Brokers and Order Flow Leakage: Evidence from Fire Sales

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Overview

Motivation

How does the information get disseminated in financial markets?

- A standard learning model posits learning from public signals (prices, volume, etc.);
- Inside information as an alternative way of learning

Does informed trading destabilize the market?

- Welfare implications of inside trading (DeMarzo, Fishman, Hagerty, 1988).
- Evidence of front running of fire-sales trades (Cai, 2002; Coval and Stafford, 2007; Chen, Hanson, Hong, and Stein (2009)).

Literature Framework

Slow trading and Predation:

- Large investors have an incentive to split their trades to reduce market impact:
  - **Theoretically** sound (Kyle 1985; Garleanu and Pedersen 2013) and **empirical** support (Di Mascio, Lines and Naik 2016)
- However, executing slowly over time $\Rightarrow$ risk of predation
- Consequences of predatory trading:
  - Higher transaction costs, illiquidity
  - Amplification of shocks
  - Excess volatility and market fragility

Also, predatory trading is problematic during fire sales (large amount in short time)

Summary

This paper:

1. Using trade-level data and brokers' order flow information
2. Look at large liquidation events as a shock to private information
3. Study the consequences of predatory trading for price formation (the value of order-flow information)

Results:

1. Brokers' best clients tend to predate on the liquidating funds: a long-short position of selling holdings and buying them back generates 25bps over a 10-day period
2. The liquidation costs of the distressed funds double around the shock
3. "Aware brokers" subsequently generate higher commissions from executing predators' trades

General Idea

Brokers' information set: brokers intermediating fire sales are in a privileged position

- They may spread the news that a large trade is likely to extend over time
  - Incentive: for their clients, order flow info is profitable $\Rightarrow$ establish a reputation as a source of valuable information
  - Cost: leaking leads to poor execution and bad reputation $\Rightarrow$ they should invite other traders to provide liquidity

- Empirical Questions:
  - Do brokers leak order flow information?
  - When they do is to provide liquidity or stimulate predation?
  - Are fire sales exacerbated by predatory trading?

Data

Objective: analyze brokers behavior empirically using Acerno Data

- Use data from Abel Noser Solutions (Ancerno Ltd) - Perform transaction cost analisys for institutional investors.
- Advantages established by prior literature:
  1. Unique brokers ID associated to each execution
  2. Free of self-reporting bias
  3. Free of survivorship bias
- Transaction-level data on institutional trades (1999-2014) for about 800 institutions (managers) executing 350 million trades in US stocks with 955 brokers.
- A observation is a aggregation of all trades on the same stock, same side (buy or sell), same manager, executed by same broker at the same day.

Definitions

Fire sales are large and long-lasting portfolio-level liquidations, specifically:

1. Abnormal negative manager portfolio-level flow

$$Z_t^m = \frac{DVol_t^m - \mathbf{E}(DVol_t^m)}{\sigma(DVol_t^m)} < -0.25$$

   for at least 5 days in a roll, where $DVol_t^m$ is the portfolio level dollar volume traded by manager m on day t. (Rolling window of 120 days)
2. Large volume at the stock-level j (at least 1% of ADV for at least a day)
3. At least 10 stocks being sold

