Brokers and Order Flow Leakage: Evidence from Fire Sales

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Slow Trading and Predation

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- *Concern*: other traders might anticipate the intent to trade again in the near-future and take advantage by trading in the same direction to benefit from the future price impact
- *Predatory trading* has strong theoretical support (Brunnermeier and Pedersen, 2005) and is borne out by anecdotal evidence
- During the LTCM wind down, the fund's typical trading and lending counterparties also sold the same assets

Systemic Relevance

- Besides increasing trading costs, predatory trading can make the market more illiquid at times of crisis and amplify fire sale
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- Restricting the diffusion of public information might not be sufficient to prevent predatory behavior
  - Institutional investors routinely make use of **brokers** to execute their trades
  - Prime brokers for hedge funds operate also as lenders and risk managers: they know about breach of risk limits and deleveraging

Research Questions

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- On the other hand, if brokers foster predatory trading, they may build a bad reputation
- Thus, they may instead have the incentive to facilitate the trade and invite liquidity provision by other traders

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- On the other hand, if brokers foster predatory trading, they may build a bad reputation
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- Empirical question: Do brokers foster predatory trading or liquidity provision?

- Are fire sales exacerbated by predatory trading?

Is Order-Flow Leakage Legal?

- Brokers have fiduciary duty to their clients to provide best execution
- Regulators have prosecuted unfair access to information given by brokers to some clients (Citi, Credit Suisse, ITG, UBS, etc.)
- Brokers and exchanges sell data products giving access to *aggregate* order flow
    - Thomson Reuters' Autex: Indication of Interest and Advertised Trades
- In their defense, brokers can always argue that they spread information to search for trading counterparties
- In sum, brokers can leak information in 'legal' ways, but this is not in the clients' best interest

Related Literature

- Fire sales
  - Shleifer and Vishny (1992, 1997), Kiyotaki and Moore (1997): natural users of an asset are sidelined
  - Brunnermeier and Pedersen (2005), Di Maggio (2016): arbitrageurs can predate on fire sales and reduce liquidity
  - This paper: fire sales can be exacerbated by brokers' order flow leakage

- Information percolation in Financial Markets
  - Di Maggio, Franzoni, Kermani, Sommavilla (2016): brokers spread *fundamental information* which they extract from trades
  - This paper: brokers leak *order flow information*

- Kervel and Menkveld (2018): HFTs provide liquidity for short-lived (<7 hours) orders and predate longer-lived orders
  - This paper: the role of brokers in fostering predation, destabilizing behavior during fire sales

The Data

- Ancerno Ltd. performs transaction cost analysis for institutional investors (mutual funds, hedge funds, pension funds)
- It provides a **trade-level** dataset from 1999 to 2014
- About 800 institutions (**managers**) executing 350 million trades in U.S. stocks with 955 **brokers**
- Subset of institutional investors: ratio of Volume traded in Ancerno to Volume traded in 13F up to 20%
- Main advantages:
  - Free of survivorship and backfill biases
  - Data are not self-reported by asset managers, but reported by their clients

Fire Sale: Definition

- To identify fire sales, we do the following:
  - We compute standardized volume at the **day-manager level**

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

    The mean and volatility are estimated over a six-month rolling window
  - Whenever a manager's Z_t^m is -0.25 for at least 5 consecutive days, we say that the manager is in 'distress'

