Financial Markets Microstructure
Lecture 14
Market Transparency
Chapter 8 of FPR

Egor Starkov

Københavns Unversitet
Spring 2023

- Fragmentation is ubiquitous

- It is costly for uninformed traders, who would prefer to coordinate on a single market

- Other costs may include less risk sharing and less competition among traders (see book)

- Some benefits are possible (larger depth), depending on setting and trading format

Today: Market transparency

- Financial markets are among the more transparent ones
    - Historical price and transaction data often available
- But there are a ways to go
    - Often you do not know the price at which your trade will be executed.

Today: Market transparency

- Financial markets are among the more transparent ones
  - Historical price and transaction data often available
- But there are a ways to go
  - Often you do not know the price at which your trade will be executed.

- Today: discuss how transparency affects market outcomes
- Related to last week's discussions
- Different kinds of transparency have different effects

Market transparency: introduction

- Market transparency can refer to different information
    - **Pre-trade information**: quotes and state of LOB
    - **In-trade information**: trader identity
    - **Post-trade information**: realized trades and prices

Market transparency: introduction

- Market transparency can refer to different information
  - **Pre-trade information**: quotes and state of LOB
  - **In-trade information**: trader identity
  - **Post-trade information**: realized trades and prices
- Exchanges profit from selling this type of data
  - Different traders end up with different information sets
  - Some types of traders may benefit from a lack of transparency

Transparency also regulated

- In both Europe and the US: rules to assure pre-trade information
- Also, firms must disclose relevant information
- The US has a centralized system for collecting post-trade information, but not Europe

General ideas

1. In an opaque market, search costs confer monopoly powers to dealers

2. Transparency may foster competition, but also collusion

3. Risk-sharing may be better when markets are opaque

General ideas

1. In an opaque market, search costs confer monopoly powers to dealers

2. Transparency may foster competition, but also collusion

3. Risk-sharing may be better when markets are opaque

- Before we begin: remember how we discussed that "private" info is out there, you just need to find it and put it together?

- Same thing with transparency – "opaque" information is not necessarily "inaccessible", but can just be "not accessible enough"

- An (extreme) example of poorly informed trading

This lecture:

Quote transparency

- In some markets LOB and dealer quotes are visible (possibly at a cost)
- In some other (esp. illiquid) markets trader must search for quotes
    - or approach dealers in search of price improvements
- How do search costs affect market outcomes?
- (This was the problem 3 in PS1)

Search costs

Idea based on Diamond [1971]'s chain store paradox

- Imagine a product market with consumers and firms

- Firms set prices not initially seen to consumers

- Suppose consumers are searching stores sequentially to find the best price, searching costs c per store

- Look for an equilibrium in which all stores set same price p

- Each store has market power: can charge customer up to $p + c$ if desired

- **Equilibrium**: stores set p at monopoly level

Search costs

- The situation is the same in a financial market with search cost
    - It doesn't pay to be the cheapest dealer if you can't advertise the price
    - Can always increase price and still be preferred due to search cost
    - So incentives to exploit the price, no incentives to improve the price
- Model conclusion does not depend on size of search cost (ignore what textbook says about it)
    - Although irl frictions probably increase in search cost – fancier models capture this
- Welfare implications of search costs:
    - Dealers have market power ⇒ higher profits
    - All traders are worse off, the less sophisticated ones more so (if we maintain the assumption their trades are less elastic)
- Empirical evidence from US municipal bond markets does show very high trading costs, especially for retail-sized trades [Harris and Piwowar, 2006, Green et al., 2007]

Quote transparency

- Let's look at another dimenstion of quote transparency
- While price of the first unit is often observable...
    - US protects NBBO orders for each stock
    - Exchanges or dealers may only quote best bid&ask
- ...depth can be more difficult to gauge
- If depth is volatile (which it is), may trade at the "wrong time"

Uncertainty and price sensitivity

- Consider a Kyle model with random depth $1/\lambda$.

- **Transparent market**: insider demand is inversely related to price sensitivity λ: $x^T \sim \frac{1}{\lambda}$

- **Opaque market**: traders face uncertainty, so their demand is inversely related to expected price sensitivity: $x^O \sim \frac{1}{\mathbb{E}(\lambda)}$

- Convex function. Use Jensen's inequality:

$$\mathbb{E}\left(\frac{1}{\lambda}\right) > \frac{1}{\mathbb{E}(\lambda)} \qquad \Longleftrightarrow \qquad \mathbb{E}[x^T] > x^O$$

- More (informed) trading in transparent market
  - Risk of high λ (shallow market) provides stronger incentive to reduce x than the incentive to increase x from the chance of low λ.