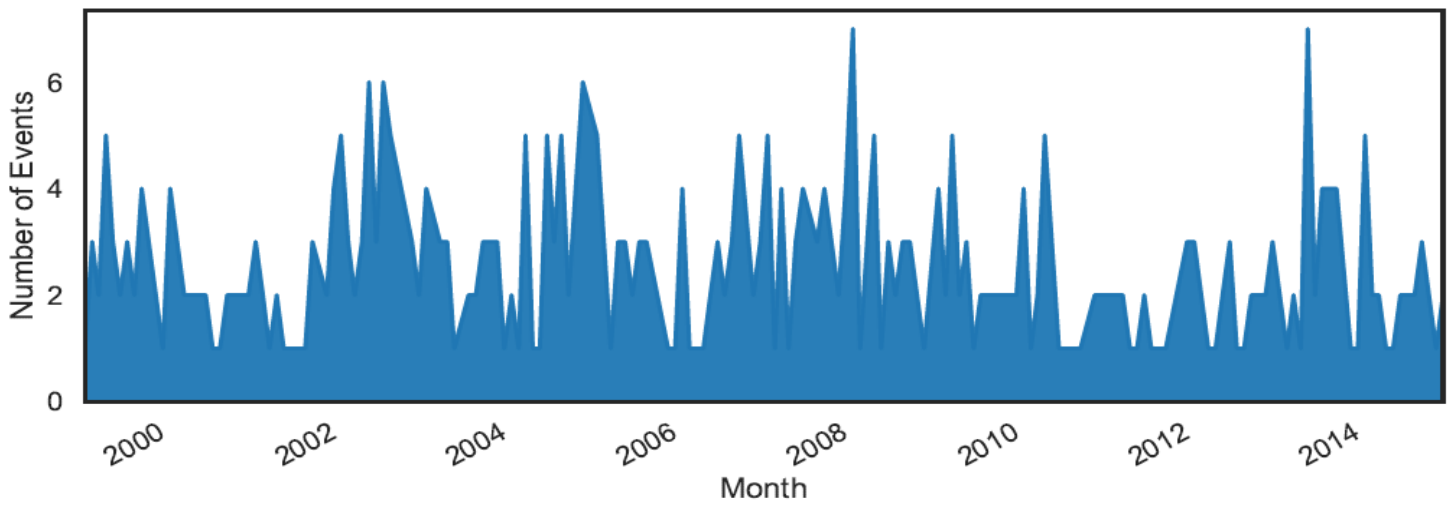
Aware broker is a dummy where:

$$Aware_{j,b,t,e} = \mathbb{1}\{Intermediated\ Fire\ Sale\ Volume_{b,j,t} > 2\%\ of\ ADV_j\}$$

Robustness changing AVD values and number of stocks require to identify fire sale or awareness

Fire Sales

385 fire sale events, evenly distributed over the sample



- Average liquidation is worth 380 millions (up to 1 billion)
- About 10% of the portfolio is liquidated on average
- More than 22 stocks sold, on average
- Proceeding are not re-invested in other stocks
- Generate on average 15% of the stock daily volume

Fire Sales

Summary statistics

Panel A: Volume Z-Score

	Obs	Mean	S.D.	Min	0.25	0.5	0.75	Max
All Managers-Days	941219	-0.035	3.249	-41.714	-0.369	0.027	0.394	35.889
Fire Sales Days	2210	-2.075	4.518	-41.714	-1.768	-1.038	-0.616	-0.251
Fire Sales Events	385	-2.002	3.410	-37.818	-1.672	-1.172	-0.878	-0.344

Panel B: Fire Sale Events

	Unit	Obs	Mean	S.D.	25%	50%	75%	90%
Dollar Volume	Million Dollars	385	-377.062	534.635	-503.571	-177.461	-50.544	-18.244
Fraction of Portfolio	Percentage	385	9.164%	23.921%	1.224%	2.274%	5.879%	15.828%
Number of Stocks		385	21.917	10.090	13	18	29	38
Event Length	Trading Days	385	5.766	1.439	5	5	6	7
Number of Brokers		385	28.803	16.095	18	27	39	52
Number of Aware Brokers		385	1.694	0.968	1	2	2	3

Fire Sales

Summary statistics

Pure anel C: Fire Sale Stocks

	Unit	Obs	Mean	S.D.	25%	50%	75%	90%
Dollar Volume	Million Dollars	8438	-17.204	20.305	-23.401	-11.246	-3.542	-1.366
CRSP volume ratio	Percentage	8438	-14.576%	16.000%	-18.749%	-9.922%	-4.585%	-2.409%
Price Decrease in [0,4]	Percentage	8438	0.831%	4.613%	-1.904%	0.666%	3.388%	7.131%
Number of Brokers		8438	5.737	5.039	2	4	8	13
Number of Aware Brokers		8438	0.522	0.603	0	0	1	1