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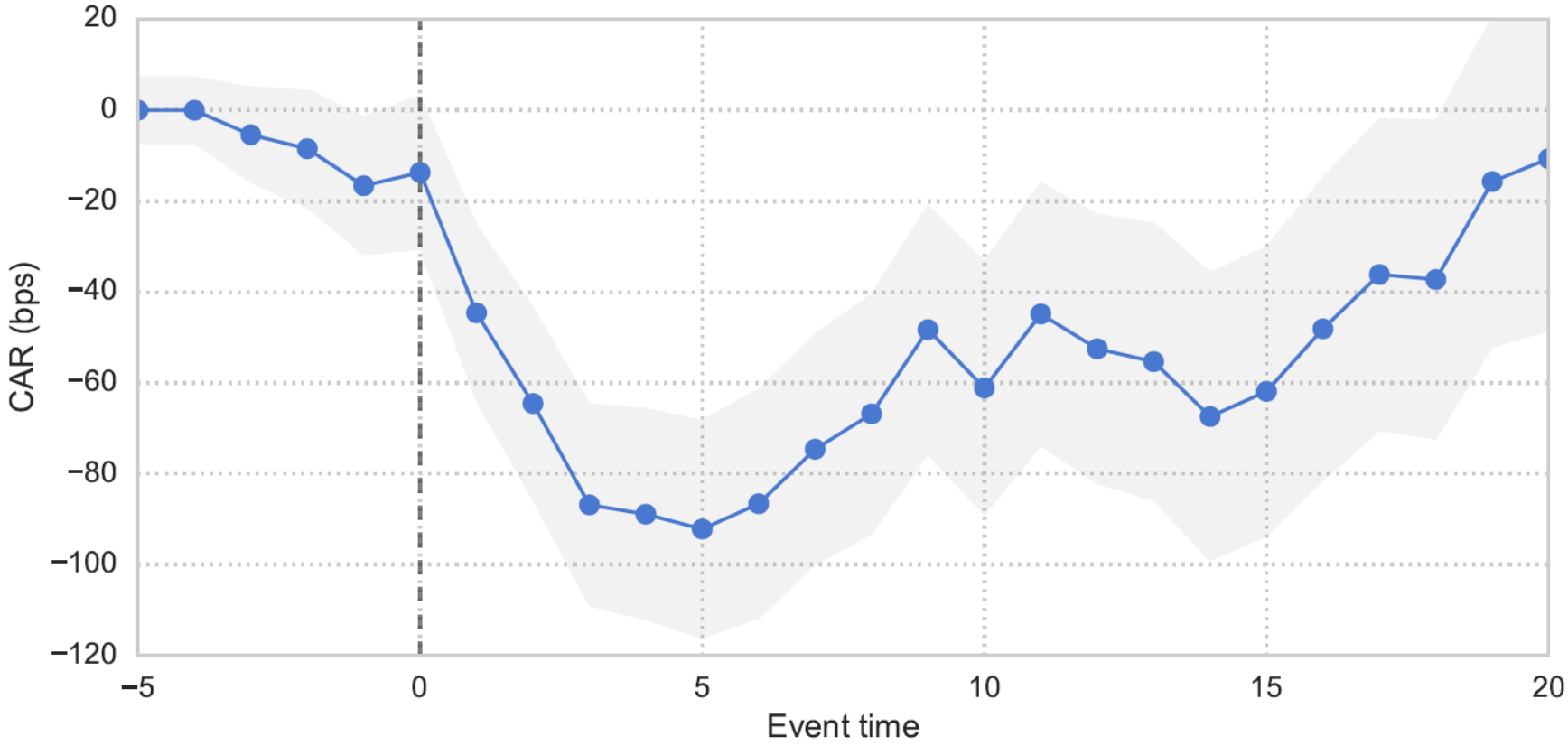
  - Whenever a manager's Z_t^m is -0.25 for at least 5 consecutive days, we say that the manager is in 'distress'
  - We also impose a **stock-level** condition: a fire sale needs to have stocks for which the selling volume is more than 1% of total market volume in at least 4 out of the 5 days in which the manager is in distress ("fire-sale stocks")
  - Finally, we keep events with at least 10 fire-sale stocks involved to avoid sales due to stock-specific news

Fire Sale: Stats

- We identify 385 fire sale events
- On average there are 22 stocks involved in each fire sale event
- On average the distressed fund liquidates $380m (median $180m)
  - Liquidations reach $1b in the bottom 10%
- The fire sale volume is about 9% of (reconstructed) portfolio value
- Liquidations can take between 5 and 11 days
- The volume of the distressed fund is on average 15% of the total market volume per day/stock (median 10%)

Fire Sale Stocks: Price Movement



Broker Awareness

- First, we exploit variation **across brokers:** Not all brokers will be *aware* of the fire sales
  - A fund uses multiple brokers to minimize price impact and info leakage (on average 27)
- *Broker Awareness: Event Level Awareness + Stock Level Awareness*
  - Event Level: Broker observes a large fraction of the fire sale volume
  - Stock Level: Broker observes a large volume at the stock level
- There are 1.7 aware brokers per event (0.5 per fire-sale stock)

Do Aware Brokers Leak Information?

- We expect: trades through aware brokers are more subject to predation than through unaware brokers
- Test :

$$Predation_{m,i,b,t} = \beta_1 Aware_{b,t} + \gamma_{m,i,b,t} + \varepsilon_{m,i,b,t}$$

  - $Aware = 1$ if the broker executing the trades is aware
  - $Predation = 1$ if the client m of broker b trades in the same direction as the originator in stock i on day t
  - $Predation = 0$ if the trade is in the opposite direction
- Other dependent variable: the predation dummy multiplied by the trade volume as a fraction of the stock market cap (standardized)

More Predation through Aware Brokers

- Brokers who are aware of the fire sale are up to 9% more likely to intermediate predatory trading

Dependent Variable	Probability of Predation				Volume of Predatory Trades			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Aware	0.091***	0.078***	0.074***	0.065***	0.171***	0.160**	0.166**	0.143***
	(4.751)	(4.848)	(4.634)	(5.256)	(2.608)	(2.530)	(2.508)	(4.445)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Manager Fixed Effects		Yes	Yes	Yes		Yes	Yes	Yes
Broker Fixed Effects			Yes	Yes			Yes	Yes
Event Fixed Effects				Yes				Yes
Stock × Day FEs				Yes				Yes
Observations	496,729	496,685	496,555	487,605	489,323	489,281	489,148	480,527
R-squared	0.076	0.103	0.107	0.439	0.020	0.028	0.032	0.321

Client Heterogeneity

- Second, we exploit variation **across clients** of aware brokers
- Best clients of the aware brokers are likely to be tipped off
- Best clients by: **Size**, **Volume**, **Commissions**
- We estimate

$$\begin{aligned} Predation_{m,i,b,t} &= \beta_1 Best\ Client_{m,b,t} \times Liquidation\ Period \\ &+ \beta_2 Best\ Client_{m,b,t} + \beta_3 Liquidation\ Period + \gamma_{m,i,b,t} + \varepsilon_{m,i,b,t} \end{aligned}$$

