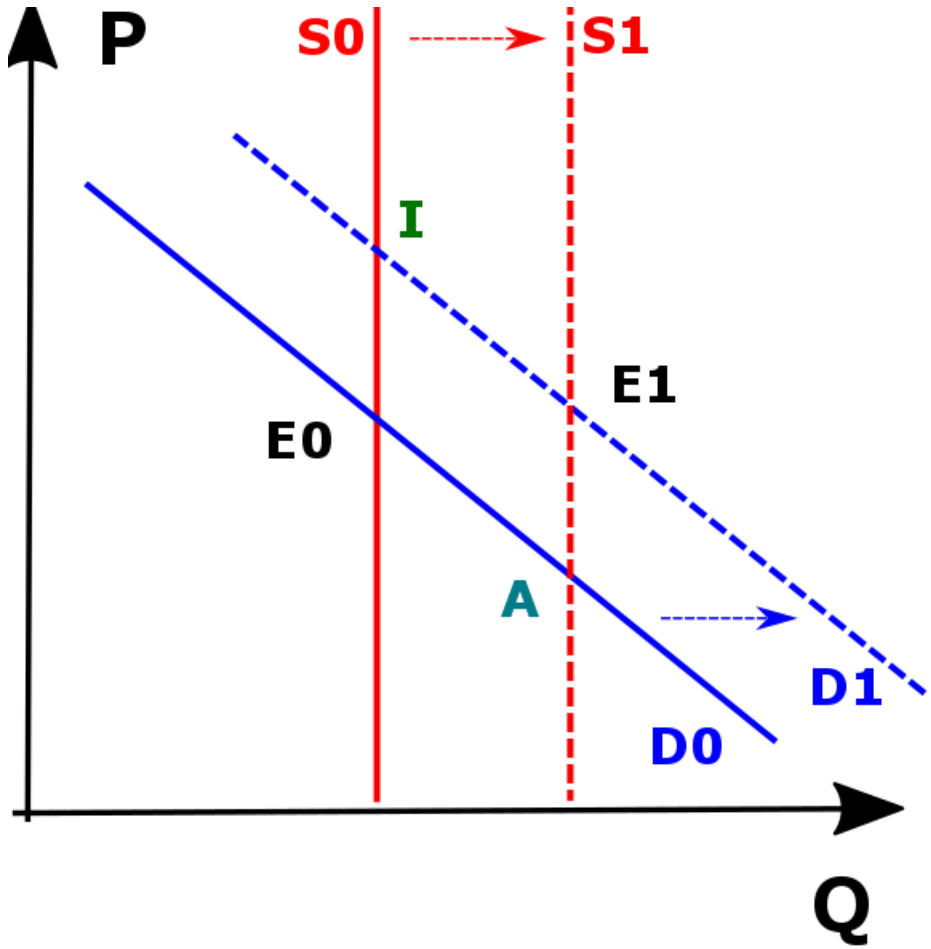
Allocative vs Informational Role

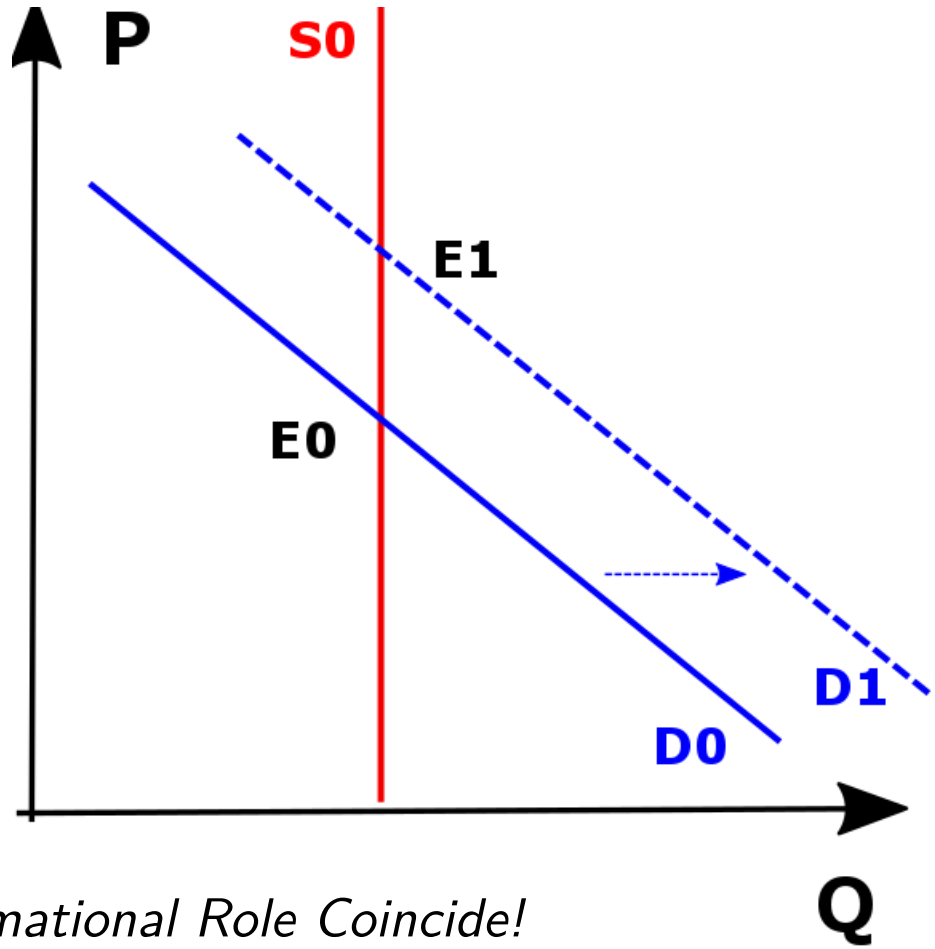
Fundamental Value Shock:



Small Noise Maintains Imperfect Information!

Allocative vs Informational Role

A Pure Demand Shock ($\alpha = 0$):



Allocative and Informational Role Coincide!

Nature of Disturbance? Supply vs Demand Competition?

Unexplored Consequences

Dispersed Information Equilibria:

- *Sticky local prices* $r_i \to 0$
- *Powerful monetary policy*

Cross-sectional Dispersion: *...increases both for productivity and for consumer prices in recessions (Bloom '09; Vavra, '14)*

Empirical Consequences:

$$\frac{\partial^2 y}{\partial m \partial \sigma_\theta} < 0 \quad vs \quad \frac{\partial^2 y^{li}}{\partial m^{li} \partial \sigma_\theta^{li}} > 0$$

- *Theoretically:* <0 *(Vavra, '14)*
- *Empirically:* <0 *(Tenreyro and Thwaites, '17)*

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Natura Non Facit Saltus

Multiple Limit Equilibria:

- *Full information*
- *Dispersed information*

Correct Limit Equilibrium?

Leibniz' Axiom:

- *Learning limit vs mathematical limit*?
- *Payoff dominance (Harsanyi and Selten, '88)*?

A Failure of Coordination?

Final Remarks

Conclusion:

- Since **Lucas (1972)** and **Grossman and Stiglitz (1980)** focus on how people infer **information** from **market prices**
- Yet, the mere presence of **market interactions** has profound implications for how prices **respond** to unobserved **fundamentals**
- **Gaetano** turns our attention to the **important role played** by such **market interactions** in *limiting price informativeness*
- **.... clear upside potential**

Rubinstein (1989): *Almost Perfect Information* $\neq$ *Perfect Information*

Thank you for your time and attention!