

Learning from Prices, Liquidity Spillovers, and Market Segmentation

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- Overview
- Key Contribution
- Robustness

- 2 periods. 2 interdependent risky assets

$$v_D = \delta_D + d_D \cdot \delta_F + \eta$$

$$v_F = d_F \cdot \delta_D + \delta_F + \nu$$

d_j : loading of asset j on asset's $-j$ principal component

- 3 types of traders in each market

- Uninformed traders:

- CARA utility; observe own asset's principal component and price

$$\mathcal{F}_j^u = \{\delta_j, p_j\}$$

- Informed traders (pricewatchers): fraction μ_j

- CARA utility; observe own asset's principal component and **both** prices

$$\mathcal{F}_j^i = \{\delta_j, p_j; p_{-j}\}$$

- Noise traders: exogenous supply u_j

- Payoff components + noise trading: normal distributions

Proposition 2: With limited attention ($\mu_j \leq 1$), there exists a noisy REE of the type

$$p_j = \delta_j + B_j u_j + A_j \delta_{-j} + C_j u_{-j}; \quad (j = D, F)$$

- Informational content of prices:

- Pricewatchers in market j extract info about δ_{-j} from p_{-j}

- $w_{-j} = \delta_{-j} + B_{-j} u_{-j}$

- They know how uninformed and pricewatchers trade

- Uninformed in market j extract **less precise** info about δ_{-j} from p_j

- $\hat{w}_j = B_j u_j + A_j \delta_{-j} + C_j u_{-j}$

- They **don't** know how pricewatchers trade

- Key mechanism: cross-price informational interdependence
 - Informativeness of price p_j (about δ_j) affects information of agents in market $-j$
 - This affects their trading intensities and price informativeness of p_{-j}
 - ...which affects trading and price informativeness in market j even further
- Liquidity: price effects of noise trading (market depth)
 - Through **price informativeness**, liquidity across markets is **interdependent**

① Amplification: **liquidity spillovers**

$$\text{intra-market: } \underbrace{\frac{dB_D}{d\gamma_D}}_{\text{total effect}} = \kappa \cdot \underbrace{\frac{\partial f}{\partial \gamma_D}}_{\text{direct effect}} ; \quad \text{inter-market: } \underbrace{\frac{dB_F}{d\gamma_D}}_{\text{total effect}} = \kappa \cdot \underbrace{\frac{\partial g}{\partial B_D} \frac{\partial f}{\partial \gamma_D}}_{\text{direct effect}}$$

- Liquidity is **Fragile** (large κ): small drops in risk tolerance may sharply reduce liquidity
- Multiple equilibria can arise: low/high price informativeness and liquidity in both markets

② Liquidity spillovers can be **negative**: opposing effects

- **Uncertainty**: more informative p_{-j} reduces uncertainty of all agents in j
 - Both pricewatchers and uninformed more willing to absorb noise trading
- **Adverse selection**: more informative p_{-j} enhances informational advantage of pricewatchers
 - Uninformed less willing to absorb noise trading

③ With endogenous info acquisition: **information complementarities**

- An increase in fraction of pricewatchers may **increase** incentives to become one

Key Contribution: spillovers through price informativeness

- Many have stressed role of risk tolerance/wealth effects in the comovement of liquidity
 - Kyle and Xiong (2001); Gromb and Vayanos (2002); Brunnermeier and Pedersen (2009)
- But cross market liquidity *contagion* through informational links seems new
 - This distinction can be important empirically
 - imagine the model with N interdependent securities!
 - Market disruptions can affect other markets where dealers don't appear funding constrained
 - It can also matter for policy implication regarding public liquidity provision
- This insight should be the main punchline
 - Perhaps document cases during 2008 crisis where this mechanism seems plausible
 - Ex: many hedge fund strategies were simultaneously hit in August 2007 and September 2008
 - Very challenging though: informational theories are hard to test!
- Low hanging fruit suggestion: add + supply and talk about risk premium

Robustness: are the main results assumption-specific?

- Let's consider different informational assumptions
 - Uninformed traders: observe **both** prices
 - $\mathcal{F}_j^U = \{\delta_j, p_j; p_{-j}\}$
 - Informed traders: observe in addition a signal of δ_{-j}
 - $\mathcal{F}_j^I = \{\delta_j, p_j; s_{-j}, p_{-j}\}$, with $s_{-j} = \delta_{-j} + \epsilon_{-j}$
- This specification is closer to traditional REE setups
 - Assumption of inability/cost of observing other prices OK for high trading frequency
 - Probably less satisfactory for modeling trading choices over weeks/months/quarters
- I conjecture that in such a (plausible) environment:
 - 1 Price informativeness and liquidity still interconnected (good!), but..
 - 2 Spillovers can only be positive
 - 3 Information acquisition is no longer complementary (i.e; Grossman and Stiglitz (1980) holds)

$$\text{Uninformed demands: } X_j^u = \frac{\mathbb{E}[v_j|\delta_j, p_j] - p_j}{\gamma_j \mathbb{V}[v_j|\delta_j, p_j]}$$

- **Uncertainty effect (denominator):**
 - More informative p_{-j} makes pricewatchers in j trade more aggressively
 - p_j becomes more informative about δ_{-j} : $\mathbb{V}[v_j|\delta_j, p_j]$ falls
- **Adverse selection effect (numerator):**
 - More informative p_j makes $\mathbb{E}[v_j|\delta_j, p_j]$ and p_j move closer together
 - Uninformed assign more probability to price movements driven by informed trading
 - ... and become less willing to "make the market" (absorb exogenous demand)
- A negative spillover occurs when uncertainty effect is weaker
 - Low fraction of informed traders (so reduction in uncertainty is low)
 - Risk tolerance is already pretty high (so mg effect on denominator is low)

- In the modified framework, this no longer holds
 - Uninformed demands: $X_j^u = \frac{\mathbb{E}[v_j | \delta_j, p_j, p_{-j}] - p_j}{\gamma_j \cdot \mathbb{V}[v_j | \delta_j, p_j, p_{-j}]}$
 - More informative p_{-j} **reduces** the informational advantage of the informed
 - Uncertainty **and** adverse selection are alleviated

- Modified framework also matters for complementarity of information
 - More informative p_{-j} : higher value of **pubic information**
 - This should reduce the benefit of becoming informed in market j (purchase private signals)
- Actually, this could reduce the multiplier κ
 - More informative p_{-j} induces **less investment** in private info
 - Which would attenuate the surge in price informativeness across markets
 - Would multiplicity still emerge? Maybe, maybe not..

- Illiquidity can spread through inter-market informational linkages
 - ✓ New insight in REE literature
 - ✓ Potentially of first-order relevance
- Central insight robust to alternative information environments
 - But some results may change under more standard REE assumptions