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Differential Access to Price Information in Financial Markets

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Background

- Recently exchanges have been supplementing their tape revenue by directly selling trade and quote data to some traders
  - NYSE: NYSE Best Quote, NYSE Open Book, and NYSE Amex Best quote
  - Nasdaq: Nasdaq ITCH
  - Arcapelago (a part of NYSE/Euronext)
  - The Deutshe Borse: MIFID Post Trade
  - London Stock Exchange…

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Background (Cont.)

- Complaints from market participants
  - Equivalent to "looking at share prices listed in tomorrow's newspaper stock tables today" ('Fast Traders' New Edge', WSJ 2010 June 4)
- Policy debates
  - SEC ---"is the existence of any latency, or disparity in information transmitted, **fair** to investors or other market participants that rely on the consolidated market data feeds and do not use individual trading center data feeds?" (SEC Concept Release on Equity Market Structure, April 2010)
  - Committee of European Securities Regulators (CESR)--- what role does price information play "in achieving ***efficient price discovery*** and facilitating the achievement and monitoring of best execution." (CESR Technical Advice, July 2010)

The Economic Questions

- Impact of differential access to price information on market outcomes?
- Many examples of accessing price information at different speeds
  - "Latency arbitrage"/"co-location": Traders purchase fast data from exchanges
  - Delays in data transmission: In volatile periods, such as "Flash Crash" of May 6, 2010, delays in data transmission sometimes arise and not all traders experience the same delay
  - Lack of real time price reporting: price data on some trades (e.g., odd-lot trades) or some markets (e.g., OTC markets) is not provided to the public

What Do We Do?

- Use a multi-period REE model to analyze the effects of differential access to price information on the equity premium, market liquidity, welfare and information production.

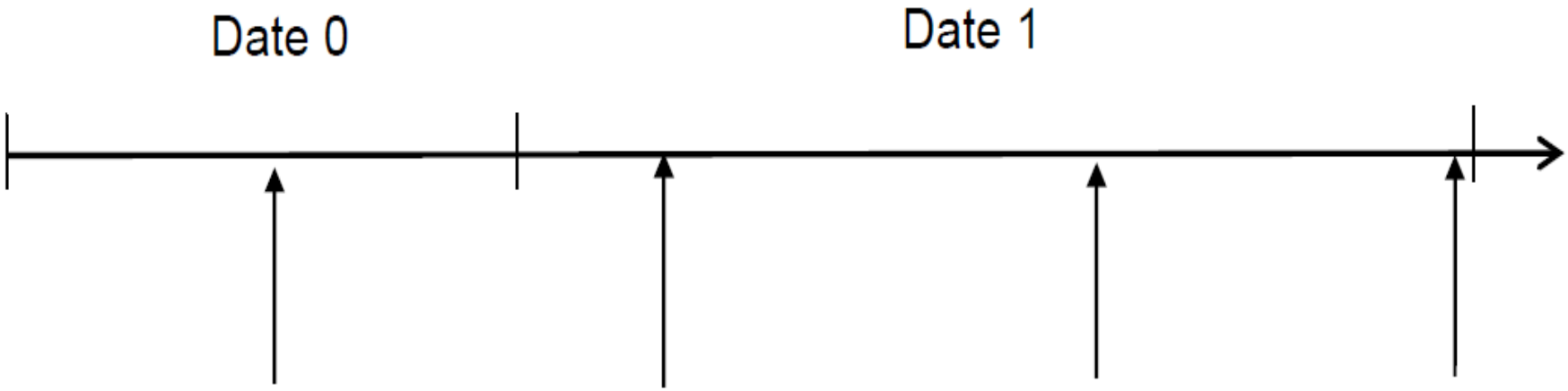
- If traders are endowed with asset-signals, more previous price information
  - Reduces the equity premium and increases market liquidity
  - Makes noise traders better-off (in terms of expected trading cost) and makes speculative rational traders worse-off

- When traders have to purchase both asset-signals and price-data, price data can "crowd out" traders' incentive to develop asset-signals.

Most Closely Related Literature

- Cespa and Foucault (2008) use a random endowment model ("Hirshleifer effect") to study normative questions
  - zero supply of stock shares causes the cost of capital to be always equal to zero
  - find that the optimal market structure is either fully opaque or has limited transparency
- Cespa and Foucault (2011) in a multi-asset setting, focus on co-movement in liquidity.

Baseline Model



- Date 0 rational traders observe signals $\tilde{s}_i^0$ and trade bonds and stocks
- Date 0 noise traders supply random $\tilde{x}^0$ shares of stocks
- Price $\tilde{p}^0$ is formed

- Exchange sells $\tilde{p}^0$ at price q
- μ fraction of date 1 rational traders purchase $\tilde{p}^0$
- Each date 1 rational trader observes signal $\tilde{s}_i^1$ (at no cost)

- Date 1 rational traders trade bonds and stocks
- Date 1 noise traders supply random $\tilde{x}^1$ shares of stocks

- Stock payoff $\tilde{v}$ realized
- Date 0 and date 1 rational traders consume

Benchmark Economies

- Compare the economy with "differential price information access", Economy D, with two benchmark economies

- Economy I: the exchange discloses the information $\tilde{p}^0$ to the public at no cost (e.g., SEC regulates a free disclosure in the US).

- Economy II: no previous price data is available (e.g., CESR bans price data selling in Europe).

Variables of Interest

- Positive variables:
  - Equity premium: $E[\tilde{v}-\tilde{p}^1]$
  - Liquidity (inverse of Kyle's lambda): $1/\alpha_x$

- Normative variables:
  - Rational traders: certainty equivalent of indirect utility
  - Exchange: profit
  - Noise traders: expected trading revenue

$$E[(\tilde{p}^1-\tilde{v})*\tilde{x}^1] = \underbrace{-E(\tilde{v}-\tilde{p}^1)*\bar{x}^1}_{\text{equity premium}} - \underbrace{\alpha_x \operatorname{Var}(\tilde{x}^1)}_{\text{price impact}}$$

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Implications of Selling Price-Information

	Economy D	Economy I	Economy II
Positive Implications			
Fraction of price-informed (μ)	0.0503	1.00	0.00
Equity premium	0.0148	0.0129	0.0216
Liquidity ($1/\alpha_x$)	4.2483	5.7407	3.4259
Normative Implications (certainty equivalence)			
Rational traders	0.0166	0.0148	0.0244
Noise traders	-0.0383	-0.0303	-0.0508
Exchange profit	0.0018	0.00	0.00
Total	-0.0199	-0.0155	-0.0264

Extension: Information Acquisition

- Date 1 traders are not endowed with asset-signals, but instead acquire them at cost *c*.

- So, Date 1 traders can purchase any combination of the two signals, $\tilde{s}^1_i$ and $\tilde{p}^0$, at costs *c* and *q*.

Results

- When c is small, our previous results are robust
- When c is large, the results are more complex; but, Economy I tends to have a higher liquidity and welfare
- Allowing the sale of differential access to price-information is generally harmful

Conclusion

- Develop a NREE model with differential access to price information.

- In an economy in which traders are endowed with private asset-signals, as more previous price information is present in the market:
  - the equity premium is lower and the market liquidity is higher;
  - noise traders are made better-off (in terms of expected trading cost) and speculative rational traders are made worse-off.

- Observing price information can cause traders to reduce their effort to gather information on the underlying asset.