Who Sees the Trades? The Effect of Information on Liquidity in Interdealer Markets[a]

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Economics of Payments

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[a] The views expressed in this paper are those of the author and are not necessarily reflective of views at the Federal Reserve Bank of New York or the Federal Reserve System.

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- Value of transparency in decentralized markets
  - TRACE

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   - Dealers make markets, subject to liquidity cost and adverse selection
   - Trading in interdealer market outcomes is endogenous

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   - Dealers make markets, subject to liquidity cost and adverse selection
   - Trading in interdealer market outcomes is endogenous
2. Main questions
   - How is interdealer market liquidity determined?
   - How does post-trade information disclosure affect liquidity and efficiency?
   - What disclosure environment might a strategic platform choose?

Main Results

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2. Effect of Post-trade disclosure
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   - Nonmonotonic effect of disclosure
3. Strategic platform
   - Endogenize disclosure environment
   - Chooses disclosure that maximizes adverse selection

Related Literature

- **Liquidity Provisions in Decentralized Markets.** Duffie, Garleanu and Pedersen (2005); Lagos and Rocheteau (2009); Arseneau et al. (2017); Cujean and Praz (2016); Dunne, Hau and Moore (2015)
- **Information Asymmetry and Disclosure.** Bessembinder, Maxwell and Venkataraman (2006); Edwards, Harris and Piwowar (2007); Bessembinder and Maxwell (2008); Benos, Payne and Vasios (2016); Loon and Zhong (2016)

Model

- Three dates $t = 1, 2, 3$
- Two types of risk neutral agents
  - Measure 1 of dealers $i \in [0, 1]$
  - Measure 1 of traders $j \in [0, 1]$

Tiered Trading Structure

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1 **"Market-making" stage.** Dealer to Trader.

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1. **"Market-making" stage.** Dealer to Trader.
2. **"Interdealer" stage.** Dealer to Dealer.

Asset Value

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- Asset has (unknown) value v

$$v = \begin{cases} \bar{v} + x & \text{w.p. } \frac{1}{2} \\ \bar{v} - x & \text{w.p. } \frac{1}{2} \end{cases}$$

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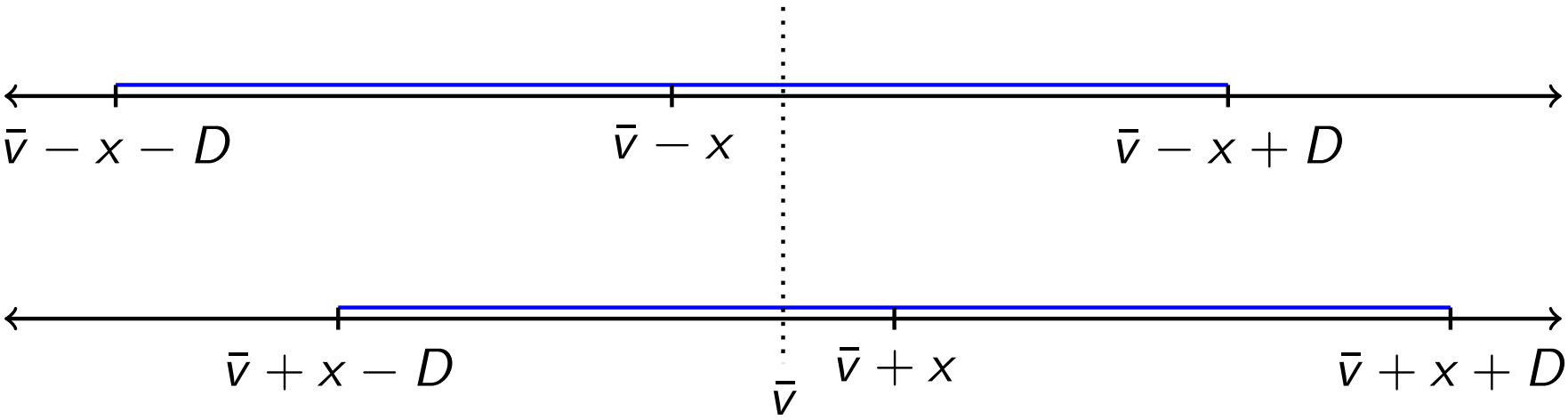
  - $v_j = v + d_j$ where $d_j \sim U[-D, D]$
  - D captures dispersion in private value

