Covid, Work from Home, and Securities Misconduct

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What encompasses market manipulation?
Regulation, Surveillance, and Consequences
Covid, Work from Home, and Securities Misconduct
Death, Destruction, and Manipulation

Market Manipulation

- Insider Trading
  - Frontrunning, Client Precedence, Trading Ahead of Research Reports, Separations of Research and Trading, Broker Ownership Limit, Restrictions on Affiliation, Restrictions on Communications, Investment Company Securities, Influencing or Rewarding Employees of Others, Anti-Intimidation/ Coordination

- Market Manipulation
  - Price Manipulation, (Marking the Open, Marking the Close, Misleading End of Month/Quarter/Year Trades, Intraday Ramping/ Gouging, Market Setting, Pre-Arranged Trades, Domination and Control)
  - Volume Manipulation (Churning, Wash Trades)
  - Spoofing (Giving up Priority, Switching, Layering)
  - False Dissemination

- Broker Agency Conflict
  - Trade Through, Improper Execution, others

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Motivation: Manipulation bad for corporate outcomes

- "The stock-price manipulation involved in massive buybacks—and the resulting exorbitant executive pay—are thus not just moral or legal problems. The consequences... net disinvestment, loss of shareholder value, diminished investment in innovation, destruction of jobs, exploitation of workers, windfall gains for activist insiders, rapidly increasing inequality and sustained economic stagnation."

-- Forbes 2017

"Resisting The Lure Of Short-Termism"

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Regulation = Trading Rules + Surveillance

- **Trading rules and surveillance** improve market liquidity (Cumming et al. 2011 JFE, 2019 FRL)

- **Trading rules** mitigate the frequency of insider trading (Aitken et al. 2015 JCF)

- **Trading rules** and **HFT** mitigate the frequency of EOD manipulation (Aitken et al. 2015 JBF)

- **Securities violations** hurt innovation (Cumming et al. 2020 JBF)

- **Securities violations** hurt mergers (Cumming et al. 2022 BJM)

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Cumming, Firth, Gathergood, Stewart (2022 Working Paper)

- # **Covid, Work from Home, and Securities Misconduct**

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Motivation

- The lengthy review above suggests we need more papers on surveillance

- **Are traders more likely to engage in misconduct when working from home?**

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Possible Prediction: Work from Home → misconduct

1. Worsening of public information when working from home (worsening of quality of research reports) (Li and Wang, 2022)

2. Distraction and mistake ("fat finger trades")

3. Less direct monitoring / oversight (Hu, Wang, Xin, 2017 MDE)

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Possible Prediction: Work from Office → misconduct

1. Inside information at office due to physical proximity Hong, Kubeck, Stein, 2015 JF; Ahern, 2017 JFE)

2. Contagion in misdconduct due to physical proximity (Gino, Ayal, and Ariely, 2009, Psychological Sci.)

3. Rumors emerge with physical proximity (Yu, Lim, Tam, 2019 PACIS; Baumol 2003 JF, Alpervoich, Cumming, Czellar, Groh, 2022 JFE)

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Data

- London Investment Bank, 162 traders

- Daily data 1 January 2019 to 18 March 2022

- pre-lockdown period:
  - 1 Jan 2019 to 18 March 2020

- lockdown period:
  - 19 March 2020 to 31 March 2022

- 88,441 employee-day observations, 138 alerts (securities violations)

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Experiment: Forced Work from Home

- Business critical functions remain in the office

- Too risky to have certain roles (e.g., book watchers) work from home
  - Suggests more fraud would happen when trading at home, if anything

- Some flexibility in who work from home based on individual needs (such as personal family matters, safety), decided more on a more ad-hoc basis.

- No policy or decision to allow work from home in a way that was correlated with, or averted to any risk of, securities fraud associated with work from home.