Panel D: Manager-Broker Relashionship Proxies

	Obs	Mean	S.D.	Min	25%	50%	75%	90%	Max
Ranking based on Volume	501568	0.035	0.079	0.000	0.000	0.004	0.031	0.101	0.965
Ranking based on Commission Paid	501568	0.032	0.071	0.000	0.000	0.005	0.032	0.088	0.924

Liquidated Stocks

Panel E: Fire Sale Stocks Selection

Dependent Variable	Amount Sold as a Fraction of the Fire Sale					
	(1)	(2)	(3)	(4)	(5)	(6)
Portfolio Weight	1.863***	1.830***	1.319***	1.805***	1.301***	1.318***
	(6.522)	(6.427)	(5.875)	(6.540)	(5.815)	(5.842)
Amihud Ratio		-0.691***			-0.486***	-0.506***
		(-8.419)			(-6.579)	(-6.775)
Market Cap			2.614***		2.427***	2.441***
			(11.580)		(10.926)	(10.977)
Volatility				-6.698***	-3.838***	-3.394***
				(-12.549)	(-7.296)	(-6.438)
One Month Return						0.112
						(0.981)
Six Months Return						0.209*
						(1.741)
One Year Return						0.340***
						(2.783)
Observations	7,948	7,948	7,948	7,948	7,948	7,948
R-squared	0.134	0.142	0.237	0.164	0.253	0.257
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Manager FE	Yes	Yes	Yes	Yes	Yes	Yes
Event FE	Yes	Yes	Yes	Yes	Yes	Yes

- Liquidated amounts correlate with portfolio weights
- Preference for large, most liquid and less volatile stocks

Price Path

Average DGTW adjusted cumulative returns for the stocks included in the fire sales across all the events.

- Price drops by 1%, incrementally during the fire sale
- Complete reversal after one trading month

Identification Strategy

Summary of methodology:

- Use forced liquidations of portfolio holding: abnormal negative order flow w/ temporary price impact.
- Variation across brokers: not all brokers are aware.
- Variation across clients: not all brokers clients get to know the information, only the best clients from which the brokers can extract the highest rents.

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- Robustness and sensitive analysis (Lots of discrete choice in threshold)
- Exercise w/ natural experiments.

Authors claim of an ideal setting to study information leakage by brokers

1. High level of asymmetric information
2. High value of order flow information
3. Arguably exogenous to fundamental

Predation or Liquidity provision?

Dependent variable:

- "Net Predation" dummy:

$$Net\ Predation_{m,j,b,t} = \mathbb{1}_{Predation} - \mathbb{1}_{Liq\ provision} \tag{1}$$

  - $\mathbb{1}_{Predation} = 1$ if the client trades in the same direction as the originator
  - $\mathbb{1}_{Liqprovision} = 1$ if the client trades in the opposite direction

Exploit heterogeneity of clients' behavior across brokers:

$$Net\ Predation_{m,j,b,t} = \beta_1 Aware_{b,j,t} + \gamma_{m,j,b,t} + \varepsilon_{m,j,b,t} \tag{2}$$