Traders' Valuation of Asset



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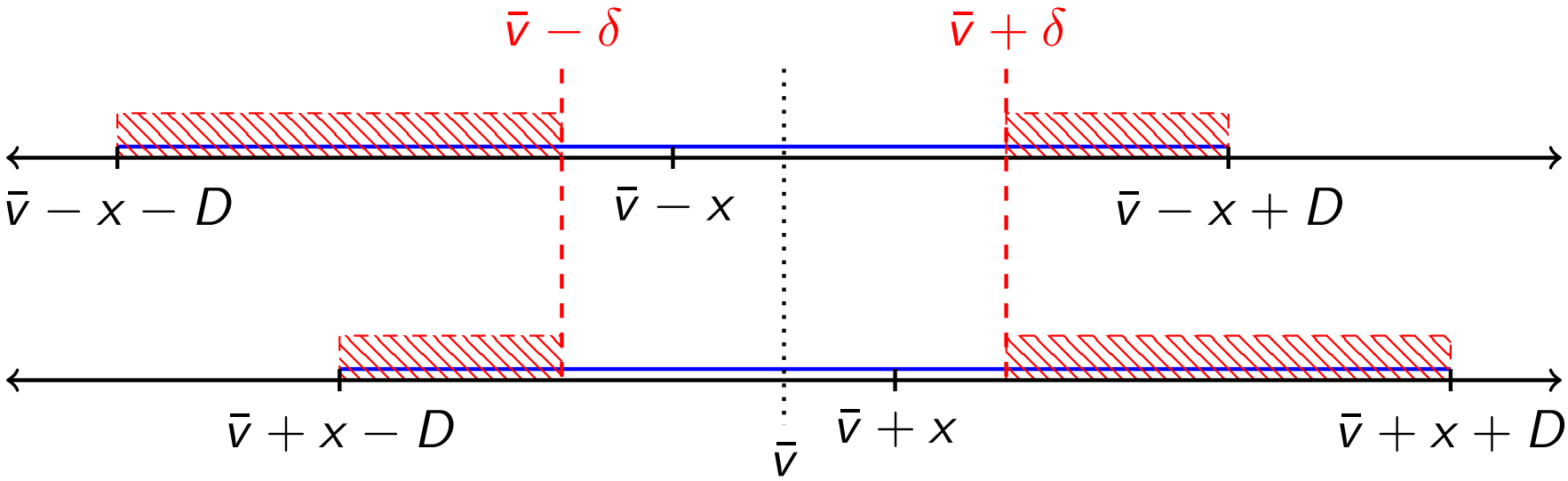
  - reject otherwise

Market-Making and Likelihood of Trade



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- Dealer type is *private*

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  - $\sigma \in \{buy, sell, \text{no trade}\}$
  - P^d transaction price

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- Dealer i incurs cost $\Delta \cdot |x_i|$.
- Δ opportunity cost of capital

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Solution concept: Symmetric-strategy PBE