- $Liquidation\ Period = 1$ for the first five days of the fire sale, =0 for the five days before

More Predation by Best Clients

- Best clients are 3% more likely to predate during fire sale

Dependent variable	Probability of Predation				
	(1)	(2)	(3)	(4)	(5)
Best clients proxy	Volume above 5%	Top Decile of Volume	Top Decile of Commissions	Ranking based on Volume	Ranking based on Commissions Paid
Best Client × Liquidation Period	0.031***	0.020***	0.022***	0.027***	0.024***
	(5.491)	(5.751)	(6.286)	(5.917)	(5.503)
Best Client	-0.008	-0.009	0.007	0.017	-0.016
	(-0.725)	(-1.023)	(0.842)	(1.088)	(-1.109)
Liquidation Period	0.010*	0.007	0.007	-0.007	-0.005
	(1.759)	(1.372)	(1.357)	(-1.175)	(-0.794)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Manager Fixed Effects	Yes	Yes	Yes	Yes	Yes
Event Fixed Effects	Yes	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Broker Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	147,667	147,667	147,667	147,667	147,667
R-squared	0.287	0.287	0.287	0.287	0.287

Trade Reversal

- Dependent variable: Fraction of sales that is reversed
- Best clients reverse more their sales during the ten days after the start of the fire sale

Dependent variable	Percentage of Positions Reversed				
	(1)	(2)	(3)	(4)	(5)
Best clients proxy	Volume above 5%	Top Decile of Volume	Top Decile of Commissions	Ranking based on Volume	Ranking based on Commissions Paid
Best Client × Dummy(0,10)	12.540*	16.513***	15.807***	37.319***	28.802***
	(1.791)	(2.794)	(2.694)	(2.881)	(2.606)
Best Client	-4.253	-7.922	-5.707	18.893	3.718
	(-0.980)	(-1.025)	(-0.482)	(0.982)	(0.236)
Dummy(0,10)	4.984*	3.573	4.256	-19.081*	-11.349
	(1.959)	(0.859)	(1.043)	(-1.675)	(-1.180)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Manager Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	14,817	12,556	12,556	12,556	12,556
R-squared	0.121	0.282	0.282	0.283	0.282