Evidence on Predation

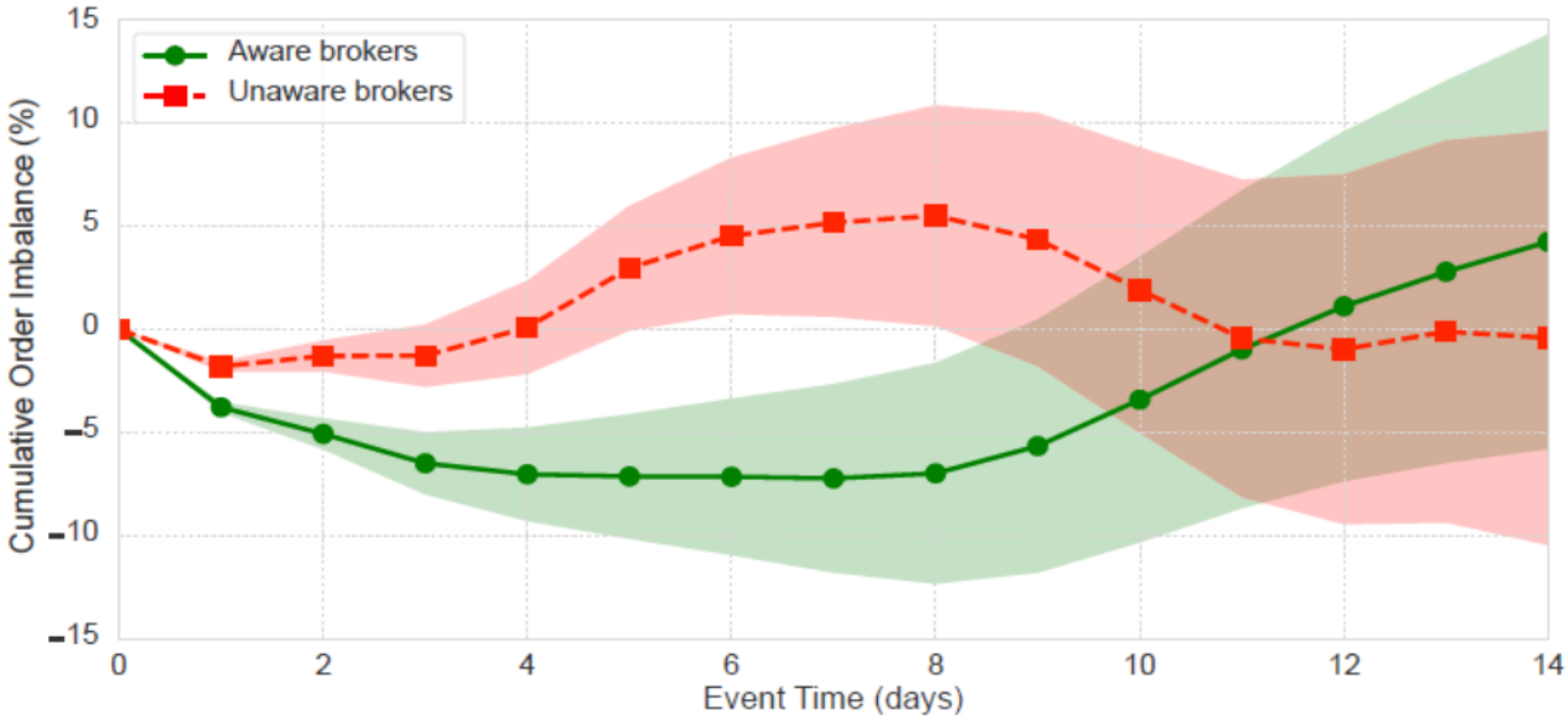
Predation Across Brokers: order flow through aware brokers is more likely to be predatory

Dependent Variable	Probability of Predation - Probability of Liquidity Provision	
	(1)	(2)
Aware Dummy	0.202***	0.113***
	(7.142)	(5.199)
Time Fixed Effects	Yes	Yes
Manager Fixed Effects	Yes	Yes
Broker Fixed Effects	Yes	Yes
Brokers × Stock FEs	Yes	
Day × Stock FEs		Yes
Observations	487,605	462,841
R-squared	0.203	0.229

- Stock Day FEs: not explained by stock-specific news or signals
- Broker Stock FEs: not explained by brokers specialization

Evidence on Predation

Order flow intermediated through aware brokers:



Main empirical Design

Best Clients proxies are the top deciles of:

1. The fraction of the brokers' volume generated by the client
2. The fraction of the brokers' commissions paid by the client

Both are highly persistent.