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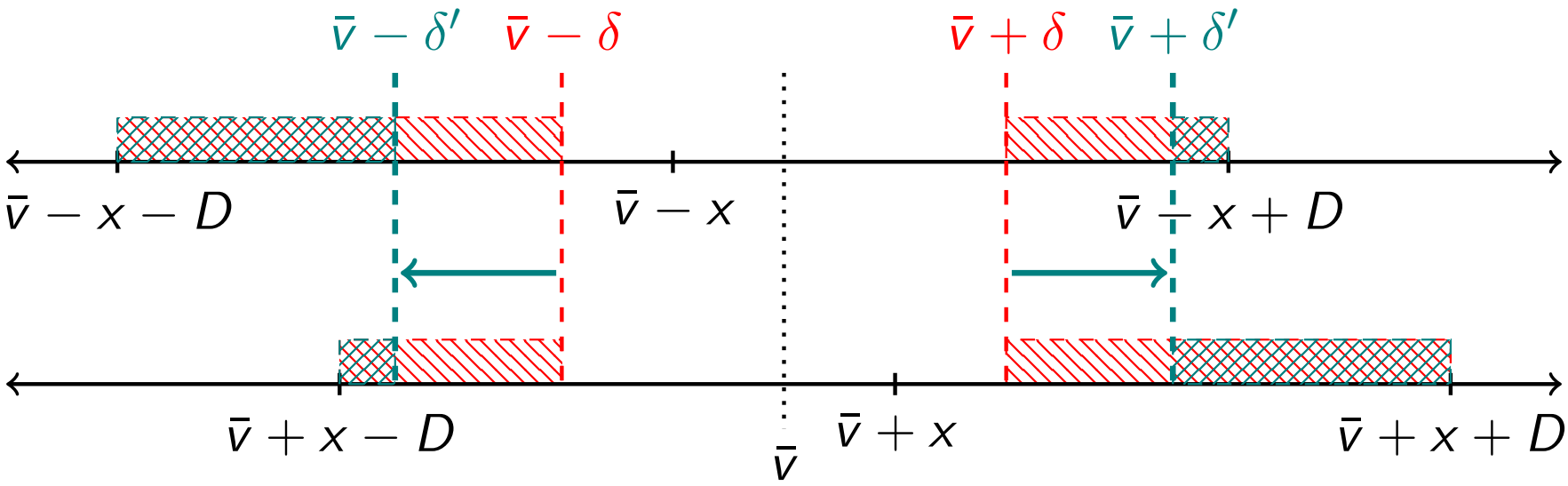
  - $\uparrow$ if trader buys
  - $\downarrow$ if trader sells

Market Making Strategies

Market-making strategies:

- **Partially revealing offer** if he chooses a $\delta_i \in (0, D - x)$;
  - δ_i increases
    - Probability of trade $\downarrow$
    - More precise beliefs of v
- **Fully revealing offer** if he chooses a $\delta_i \geq D - x$.

Increasing Bid-Ask Spread



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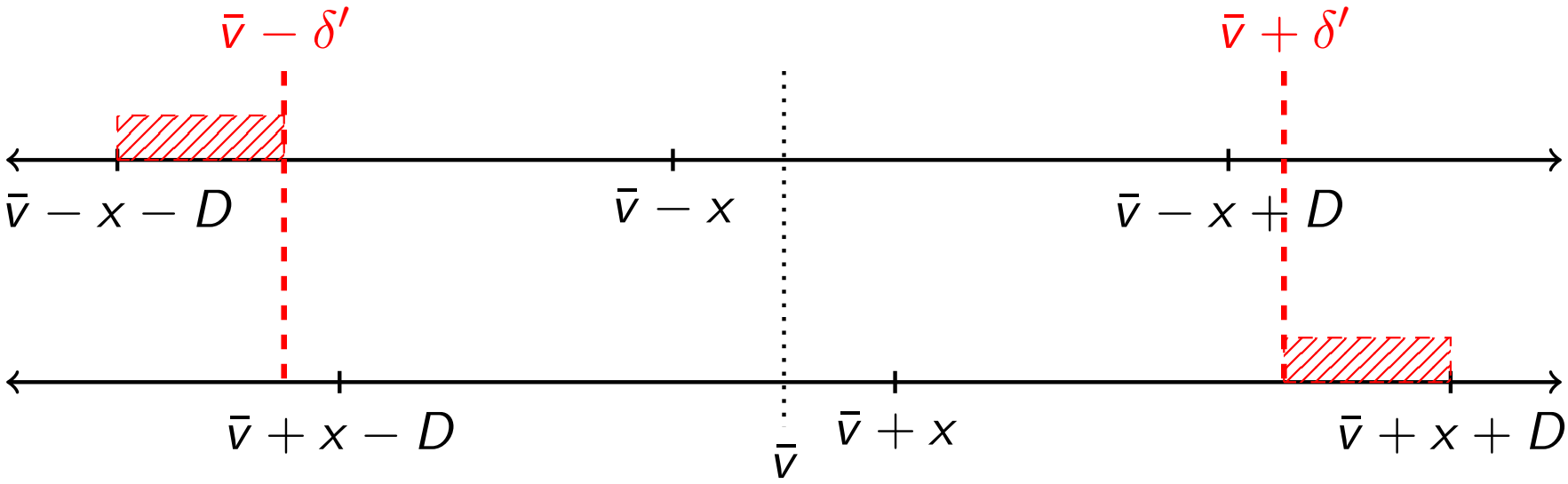
  - *Fully reveals* true value of v