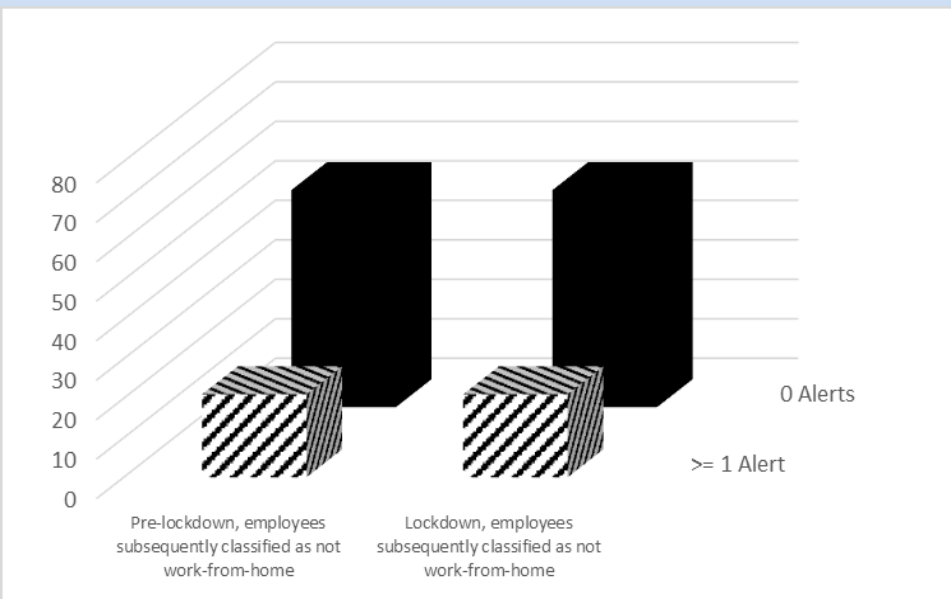**Figure 1. Trading Alerts in Pre- versus Post-Covid with Assignment for Work-from-Home**
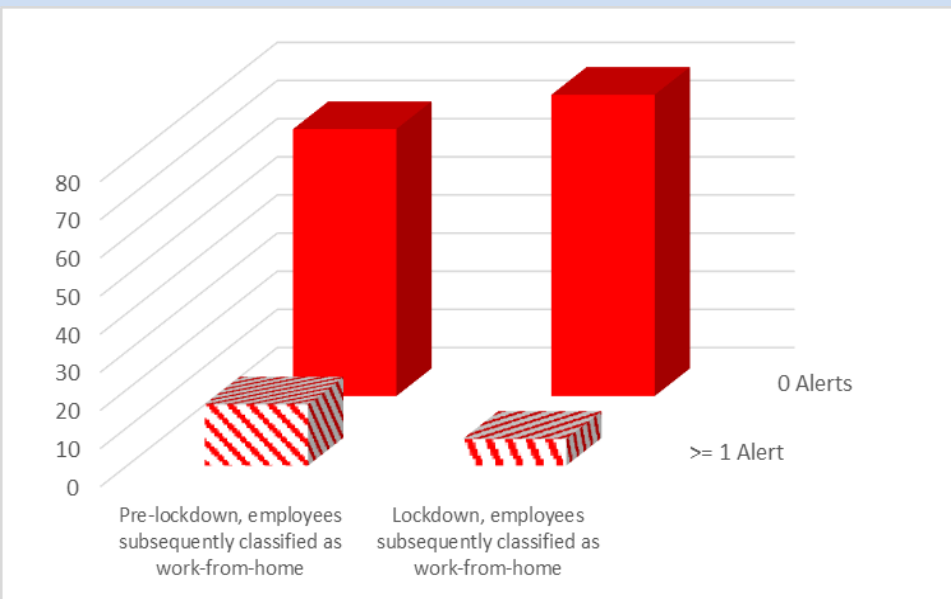
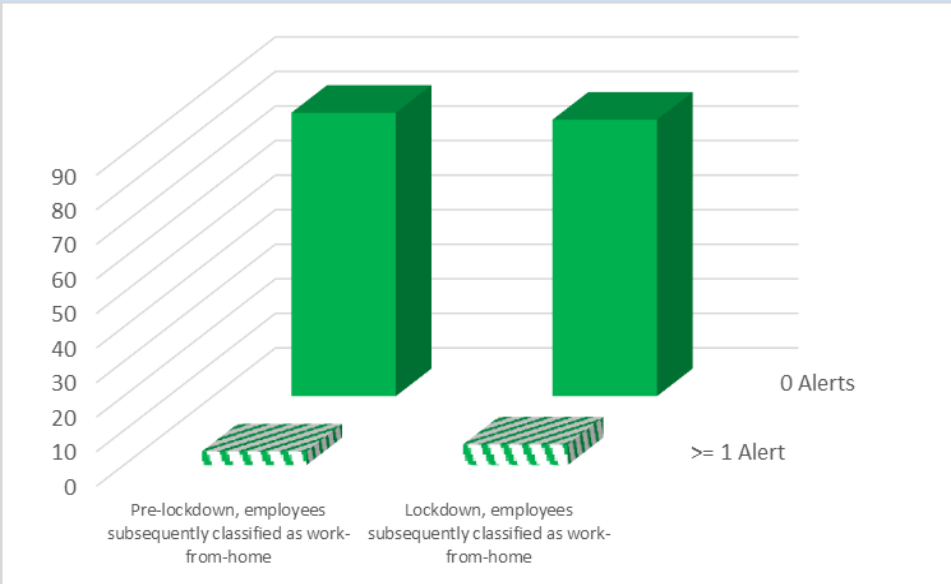**Figure 2. Communication Alerts in Pre- versus Post-Covid with Assignment for Work-from-Home**

