Discussion of Bloomfield, O'Hara and Saar (2012) "Hidden Liquidity: Some New Light on Dark Trading"

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Main results

- Does transparency affect traders' behaviors? Yes
- Does transparency affect market outcomes? No
- Interesting results with regulatory implications on dark trading

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- Does transparency affect traders' behaviors? Yes
- Does transparency affect market outcomes? No
- Interesting results with regulatory implications on dark trading
- These results are also natural through the lens of a model.
  - A simple trading model in the form of a batch double auction, e.g. an open auction, or a close auction. Adapted from Du and Zhu (2012) "Ex Post Equilibria..."
  - Model predicts the sign of comp stat, but not statistical significance.
  - "Revenue equivalence theorem" in auction theory typically applies to independent values.

A trading model

- n symmetric traders. Trader i:
  - receives a private signal s_i and values the asset at

$$v_i = \alpha s_i + \beta \sum_{j \neq i} s_j, \quad \text{where } \alpha + (n-1)\beta = 1.$$

  - has the ex post utility $U(q_i, p^*; v_i) = (v_i - p^*)q_i - \frac{1}{2}\lambda q_i^2$, where $q_i =$ quantity and $p^* =$ price.

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- The market is organized as a uniform-price double auction, with observed liquidity supply S.
  - Each trader i submits a *demand schedule* $x_i(p)$.
    Trader i is willing to buy $x_i(p)$ units at the price of p.
  - The market-clearing price p^* satisfies

$$\sum_{i=1}^{n} x_i(p^*) = S.$$

An ex post equilibrium

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Proposition

Suppose that $n\alpha > 2$. There exists an ex post equilibrium in which trader i submits the demand schedule

$$x_i(p) = \frac{n\alpha - 2}{\lambda(n-1)}(s_i - p) + \frac{1-\alpha}{n-1}S,$$

and the equilibrium price is

$$p^* = \frac{1}{n}\sum_{i=1}^{n} s_i - \frac{(n\alpha - 1)}{n(n\alpha - 2)}\lambda S.$$

Ex post optimality is much stronger than Bayesian optimality.

An ex post equilibrium and interpretation

- In the ex post equilibrium, the distribution of signals $(s_1, s_2, ..., s_n)$ is irrelevant. If transparency only affects (beliefs about) distribution of signals, then the (ex post) equilibrium outcome is independent of transparency regimes.

An ex post equilibrium and interpretation

- In the ex post equilibrium, the distribution of signals $(s_1, s_2, ..., s_n)$ is irrelevant. If transparency only affects (beliefs about) distribution of signals, then the (ex post) equilibrium outcome is independent of transparency regimes.
- But transparency may change λ.
  e.g. $\lambda = a Var(v_i \mid s_i, display) + b$ funding costs.
  - How much information is displayed: Visible $\geq$ Iceberg $\geq$ Hidden
  - Uncertainty about $\{v_i\}$: Hidden $\geq$ Iceberg $\geq$ Visible
  - λ is weakly increasing in opacity: $\lambda_{hid} \geq \lambda_{ice} \geq \lambda_{lit}$.
  - If $\lambda_{hid} \approx \lambda_{ice} \approx \lambda_{lit}$, then there is no observable difference across transparency regimes.