Fully Revealing Market-Making



Interdealer Markets

- Interdealer trading depends on the set of dealer types
- Given set of long, short, neutral dealers, what happens?

Interdealer Markets with Identical δ_i

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- Distribution of dealers
  - $\frac{D-x-\hat{\delta}}{2D}$ long if $v = \bar{v} + x$ and $\frac{D+x-\hat{\delta}}{2D}$ if $v = \bar{v} - x$
  - $\frac{D+x-\hat{\delta}}{2D}$ short if $v = \bar{v} + x$ and $\frac{D-x-\hat{\delta}}{2D}$ if $v = \bar{v} - x$
  - $\frac{\hat{\delta}}{D}$ neutral

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- Receiving dealers infers sell offer made by long dealer
- Offset position by selling asset $\rightarrow$ avoid liquidity cost Δ

Gains from Trade in Interdealer Market

- The reservation price of a receiving dealer of type θ:

$$E[v|\text{match between long and } \theta\text{-type dealer}] + \begin{cases} \Delta & \text{if } \theta = s \\ -\Delta & \text{if } \theta = l, n \end{cases}$$

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- $\therefore$ Long dealer maximizes payoff by offering short reservation price

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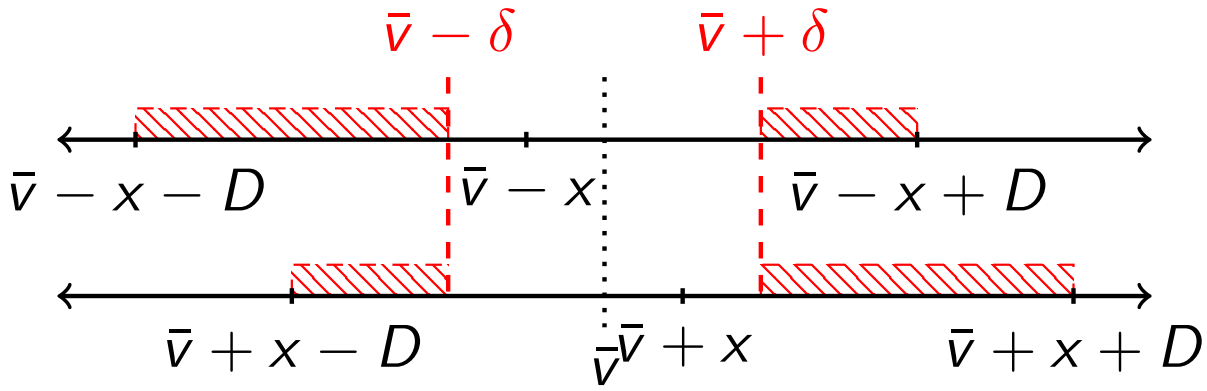
- **All trades with surplus occur**