Douglas Cumming (2022)

Securities Misconduct

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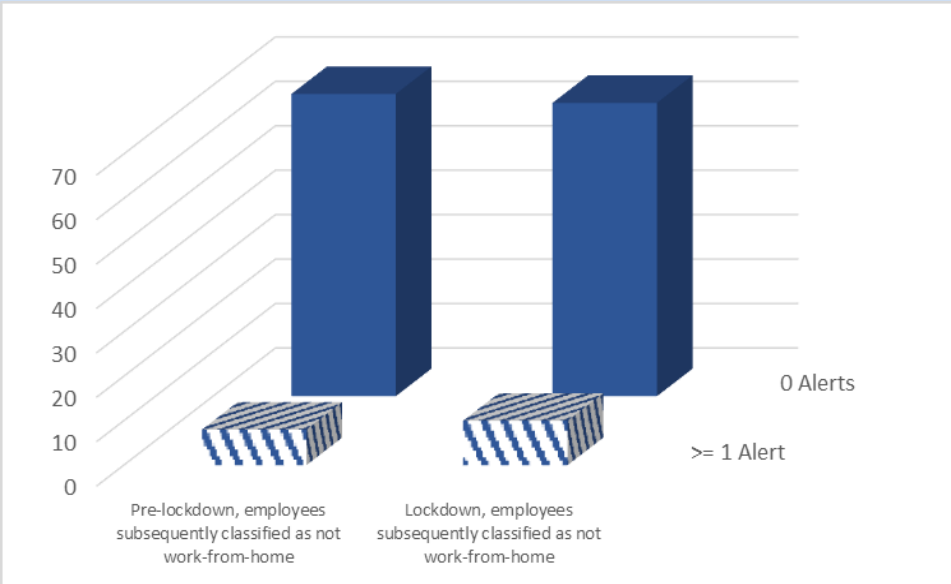
Figure 1: Trading Alerts

- Pre-lockdown, 18.61% (27.63%) of employees that were subsequently assigned to work from home (not work from home) had 1 or more trading alerts for securities violations, and this difference in proportions is not statistically significant (P=0.171).

- Post lockdown, 8.14% (27.63%) of employees subsequently assigned to work from home (not work from home) had 1 or more trading alerts for securities violations, and this difference in proportions is statistically significant (P=0.001).

- The difference between pre- and post-lockdown for employees subsequently assigned to work from home is significant (P=0.044), while the difference between the pre- and post-lockdown for employees subsequently assigned to not work from home is not significant (P=1.000).

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Figure 2: Communication Alerts

- Pre-lockdown, 4.66% (10.53%) of employees that were subsequently assigned to work from home (not work from home) had 1 or more communication alerts for securities violations, and this difference in proportions is not statistically significant (P=0.156).

- Post lockdown, 6.98% (13.16%) of employees subsequently assigned to work from home (not work from home) had 1 or more communication alerts for securities violations, and this difference in proportions is not statistically significant (P=0.190).

- The difference between pre- and post-lockdown for employees subsequently assigned to work from home is not significant (P=0.617), while the difference between the pre- and post-lockdown for employees subsequently assigned to not work from home is not significant (P=0.516).