Order flow transparency

- In some markets (OTC, FX) an order may be filled simultaneously by different liquidity providers
- What does it matter if they can or cannot observe the whole order flow?

Order flow transparency

- In some markets (OTC, FX) an order may be filled simultaneously by different liquidity providers
- What does it matter if they can or cannot observe the whole order flow?
  - We saw one answer already (Glosten vs Kyle)
  - Will now look at another way to model this

Order flow: Model

- Consider a simple variation on a Glosten-Milgrom model
- **Value**: high v^H or low v^L with equal probability
  - Mean: $\mu = (v^H + v^L)/2$
- **Dealers**: set quotes, competitive, risk neutral
- **Traders**: two unit market orders arrive
  - With prob. π: both are from informed trader(s) (there was an info event)
  - With prob. $1 - \pi$: both from liquidity traders; one seller, one buyer
- Idea: higher order flow correlation when traders are informed. Intuition:
  - Informed traders: if all learn that the asset value is, say, high, then should all want to buy
  - Liquidity traders: suppose pension fund decides it wants a less risky portfolio. (Probably) uncorrelated with other liquidity traders' decisions. For simplicity we strengthen that to perfect negative correlation.

Order flow: Equilibrium

- **Opaque**: dealers quote without seeing the entire market order flow
    - As in chapter 3, $a^O = \mu + \pi(v^H - \mu)$ and $b^O = \mu - \pi(\mu - v^L)$
- **Transparent**: dealers condition quotes on both orders
    - Two buyers: must be informed, $a^T = v^H$
    - Two sellers: must be informed, $b^T = v^L$
    - One of each: trade at μ
- Transparent (T) versus opaque (O) market:
    - T better than O for the uninformed: avoid adverse selection premium
    - Better price discovery in T than in O: private information revealed
    - The informed prefer O: get better prices

This lecture:

Post-trade transparency

- If orders arrive sequentially, what effect does information about past orders have?
- **Value**: high v^H or low v^L with equal probabilities
  - Mean: $\mu = (v^H + v^L)/2$
- **Dealers**: set quotes, competitive, risk neutral
- **Traders**: two traders arrive, submit unit market orders
  - With prob. π: both are informed
  - With prob. $(1-\pi)/2$: both liquidity traders; first seller, then buyer
  - With prob. $(1-\pi)/2$: both liquidity traders; first buyer, then seller
- **Transparent market**: All dealers observe the first order d_1
  - Set $a_1 = \mu + \pi(v^H - \mu)$ and $a_{2,d_1} = \mathbb{E}[v|d_1, buy]$

Post-trade transparency: Period 2

Opaque market: One dealer gains informational advantage. Focus on ask side

- Period 2. Denote the dealer who observed period-1 trade by I, and the other dealer by U.
  - For simplicity, suppose I sets price after observing U's quote
  - Dealer I: Suppose you saw the first trade, and second trade is a buy, and U-dealer quotes a_2^U:
    - If the first trade was a sell, I expects $\mathbb{E}[v] = \mu$, so set price at $a_{2s}^I = a_2^U - \epsilon$.
    - If it was a buy, I knows $v = v^H$, so quote $a_{2b}^I \geq v^H$
    - I picks off period-2 buy order if d_1 was a sell; otherwise leaves it to U
  - Dealer U: How to quote if you didn't see the first trade and second trade is buy?
    - U knows that they only get to trade if $v = v^H$ (otherwise picked off by I)
    - Thus, uninformed dealers need to quote $a_2^U = v^H$
  - In the end, quotes are $a_2^U = v^H$, $a_{2s}^I = v^H - \epsilon$, $a_{2b}^I = v^H$.
  - (We'd get the same if I and U set quotes simultaneously)

Post-trade transparency: Period 1

- Period 1. The sequential information advantage uncovered in the previous slide can make dealers bid keenly for the first order (Forex dealers often said to quote negative spread to large traders)

    - In second period, I's profit is $(1 - \pi)(v^H - v^L)/2$. U's profit is zero

    - Competition leads the first period half-spread to be reduced by this amount, to $(2\pi - 1)(v^H - v^L)/2$ (dealers undercut each other to obtain information contained in first order)

    - The uninformed's aggregate trading cost is $\pi(v^H - v^L)$ - double the cost under transparency. Why is this?