To test if brokers spread information favoring their stronger relationship they run a diff-n-diff comparing best clients with other clients of the aware brokers, during the fire sale

$$\begin{aligned} \textit{Net Predation}_{m,i,b,t} = & \beta_1 \textit{Best Client}_{m,b,t} x \textit{Liquidation Period} \\ & + \beta_2 \textit{Best Client}_{m,b,t} \\ & + \beta_3 \textit{Liquidation Period} \\ & + \gamma_{m,i,b,t} + \varepsilon_{m,i,b,t} \end{aligned} \tag{3}$$

Reference is bottom decile and reference period is 5 days before into the fire sale: [-5, 4], while "Liquidation Period" indicates the liquidation days: [0, 4]

Estimation results

Predation Across Clients of Aware Brokers

Dependent variable	Probability of Predation - Probability of Liquidity Provision	
	(1)	(2)
Best clients proxy	Ranking based on Volume	Ranking based on Commissions Paid
Best Client × Liquidation Period	0.055***	0.081***
	(3.181)	(4.182)
Best Client	0.023	0.048**
	(1.427)	(2.500)
Liquidation Period	0.006***	0.005***
	(5.683)	(4.942)
Time Fixed Effects	Yes	Yes
Manager Fixed Effects	Yes	Yes
Event Fixed Effects	Yes	Yes
Stock Fixed Effects	Yes	Yes
Broker Fixed Effects	Yes	Yes
Observations	501,567	501,567
R-squared	0.046	0.046

Going Further: Information

Furher information:

- More than 60% of the victims were predade only once.
- 30% of the sample predates more than once. The conditional probability of predating after you predated once is twice as large (compared with the unconditional)
- Best clients of the aware clients are faster in predation (start to predate before the other clients)
- Less predation when the fund in distress is one of the brokers best clients.

Robustness: Alternative Explanation – Common Signals

Asset Managers are responding to the same common signal

- Aggregate market shocks
- News about specific stocks

Sub-sample analysis, excluding:

1. Recession periods
2. Negative fundamental news
3. Stocks with high short interest
4. Stocks with strong negative momentum

Results are robust and magnitude is unchanged‘

Going Further: More results

- Best clients of aware brokers are more likely to reverse their trades after the fire sale is over $\Rightarrow$ Consistent with predatory trading
- Predation is more proeminent in periods of financial distress (measured by the VIX)
- Predation mainly comes from hedge funds $\Rightarrow$ As expected, since they can take short positions

Late-trading Scandal – Natural Experiment

- Late-trading scandal of 2003, as in Anton and Polk (2014)
- 27 fund families experienced significant outflows over 2 years
- Exogenous driver of mutual funds' selling activity
- Brokers information advantage:
  - when these funds were liquidating and
  - which stocks were involved in the liquidation
- Diff-in-diff: compare flow through aware and unaware brokers, before and after the scandal

Late-trading Scandal – Natural Experiment

Dependent variable	Probability of Predation - Probability of Liquidity Provision				
	(1)	(2)	(3)	(4)	(5)
Selling × Post Scandal	0.087***	0.097***	0.069***	0.060***	0.046***
	(11.406)	(12.800)	(9.261)	(8.220)	(6.342)
Selling	0.147***	0.141***	0.148***	0.152***	0.179***
	(23.040)	(22.135)	(22.406)	(23.537)	(28.281)
Post Scandal	-0.025***				
	(-9.289)				
Time Fixed Effects		Yes	Yes	Yes	Yes
Manager Fixed Effects			Yes	Yes	Yes
Stock Fixed Effects				Yes	Yes
Broker Fixed Effects					Yes
Observations	12,087,004	12,087,004	12,087,001	12,086,863	12,086,781
R-squared	0.001	0.013	0.068	0.076	0.082