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Regressions

- Standard difference-in-differences set-up
  - Post Covid, Treatment, Post-Covid * Treatment

- Binomial logit regressions Table 6

- Robustness checks:
  - Multinomial logit regressions Table 7
  - Poisson regressions, OLS regressions in Table 8

Table 6 binomial	Alert				Comms.Alert				Trade.Alert			
	(1)		(2)		(3)		(4)		(5)		(6)	
	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat
lockdown	0.290	1.45	0.265	1.33	0.655	1.44	0.650	1.43	0.200	0.893	0.166	0.747
wfh.group	-0.798	-3.24***	-0.798	-3.24***	-0.817	-1.33	-0.817	-1.33	-0.794	-2.956***	-0.794	-2.96***
lockdown:wfh.group	-0.679	-1.73*	-0.680	-1.72*	0.016	0.02	0.015	0.02	-1.033	-2.106***	-1.034	-2.11**
return			9.697	1.32			3.014	0.29			11.826	1.315
Tuesday			0.292	1.06			0.488	0.78			0.242	0.43
Wednesday			0.078	0.27			0.347	0.65			0.006	0.02
Thursday			0.455	1.64			0.517	0.82			0.441	1.42
Friday			0.089	0.30			0.404	0.63			0.0003	0.00
constant	-6.167	-43.1***	-6.363	-25.1***	-7.981	-22.6***	-8.350	-13.1***	-6.346	-40.6***	-6.498	-23.6***
Number of Observations	88,441		88,418		88,441		88,418		88,441		88,418	
Veall-Zimmermann Pseudo R^2	0.020		0.023		0.015		0.016		0.023		0.026	

Table 7: Multinomial	Model (1)				Model (2)			
	Comms Alert		Trade Alert		Comms Alert		Trade Alert	
	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat
lockdown	0.656	1.436	0.200	0.894	0.651	1.422	0.166	0.7636
wfh.group	-0.818	-1.335	-0.794	-2.956***	-0.818	-1.336	-0.796	-2.957***
lockdown:wfh.group	0.015	0.019	-1.033	-2.107**	0.014	0.018	-1.036	-2.108**
return					3.036	0.229	11.827	1.617
Tuesday					0.488	0.779	0.242	0.781
Wednesday					0.347	0.537	0.006	0.987
Thursday					0.517	0.819	0.441	1.448
Friday					0.404	0.624	0.004	0.001
constant	-7.979	-22.565***	-6.345	-40.593***	-8.348	-14.253***	-6.498	-24.309***
Number of Observations	88,441		88,441		88,418		88,418	

	OLS Regressions						Poisson Regressions					
	(1) All Alerts		(2) Comm Alerts		(3) Trade Alerts		(4) All Alerts		(5) Comm Alerts		(6) Trade Alerts	
	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat	coefficient	t-stat
lockdown	0.000671	1.376	0.000315	1.404	0.000357	0.822	0.264	1.332	0.650	1.434	0.165	0.746
wfh.group	-0.001149	-3.254***	-0.160450	-1.339	-0.000959	-2.964***	-0.797	-3.244**	-0.817	-1.334	-0.792	-2.956***
lockdown:wfh.group	-0.001009	-1.816*	-0.000172	-0.647	-0.000837	-1.714*	-0.679	-1.715*	0.015	0.020	-1.033	-2.109**
return	0.014802	0.011	0.000978	0.260	0.013823	1.291	9.673	1.323	3.013	0.290	11.801	1.316
Tuesday	0.000439	1.059	0.000148	0.790	0.000291	0.787	0.295	1.058	0.488	0.779	0.241	0.784
Wednesday	0.000099	0.254	0.00097	-0.538	0.000003	0.008	0.078	0.265	0.347	0.537	0.006	0.017
Thursday	0.000718	1.647	0.000157	0.835	0.000560	1.426	0.454	1.640	0.516	0.823	0.440	1.425
Friday	0.000114	0.289	0.000115	0.629	-0.000001	-0.003	0.089	0.299	0.404	0.628	0.0002	0.001
constant	0.001828	4.615***	0.000238	1.387	0.001590	4.450***	-6.364	-24.150***	-8.350	-13.123***	-6.500	-23.603***
Number of Observations	88,418		88,418		88,418		88,418		88,418		88,418	
Adjusted R^2, Veall-Zimmermann Pseudo R^2	0.0003		0.00008		0.0003		0.023		0.016		0.026	

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Economic Significance

- Selection effect

  - The economic significance is such that there is a reduction in alerts by approximately 13.9% (annualized), relative to the average frequency of alerts in the data, when employees work from home.