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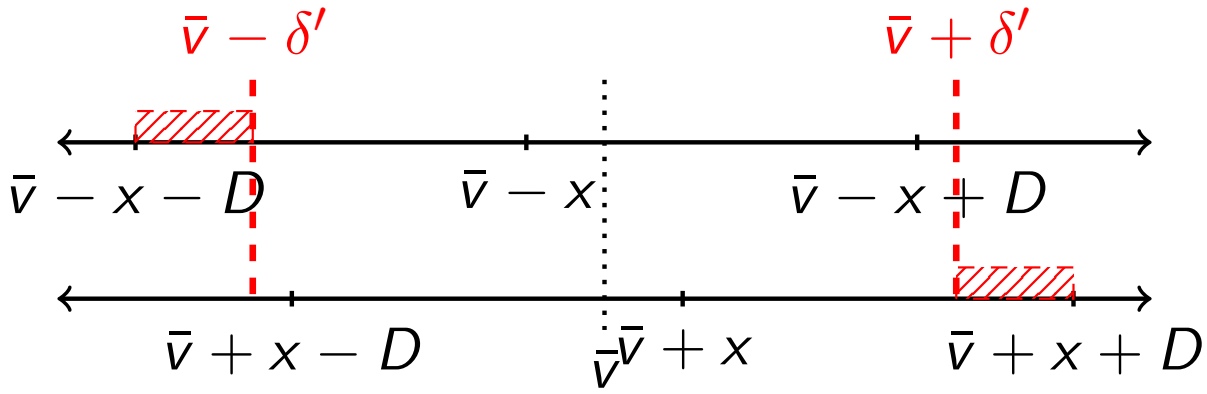

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- When do dealers choose partially revealing offers in equilibrium?

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$$V_\theta(\delta_i, \hat{\delta}) = \underbrace{\left(\sum_v P(v|\theta) P(\text{match with opposite dealer}|v, \theta) \right) \Delta}_{\text{gains from netting}}$$

$$+ \underbrace{\left(\sum_v P(v|\theta) P(\text{match with opposite dealer}|v, \theta) \right) (\bar{v} - E_i[v|trade])}_{\text{information rents}}$$

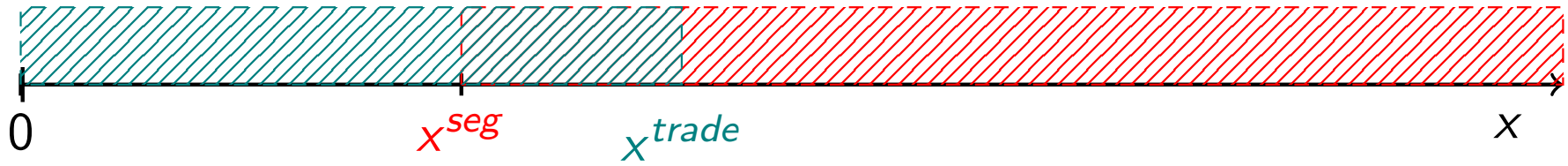
Expected Payoffs at $t = 1$

$$\Pi_i(\delta_i, \hat{\delta}) = \underbrace{P(\gamma_j(P^b, P^a) = accept|\delta_i) \cdot (\bar{v} + \delta_i - E[v|\delta_i] - \Delta)}_{\equiv A, \text{ market-making payoff}}$$
$$+ \underbrace{\sum_{\theta} P(\theta_i = \theta|\delta_i) \cdot V_\theta(\delta_i, \hat{\delta})}_{\equiv B, \text{ interdealer payoff}}$$

Two Types of Equilibria

Result.

- For $x < x^{trade}$, equilibrium with interdealer trading exists;
- For $x > x^{seg}$, equilibrium with market segmentation exists.