Consistent with information leakage by aware brokers

The value of information

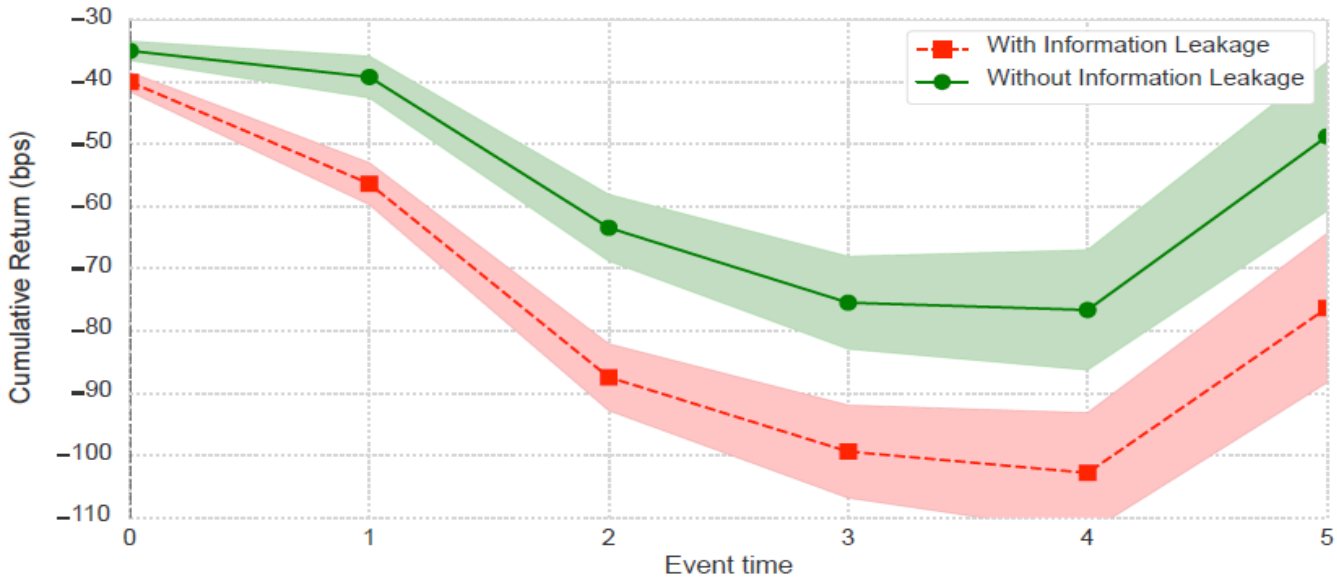
- Best clients of aware brokers generate more than 20 bps in two weeks, exploiting the leaked information with the right timing $\Rightarrow$ Order flow information is valuable
- Brokers can charge the predating managers 10%-25% higher commissions $\Rightarrow$ Brokers benefit from leaking
- Negative price impact when comparing to the counter-factual where there is no leakage of information $\Rightarrow$ Liquidating funds try to avoid leakage by using several brokers (mean of 29). However there is a lot of persistence in broker-manager relationship.

The value of information

Profitability of predatory trades: liquidation events (left) and placebo sample (right)

Predation Destabilizes Prices

- Look at price path with/without information leakage
- Use events with no aware brokers as counter-factual



- Predation exacerbates the (non-fundamental) shock

Concluding Remarks

- This paper highlights that brokers' incentives to attract and retain business are likely to induce them to leak order flow information to other market participants
- Trade-off between slow execution to avoid price impact (Kyle 1985) and information leakage
- A source of concern for regulators: leakage exacerbates the costs associated with forced liquidations (especially important at times of scarce liquidity)
- Predatory trading can be an important source of alpha for active managers, which does not contribute to market efficiency

Thank you!

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