- Treatment effect

  - The economic significance is such that forced assignment to work from home post covid causes an approximate 7.2% (annualized) reduction the probability of a trade alert relative to the average probability of trade alerts appearing in any given day in the data.

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Limitations / Scope for Future Papers

- Unknowns:
  - Magnitude of harm caused unknown (only frequency)

  - Other trader characteristics
    - Race, gender, actual address of residence

  - Computing power at home
    - But there is evidence that shows more computing power and HFT/AT is associated with less manipulation

- Different cities, countries… could get different results in other contexts

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Conclusions

- Traders Work from home → more fraud?
  - Yes? if focus on reduction in monitoring, lowering of quality of information environment
  - No? if focus on contagion and rumors with proximity

- Experiment: who is forced home?
  - Critical functions kept at office, including book watchers
  - Suggest any bias in the test, it would lead us to find less misconduct post covid trading from office

- The data indicate that traders that work from home → less fraud

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Akter, Cumming, and Ji (2022 Working Paper)

- **Death, Destruction, and Manipulation**

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Motivation

- "US senators accused of **coronavirus insider trading** are a symbol of **moral bankruptcy**"

- **"Unethical and selfish behavior becomes especially disgusting in a time of a deadly pandemic"**

  – The Guardian
    - https://www.theguardian.com/commentisfree/2022/mar/21/us-senators-accused-coronavirus-insider-trading-are-a-symbol-moral-bankruptcy

- **How often does this happen?**

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Exogenous Events: Disasters

- Crises: hurricanes, floods, ice storms, etc.

- All cause destruction (property, crops), some injuries & death

- Match disasters to location (place, time) of head office

- Investors concerned about stock prices during disasters. But investors often misestimate disasters (over or underestimate).

- Disasters also distract / divert attention

- Prediction:

- **Disasters are a great time to manipulate stocks**

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Disasters more specifically

- **Some industries should be particularly hit by select disaster events**

- Examples:
  - Injuries and deaths widen scope for manipulation of health stocks
  - Property damage widens scope for manipulation of finance and insurance stocks
  - Crop damage widens scope for manipulation on agriculture crop and other life science industry stocks
  - Injuries widen scope for manipulation of transportation and manufacturing stocks

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Other pertinent factors for predicting manipulation

- ## Manipulation less likely with:
  - – More analysts (too much surveillance, too little information asymmetry)
  - – More volatile stocks (harder to execute manipulation)

- ## Greater incentives to manipulate stocks that are
  - – Underperforming (improve your return)
  - – Traded frequently (less likely to be detected)

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Data

- Sources: Capital Markets CRC (Sydney)

- National Oceanic and Atmospheric Administration

- CRSP, Compustat, IBES

- 2007 to 2018

- Intra-day data converted into a monthly panel
- Why? Disasters affect companies and their stocks over a prolonged period

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Continuous Trading Manipulation 30 mins Number of Alerts

- **1st main dep var:** monthly continuous trading manipulation 30 mins number of alerts, which sums up the total number of alerts a security incurs during a month.

- The Continuous Trading Manipulation metric detects abnormal 30-minute change of liquidity, returns and transaction cost based on the following rules:

a. For every 30-minute window *(j)* after opening of the current trading day *(t),* calculate the following metrics for every security in the market.
   – Total trading value over the past 30 minutes (Val)
   – Total trading volume over the past 30 minutes (Vol)
   – Return over the past 30 minutes (Ret)
   – Average effective spread over the past 30 minutes (EffSpr)
   – Average quoted spread over the past 30 minutes (QuotedSpr)

b. For every security in the market, calculate the average value of the above metrics for each 30-minute window *(j)* over the past 30 trading days *(t-1 to t-31).*

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c. For the **jth** 30-minute window of the current trading day **(*t*)**

- For security i, calculate the difference **(*Security_Delta$_{i,j,t,m}$*)** between metric **m** for the current window **(*j*)** and the average metric value for the same window **(*j*)** over the past 30 trading days. (Note that for the trading volume and trading value metric, the difference is calculated as the percentage change.)