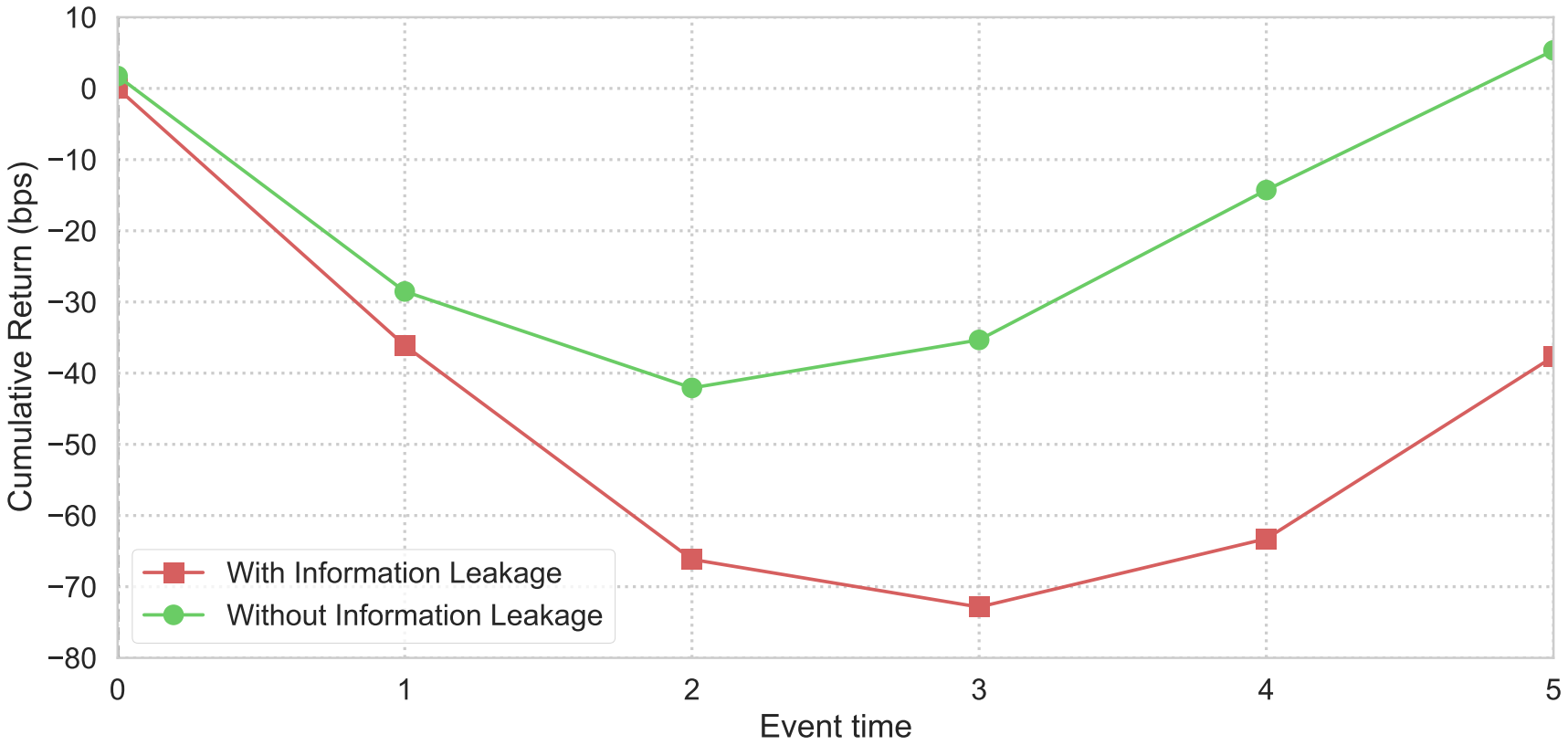
Alternative Hypothesis

- Main alternative hypothesis: asset managers are responding to the same common signal
  - There might be an aggregate shock in the market that leads funds to offload their positions
  - Or, news about the stocks might be released, triggering the funds' trading behavior

- We show robustness to exclusion of:
  - Periods of market turmoil
  - Stocks experiencing negative news
  - Stocks with negative price momentum
  - Stocks with high short interest
- We use natural experiment of Late Trading Scandal to identify predation around forced liquidations

Predation Magnifies Price Drop During Fire Sales

- Counterfactual: use 29 (7.5%) fire-sale events with no aware brokers
- The price path with predation is almost twice as deep



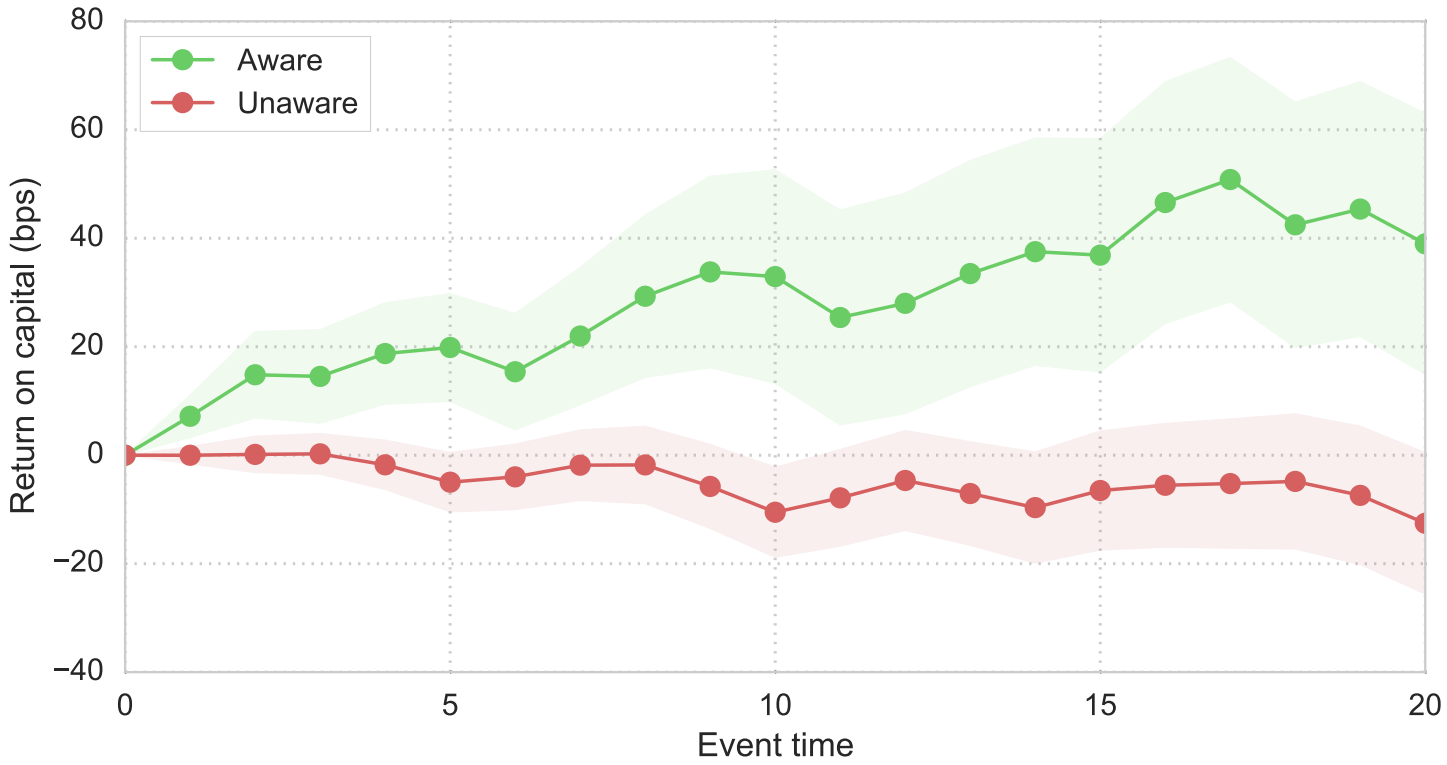
Higher Trading Costs for Liquidators

- The price impact of liquidators is up to 25% of a standard deviation higher with information leakage