Measuring Market Liquidity

- measure μ of offers accepted by traders
- For $x \in (x^{seg}, x^{trade})$, interdealer trading improves market liquidity

- Comparative statics of market liquidity μ
  - decreases in Δ
  - decreases in x
  - increases in D

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- Efficiency can be improved by limiting private benefits
- Gains from **post-trade information disclosure.**

Extension with Post-Trade Information Disclosure

At date 2, CCP publicly discloses anonymized trades in date 1.

Value of Post-Trade Information

Result. Suppose that a dealer observes the set of successful trades made at $t = 1$. Then, the dealer perfectly infers the true value of v.

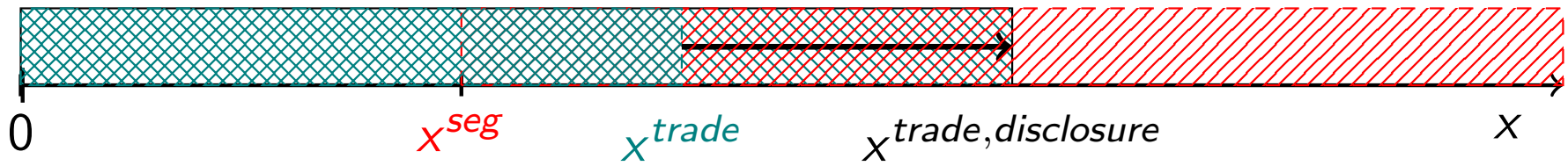
Effect of Post-Trade Disclosure

$$V_\theta(\delta_i, \hat{\delta}) = \underbrace{\frac{1}{2}\left(\sum_v P(v|\theta)P(\text{match with opposite dealer}|v,\theta)\right)2\Delta}_{\text{gains from netting}} - \underbrace{0}_{\text{information rents}}$$

Equilibrium Under Disclosure

Result. Under disclosure, equilibrium with interdealer trading exists if $x < x^{trade,disclosure}$.

1. Interdealer trading occurs for larger x
2. Tighter bid-ask spreads



Key Takeway from Full Post-Trade Disclosure

Market efficiency increases with perfect disclosure of information

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- Interdealer trading occurs for greater x
- Transparency $\Rightarrow$ dealers increase liquidity provision

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  - Selective disclosure to subset of dealers

General Disclosure Environment with λ

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- Earlier cases:
  - No disclosure ($\lambda = 0$)
  - Perfect disclosure ($\lambda = 1$)

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- Small deviation from no disclosure case ($\lambda = 0$)
- When λ very small

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Equilibrium with λ

- For $\lambda \in [0, \bar{\lambda}]$,
  - Dealers trade at "uninformed prices"
  - Informed dealers extract information rents
- For $\lambda \in (\bar{\lambda}, 1]$,
  - Dealers trade at "informed prices"
  - Uninformed dealers use prices to screen

Nonmonotonicity with λ

Result. When x and D are sufficiently large, liquidity is nonmonotonic over the interval of $\lambda \in (0, 1)$.

Competing Effects with Partial Disclosure

- **Information Effect.** As λ increases, more dealers become informed
- **Adverse Selection Effect.** Uninformed dealers face adverse selection

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- As λ increases, benefits of information dominate
- Intermediate λ worse than all or *no* information

Strategic Platform

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- Potential reason for $\lambda < 1$ is due to costly access
- Platforms may charge dealers for timely access to info

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- Endogenize λ

Extension: Strategic Platform

At date 2, Platform chooses cost c at which dealer can observe trades.

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Result. For sufficiently large x and D, a strategic platform selects some cost $c^{\diamond} > 0$ that **induces** $\bar{\lambda}$.

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- SEC ruling against exchanges over raising market-data fees.
- Market participants' concern when competing banks operate post-trade platforms

Conclusion

- Develop model of decentralized market with tiered trading structure
- Dealers dealt with adverse selection and liquidity costs

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Main Takeaways:

- Link between market liquidity and interdealer liquidity
- Welfare gains from perfect disclosure
- Nonmonotonic effect of disclosure
- Suboptimal outcome with strategic platform