- Calculate the average value of **Delta$_{i,j,t,m}$** across all securities **(*Mkt_Delta$_{j,t,m}$*).** Note that for the 30-minute return metric, index returns is used to calculate the average delta.

- Calculate the difference between **(*Security_Delta$_{i,j,t,m}$*)** and **(*Mkt_Delta$_{j,t,m}$*)** for the current trading day **(*Current_Security_Delta$_{i,j,t,m}$*)** and the average daily difference over the past 30 trading days **(*Hist_Security_Delta$_{i,j,t,m}$*)**

- If there are 3 or more metrics with **(*Current_Security_Delta$_{i,j,t,m}$*)** that is more than 3 standard deviations away from **Hist_Security_Delta$_{i,j,t,m}$,** increase the number of Continuous Trading Manipulation alert by one.

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Three Additional Dependent Variables

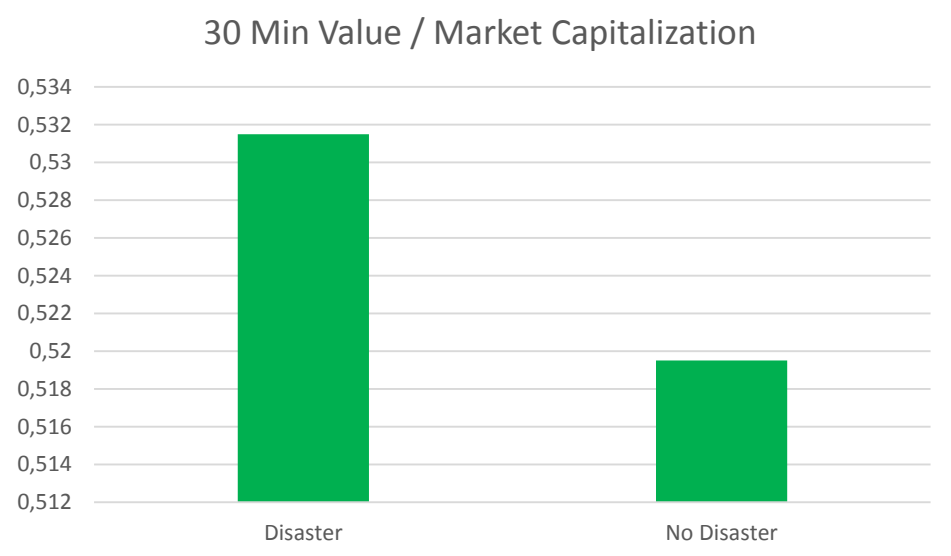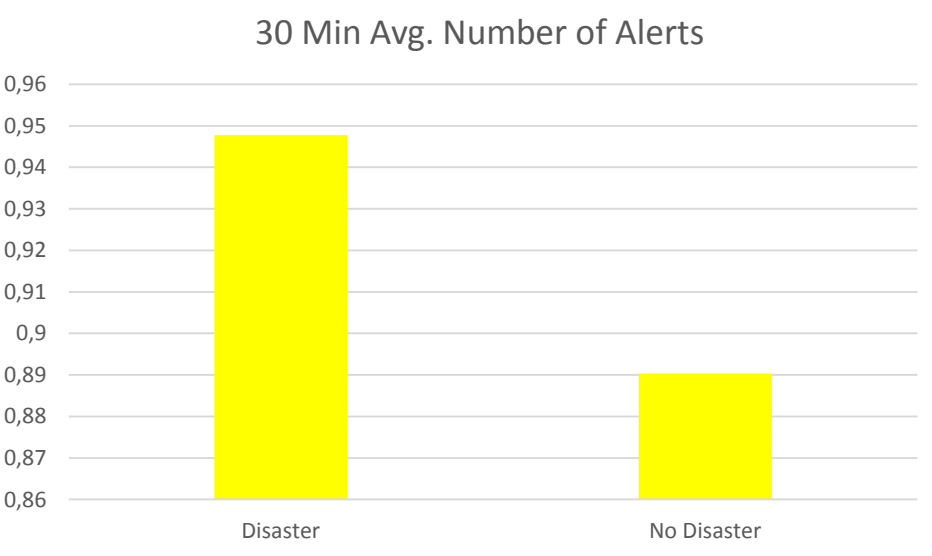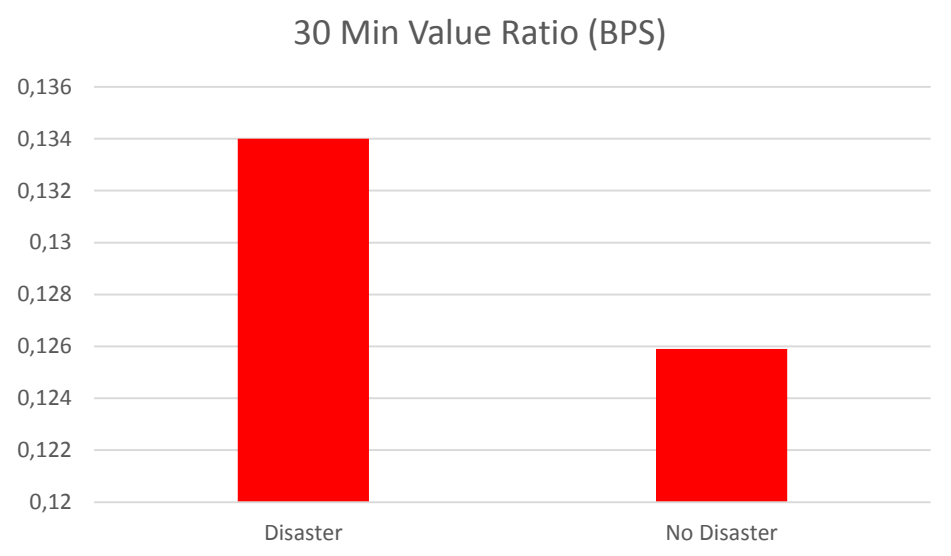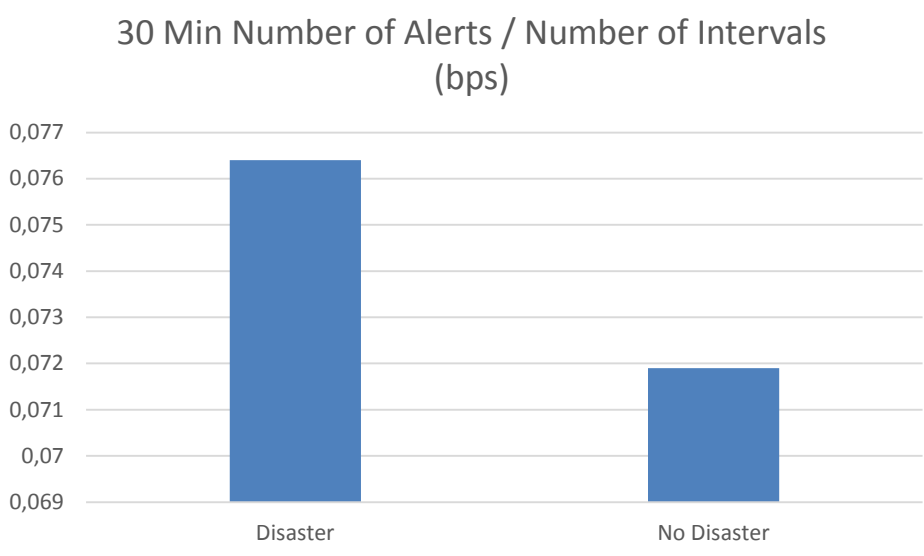|	
Continuous Trading Manipulation 30 mins Number of Alerts to Number of Intervals Ratio (bps)	It represents the ratio of the number of Continuous Trading Manipulation alerts over the total number of 30-minute (j) windows for security i on day t. The paper uses the monthly continuous trading manipulation number of alerts to number of intervals ratio by summing up the total number of the ratios for each day of a month when security i was exposed to continuous trading manipulation.
Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization	It represents the trading value across all 30-minute (j) windows with Continuous Trading Manipulation alert triggered for security i on day t. The paper uses the monthly continuous trading manipulation 30 mins total trade value by summing up the trading values for each day of a month when security i was exposed to continuous trading manipulation.
Continuous Trading Manipulation 30 mins Value Ratio (bps)	It represents the ratio of trading value across all 30-minute (j) windows with Continuous Trading Manipulation alert over the total trading value for security i on day t. The paper uses the monthly continuous trading manipulation 30 mins value ratio (bps) by summing up the ratios for each day of a month when security i was exposed to continuous trading manipulation.