Dependent variable	Price Impact (basis points)		
	(1)	(2)	(3)
Benchmark Price	First Placement Price	Open Price	First Transaction Price
Aware Broker Dummy	34.922***	40.130***	22.079**
	(2.821)	(2.937)	(2.403)
Followers Volume	23.253***	23.796***	8.174
	(2.728)	(2.662)	(1.632)
Generator Volume	8.062	10.259	1.141
	(0.753)	(0.863)	(0.150)
Amihud Ratio	-19.239	-20.645	-18.706
	(-1.078)	(-1.114)	(-1.389)
Time Fixed Effects	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes
Observations	6,291	6,291	6,291
R-squared	0.431	0.431	0.416

Higher Profits for Predators

- Trading profits of best clients of aware brokers are 40-75 bps higher around fire sales



Do Brokers Benefit from Leaking? Yes

- Brokers can charge the predating managers 10%-25% higher commissions in two years after fire sale (in std. dev. units)

Dependent variable	Commissions per dollar (basis points)				
Best clients proxy	(1) Volume above 5%	(2) Top Decile of Volume	(3) Top Decile of Commissions	(4) Ranking based on Volume	(5) Ranking on Commissions Paid
Best Client × Post	0.553***	0.508***	0.377***	1.017***	0.906***
	(4.915)	(5.567)	(4.128)	(8.534)	(7.628)
Best Client	-0.908***	-0.947***	-0.492***	-4.127***	-1.400***
	(-8.187)	(-9.514)	(-4.833)	(-12.830)	(-4.525)
Post	-0.682***	-0.779***	-0.739***	-1.250***	-1.169***
	(-12.711)	(-12.188)	(-11.616)	(-12.981)	(-12.339)
Event Fixed Effects	Yes	Yes	Yes	Yes	Yes
Manager Fixed Effects	Yes	Yes	Yes	Yes	Yes
Broker Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	252,416	252,416	252,416	252,416	252,416
R-squared	0.313	0.314	0.313	0.318	0.314

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
- Tradeoff between slow execution to avoid price impact (Kyle, 1985) and information leakage
- A source of concern for regulators: leakage exacerbates price drops during fires sales, especially important at times of scarce liquidity