- Would dealers commit to transparency?

    - No, there is always an individual incentive to hide your orders (section 8.4.2)

    - May explain the rise of less transparent trading venues

Post-trade transparency: Collusion

- If dealers are not perfectly competitive, they can try to collude to increase their profits
- Cartels are sustained via a threat of punishment in case anyone deviates

Post-trade transparency: Collusion

- If dealers are not perfectly competitive, they can try to collude to increase their profits
- Cartels are sustained via a threat of punishment in case anyone deviates
- Prerequisite for collusion: ability to detect deviations
  - Transparency improves this ability
 - So may help collusion

This lecture:

In-trade information

- Transparency may relate not only to quote and order data, but also to trader identity.
  - LOB is usually anonymous and thus opaque
  - dealer interactions can be personal

In-trade information

- Transparency may relate not only to quote and order data, but also to trader identity.
    - LOB is usually anonymous and thus opaque
    - dealer interactions can be personal
- If trader's identity is visible, it may affect the prices they get
    - Institutional investors rarely engage in informed trading, so will get good price;
    - Insiders will get bad prices.
    - See the figure for FX market on the next slide (from Ranaldo and Somogyi [2019])

In-trade information

- Transparency may relate not only to quote and order data, but also to trader identity.
    - LOB is usually anonymous and thus opaque
    - dealer interactions can be personal
- If trader's identity is visible, it may affect the prices they get
    - Institutional investors rarely engage in informed trading, so will get good price;
    - Insiders will get bad prices.
    - See the figure for FX market on the next slide (from Ranaldo and Somogyi [2019])
- If identity is limited to some identifier in the system, trader can still build a reputation through history of actions
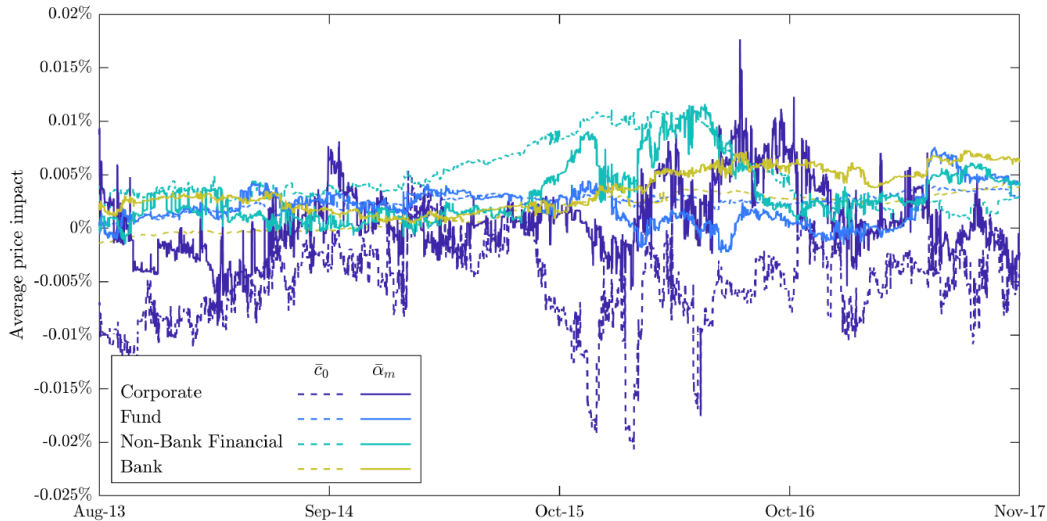
The cross-sectional average contemporary ($\bar{c}_0^r$) and permanent ($\bar{\alpha}_m$) price impact

where

- **fund** includes pension funds, hedge funds, and sovereign wealth funds;

- **nonbank** financial refers to insurance companies, brokers, and clearing houses;

- **corporate** comprises any non-financial organization

- but $\sim 80\%$ transactions are bank-bank

In-trade information

- There may be ways to signal or credibly disclose the fact that your trade is uninformative
    - E.g. can advertise trade a few days in advance – "sunshine trading"
- In this case they *will* be used because uninformed traders will want to separate – transparency will prevail
- Same may happen due to cream-skimming
    - Large banks can execute trades in their own dark pools instead of forwarding to the market
    - They would pick off profitable trades and forward the rest
    - The market would account for this and set wider spreads for trades that make it to the market
    - Reducing cream-skimming has been one focus of MiFID II regulation.