3.4 Market quality: Information Efficiency

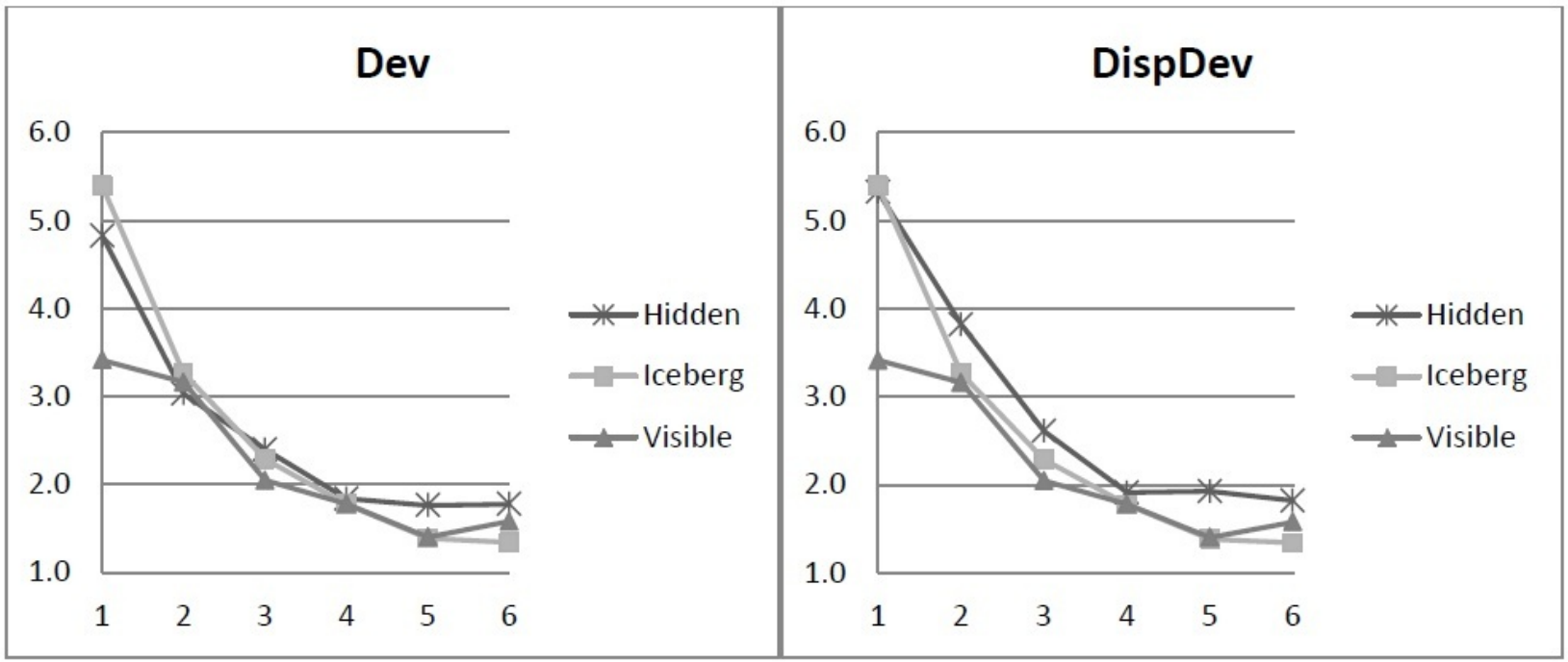
Model: The equilibrium price

$$p^* = \frac{1}{n}\sum_{i=1}^{n} s_i - \frac{(n\alpha - 1)}{n(n\alpha - 2)}\lambda S.$$

If $\mathbb{E}(S) = 0$, then $\mathbb{E}(p^*) = \sum_i s_i/n$ in all three regimes.

Experiment: Info efficiency is similar across transparency regimes.

Consistent



3.5 Trading profits

Model: Liquidity orders have a price impact proportional to λS. Their loss is proportional to λS^2. More opaque, more uninformed loss.

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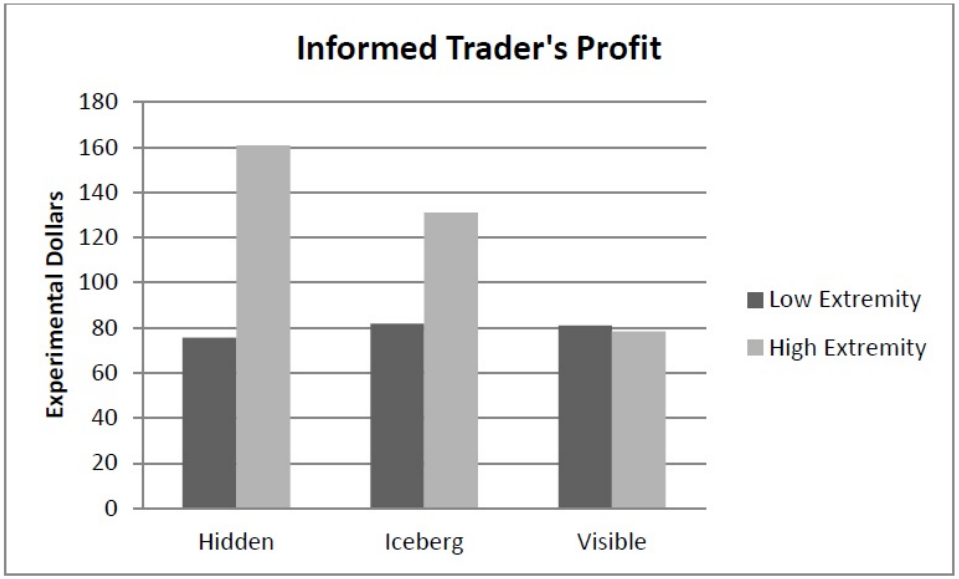
Experiment: Profits(hidden) $>$ profits(visible) for high-value info, otherwise not significantly different.



Consistent, up to statistical power.

3.3 Market quality: Liquidity

Model: Recall $x_i(p; s_i) = \frac{n\alpha-2}{\lambda(n-1)}(s_i - p) + \frac{1-\alpha}{n-1}S$. Aggregate depth at price p is

$$\left|\frac{\partial \sum_i x_i(p)}{\partial p}\right| = \frac{n(n\alpha-2)}{(n-1)} \cdot \lambda^{-1}.$$

Price impact, $\partial p/\partial x_i$, is proportional to λ.

Effective bid-ask spread is proportional to price impact (and to λ).

More opacity, higher λ, higher effective spread, and higher price impact.

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Experiment: Bid-ask spread and price impact do not vary with opacity. Consistent, up to statistical power

Depths are larger in opaque markets. Inconsistent, but how about "serious", closer-to-mid depth in the data? (If I can manage orders as price moves, I don't have to post many orders away from the mid.)

3.1 Who use nondisplayed orders?
3.2 Who supplies or demands liquidity?

The model has limited predictions for these questions.

Experiment:

- Informed traders respond more to changes in transparency.
- Total number of limit orders submitted does not vary significantly with transparency.
- Submission rates, fill rates, and taking rates vary (mildly) with transparency.

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Questions:

- What determines traders' choices between lit/dark orders? e.g. Why would informed submit any visible order in the hidden regime?
- Plot the schedule of limit orders by informed and uninformed traders?

Summary

- Conclusion: Market outcomes vary little with transparency regimes.
- Provocative (and natural) results, fresh insights on dark trading.
- A model that "explains" the results?
- Would richer order types "offset" market structure changes?