The Granular Nature of Large Institutional Investors

- **Itzhak Ben-David**

  Fisher College of Business, The Ohio State University, and NBER

- **Francesco Franzoni**

  University of Lugano (USI) and Swiss Finance Institute

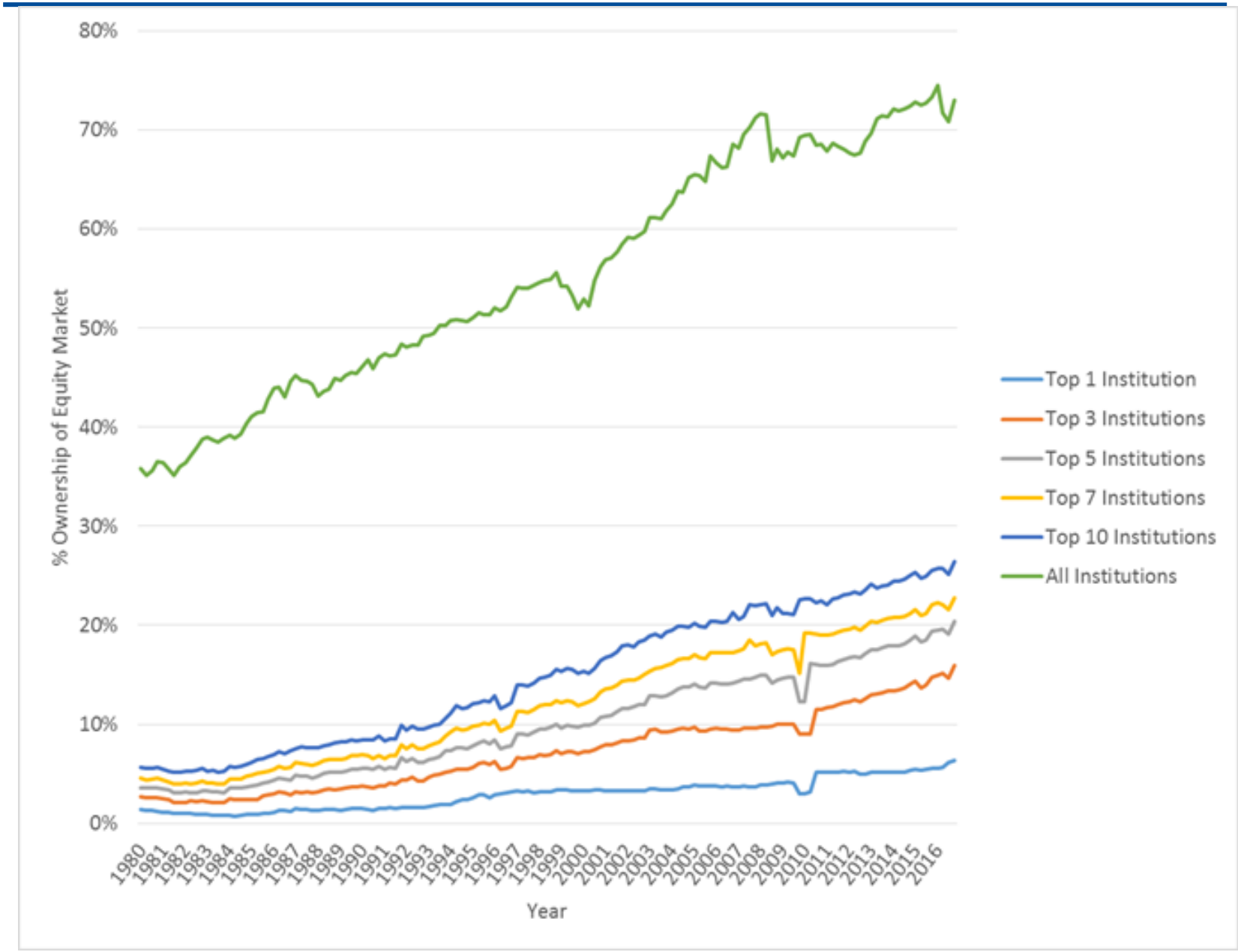
- **Rabih Moussawi**

  Villanova School of Business and Wharton Research Data Services (WRDS)

- **John Sedunov**

  Villanova School of Business

Size of Top Institutions (% of US Equity Mkt)



Regulators are Concerned

FINANCIAL TIMES

INSIDE BUSINESS

March 30, 2015 12:42 pm

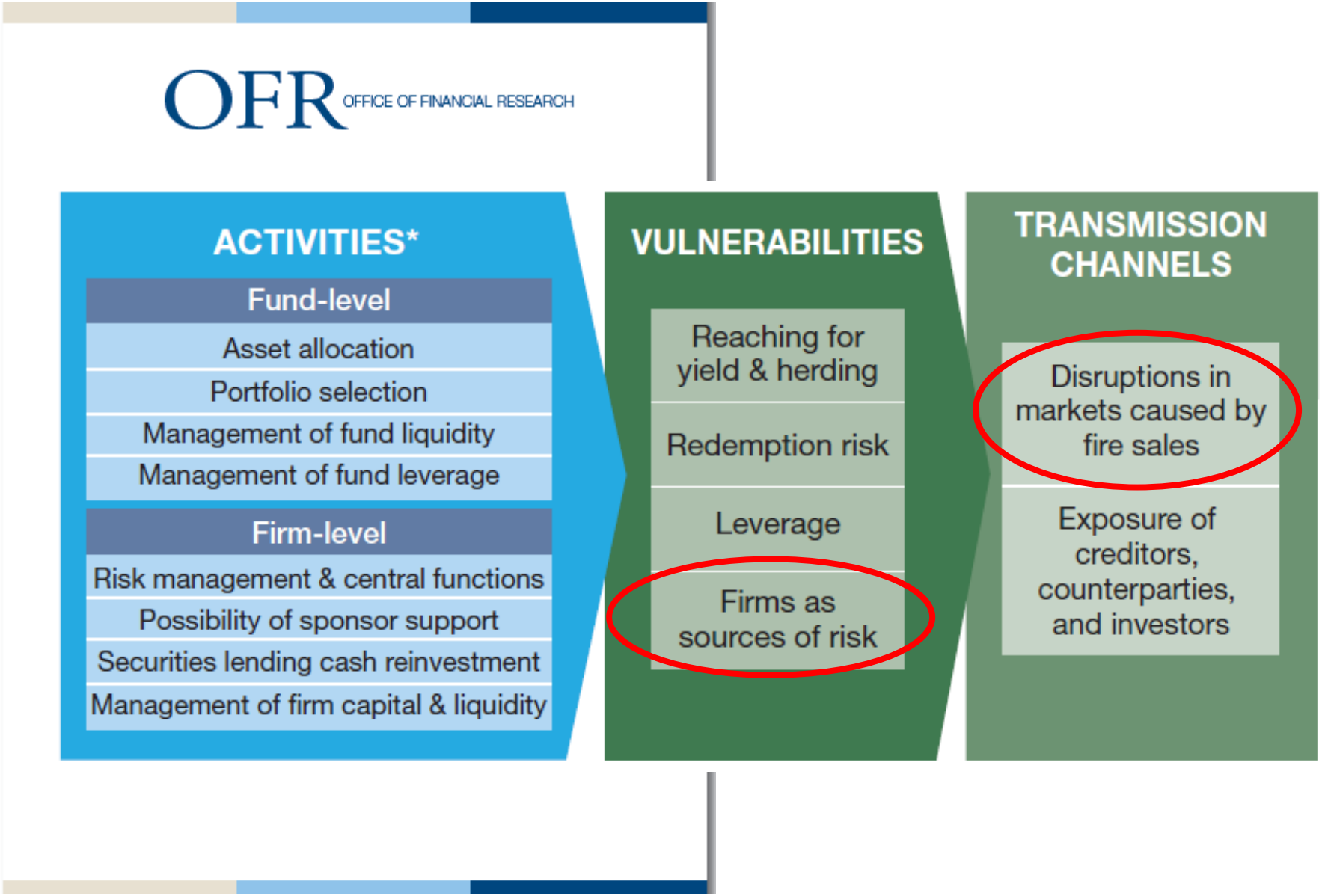
Time to find out hard way if asset management is systemic risk