In-trade information

- In all of the above, transparency leads to reallocation of welfare from insiders to the uninformed.
    - That's why regulators push for transparency and the market resists
    - You can also argue that transparency would reduce informed trading and reduce price discovery
- Hirshleifer noted that some risk-sharing trades are better conducted before information arrives
    - Think of health insurance
    - Possible to share risks before we know who suffers illness
    - Too late to share risks after the illness is known; market break-down

Conclusion

- Transparency mostly reallocates welfare across market participants
  - Uninformed traders benefit, so T helps liquidity
  - Insiders may lose, so T worsens price discovery
  - Dealers may win or lose
- But transparency may also impede risk sharing, and have adverse effects when it is asymmetrically distributed
- Opaqueness can be good in limit books
  - Hidden limit orders help uninformed traders hedge their positions where making these orders visible would by itself create adverse price movements

Exercise for next week

- Read the article on MiFID II (on Absalon). Discuss the following questions:
  - What did MiFID II change in regards to market transparency? (There are many aspects to this.) How will these changes affect market outcomes?

- Read the article on LSE acquiring Refinitiv. What implications can this have for market transparency (e.g. on LSE's own trading platform)?

- Do ex.2 after ch.8 (p.303) on price discovery

P. A. Diamond. A model of price adjustment. *Journal of economic theory*, 3(2):156–168, 1971. Publisher: Academic Press.

R. C. Green, B. Hollifield, and N. Schürhoff. Financial intermediation and the costs of trading in an opaque market. *The Review of Financial Studies*, 20(2):275–314, 2007. Publisher: Oxford University Press.

L. E. Harris and M. S. Piwowar. Secondary Trading Costs in the Municipal Bond Market. *The Journal of Finance*, 61(3):1361–1397, June 2006. ISSN 00221082. doi: 10.1111/j.1540-6261.2006.00875.x.

A. Ranaldo and F. Somogyi. Asymmetric Information Risk in Fx Markets. SSRN Scholarly Paper ID 3263279, Rochester, NY, April 2019. URL https://papers.ssrn.com/abstract=3263279.

Aspiro

- Some years ago, Jay-Z bought Swedish music service Aspiro

Aspiro

- Some years ago, Jay-Z bought Swedish music service Aspiro

Aspiro

- Shortly after they launched their new service 'Tidal'

Aspiro

- Shortly after they launched their new service 'Tidal'

Aspiro AB
FRA: IRX - Mar 31 10:20 AM GMT+2
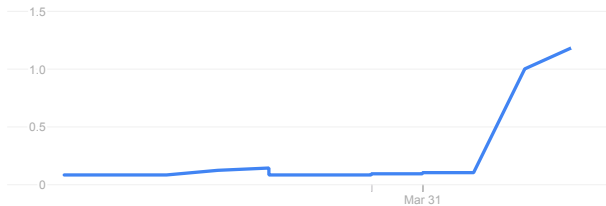
1.20 ↑1.11 (1,310.59%)

| 1 day | 5 day | 1 month | 3 months | 1 year | 5 years | max |

Open	0.10		Market cap	-
High	1.20		P/E ratio (ttm)	-
Low	0.10		Dividend yield	-

Aspiro

- There was one caveat though...
  - Since Jay-Z bought more than 90% of the stock, the remaining owners must sell to him at same price as he bought the first stock (so that he can delist the firm)
  - Meaning that they must all sell to him at price SEK 1.05