Patrick Jenkins in London Author alerts

Effective regulatory crackdown may come too late

On the other hand, you might feel reassured that the threats are under control. At the start of the month, global regulators came out with a tough policy paper on boosting the supervision of asset managers. The Financial Stability Board and the International Organisation of Securities Commissions promised a plan to identify systemically important funds and contain their risks.

Regulators are Concerned



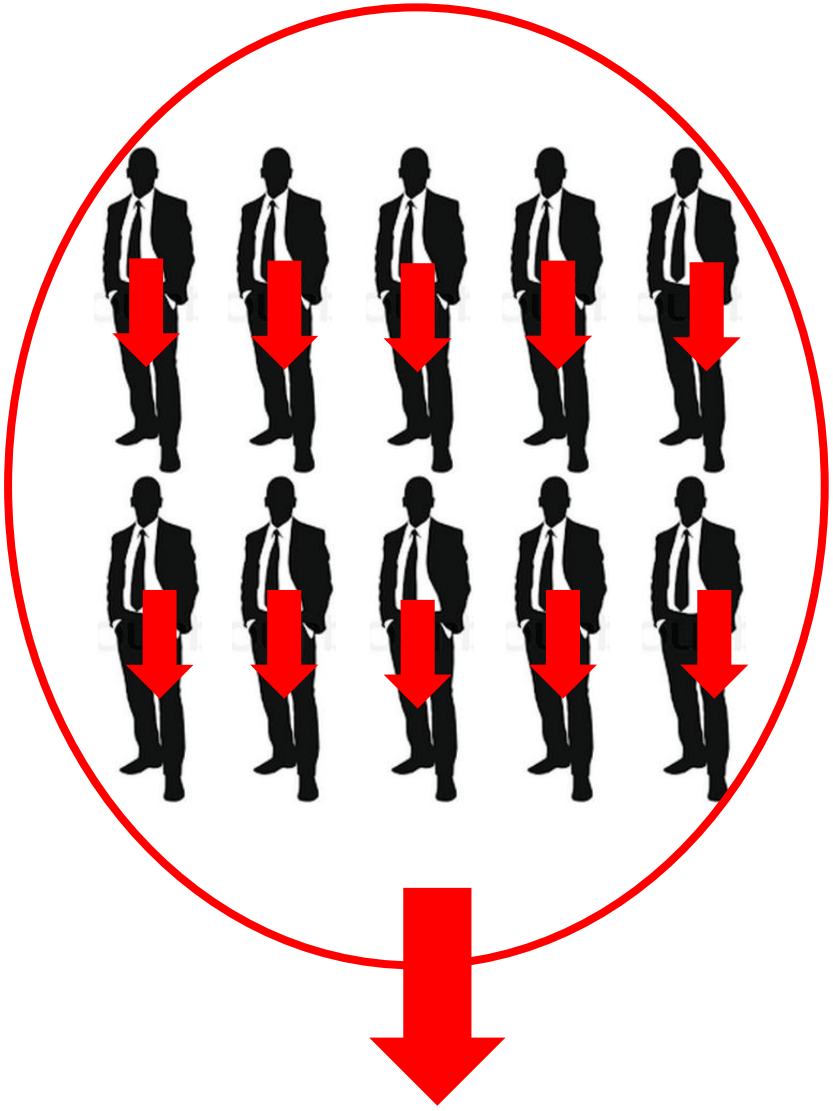
Granularity

VS.

Granularity

VS.

Sub-entities within large institution



Top Institutions Increase Stock Volatility

Hypothesis:

Institutions make large trades that increase stock volatility

- Volatility increases with large institutions' ownership

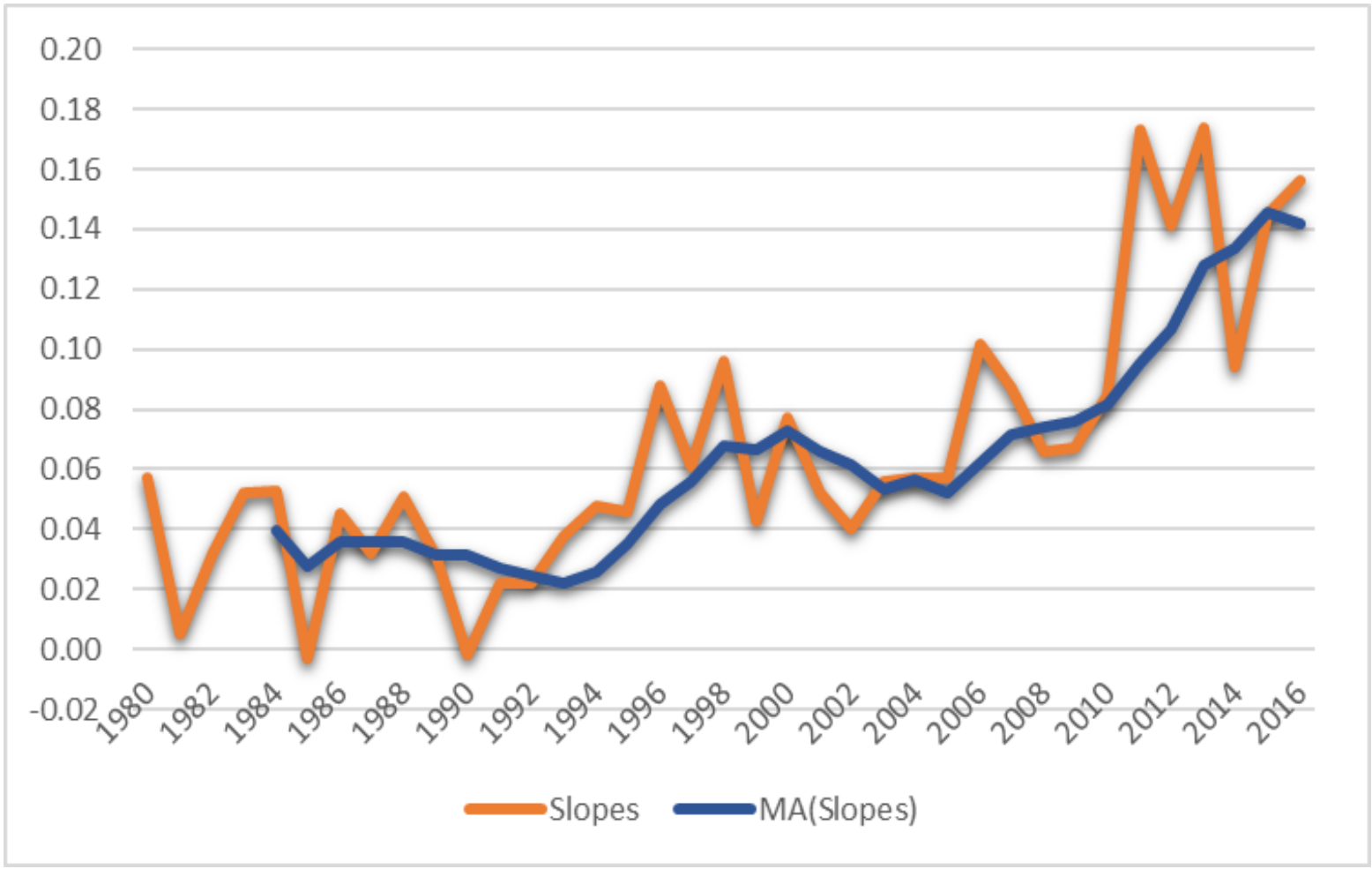
Tests:

- Stock volatility increases with large institutional ownership
  - OLS
  - Natural experiment: BlackRock – BGI Merger, 2009

Top Institutions Increase Stock Volatility

Dependent variable:	Daily volatility (q) (%)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
Top inst ownership (q-1)	1.096***	1.080***	1.071***	0.945***	1.146***	0.674***	0.238
	(4.637)	(5.542)	(6.401)	(6.625)	(6.493)	(4.087)	(1.576)
Controls: Liquidity, Size, Book-to-Market, Momentum, Ownership by other institutions							
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	666,605	666,605	666,605	666,605	666,605	666,605	666,605
Adj R^2	0.666	0.666	0.666	0.666	0.666	0.666	0.666

Slope Increases Over Time…



Price Dislocations during Times of Market Stress

- In bad quarter, returns are lower by 10% of st.dev. for stocks with higher ownership by top institutions

Dependent variable:	DGTW Excess Returns (Quarterly)						
Institutions:	Top 3	Top 5	Top 7	Top 10	Top 11-20	Top 21-30	Top 31-50
Top inst ownership (q-1)	-0.001	0.000	0.006	0.005	0.002	0.015	-0.014
	(-0.073)	(0.028)	(0.593)	(0.511)	(0.367)	(1.470)	(-1.540)
Top inst ownership (q-1) × Market Stress Quarter	-0.175*	-0.171**	-0.173**	-0.191***	0.012	-0.001	0.097**
	(-1.728)	(-2.341)	(-2.448)	(-2.966)	(0.329)	(-0.015)	(2.318)
	Controls: Liquidity, Size, Book-to-Market, Momentum						
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	479,839	479,839	479,839	479,839	479,839	479,839	479,839
Adj R^2	0.080	0.080	0.080	0.080	0.080	0.080	0.080

Conclusion

- Causal evidence that large institutional investors increase stock volatility
- Evidence that the increase in volatility reflects noise, as opposed to improved price discovery
- During periods of market turmoil significant larger price drops for stocks owned by large institutions
- Consistent with a magnification of fires sales as a result of increased concentration in asset management