Aspiro

- There was one caveat though…
  - Since Jay-Z bought more than 90% of the stock, the remaining owners must sell to him at same price as he bought the first stock (so that he can delist the firm)
  - Meaning that they must all sell to him at price SEK 1.05
  - The day before this forced trade was due to be executed, trading was halted by the exchange when the price was at SEK 11.00
  - Traders seemed unaware of this rule or unaware that Jay-Z had acquired enough stock to trigger the rule, so OMX Stockholm issued two notices and phoned brokers
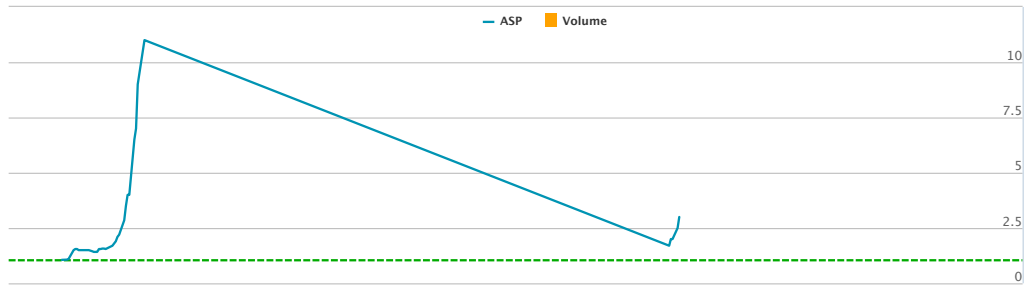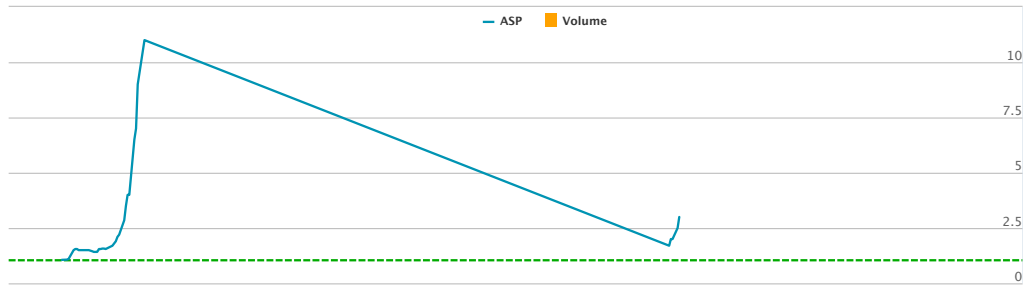 - Let's see what happened

Aspiro

First trading halt
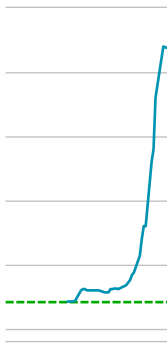
Brokers are phoned and price is adjusted
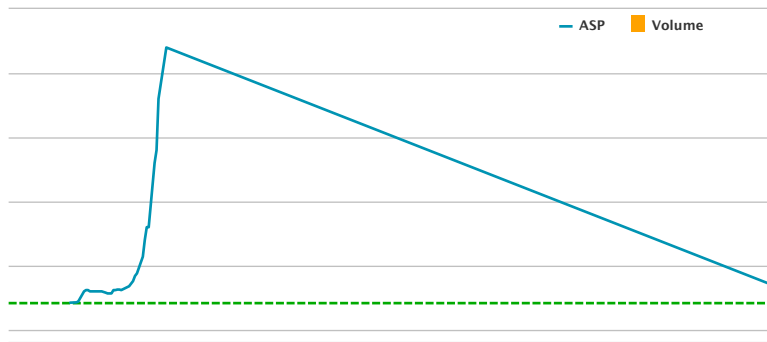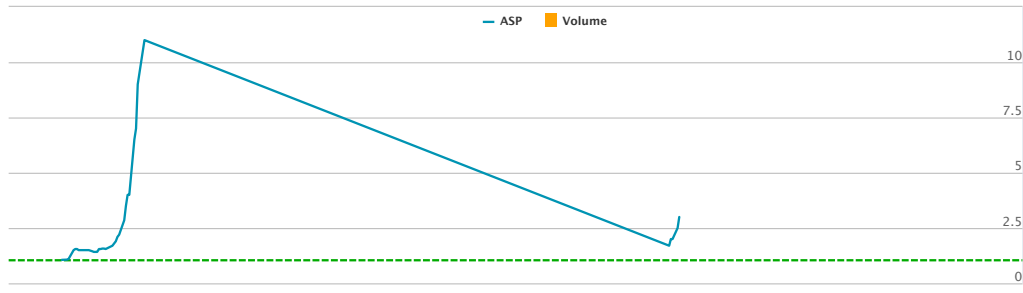
Aspiro

Trading resumes...

Aspiro

Trading resumes...

The stock immediately started trading at 3 times tomorrow's forced bid price, and was closed down again.

Aspiro

Trading resumes…

The stock immediately started trading at 3 times tomorrow's forced bid price, and was closed down again. Sometimes, even the most basic and readily available information can be opaque to some traders. Back