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Variable	Obs	Mean	Median	Std. Dev	Min	Max
Dependent Variables						
Continuous Trading Manipulation 30 mins Number of Alerts to Number of Intervals Ratio (bps)	418,469	0.0442	0.0000	0.0941	0.0000	2.8333
Continuous Trading Manipulation 30 mins Value Ratio (bps)	418,469	0.0856	0.0000	0.1802	0.0000	3.3231
Continuous Trading Manipulation 30 mins Number of Alerts	418,469	0.5471	0.0000	1.1663	0.0000	34.0000
Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization Winsorized 5/95	418,469	0.3116	0.0000	0.6624	0.0000	2.4667
Disaster Variables						
Damage Property Direct	418,469	$855,637.10	$0.00	$87,000,000.00	$0.00	$9,000,000,000.00
Damage Crops Direct	418,469	$276.77	$0.00	$110,647.10	$0.00	$50,000,000.00
Deaths Direct	418,469	0.0077	0.0000	0.1707	0.0000	18.0000
Injuries Direct	418,469	0.0058	0.0000	0.7107	0.0000	200.0000
Firm Variables						
Analyst Coverage	418,469	4.8701	4.6667	2.0910	1.0000	54.7500
Returns	418,469	0.0075	0.0045	0.1405	-0.9936	8.3365
Idiosyncratic Risl	418,469	0.1124	0.1002	0.0615	0.0007	1.2067
Systematic Risk	418,469	0.0105	0.0107	0.0079	0.0000	0.0637
Current Assets	418,469	1146.7290	275.9160	4787.5550	0.0000	159851.0000
Liquidity Ratio	418,469	2.8080	2.1227	10.2724	0.0000	4036.0000
Share Trade Volume	418,469	2.5555E+05	44697.0000	1.4212E+06	0.0000	2.0100E+08
Market Capitalization	418,469	4.6443E+06	545779.1000	2.1500E+07	0.0000	1.1000E+09
Debt / Equity	418,469	3.7921E+05	0.9863	4.6932E+06	0.0000	4.2600E+08
Net Income to Sales	418,469	299.2599	51.8533	1392.1190	0.0000	104821.0000
Sales Turnover	418,469	3240.2150	471.1220	14073.4300	0.0000	496785.0000
R&D Intensity	418,469	0.0736	0.0304	0.6788	0.0000	285.7857
Market to Book	418,469	871.9587	44.0977	23475.6500	0.0000	9737458.0000
Tobin's Q	418,469	4.6444	1.4449	127.4109	0.1271	22787.4000
Company Age	418,469	11.2686	11.0000	5.6061	0.0000	50.0000
Market Conditions						
Return S&P	418,469	0.0044	0.0098	0.0418	-0.1694	0.1077

		Continuous Trading Manipulation 30 mins Number of Alerts to Number of Intervals Ratio (bps)		Continuous Trading Manipulation 30 mins Value Ratio (bps)		Continuous Trading Manipulation 30 mins Number of Alerts		Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization Winsorized 5/95	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
Damage Property	>0	0.0781	0	0.1376	0	0.9776	0	0.5004	0
	=0	0.0723	0	0.1264	0	0.8942	0	0.5216	0
	Difference	0.0059***	0	0.0111***	0	0.0834***	0	(0.0212)**	0
Damage Crops	>0	0.0788	0	0.1326	0	1.01	0	0.4483	0
	=0	0.0724	0	0.1268	0	0.8969	0	0.5209	0
	Difference	0.0064	0.00	0.0058	0	0.1132	0	-0.0726	0
Direct Deaths	>0	0.07507	0	0.1324	0	0.9304	0	0.5285	0
	=0	0.0724	0	0.1267	0	0.8963	0	0.5206	0
	Difference	0.0027		0.0057		0.0341	0	0.0078	0
Direct Injuries	>0	0.0864	0.0769	0.1492	0.0458	1.0781	1	0.5674	0.0421
	=0	0.0723	0	0.1266	0	0.8949	0	0.5203	0
	Difference	0.0141***	0.0769***	0.0226**	0.0458***	0.1832***	1***	0.0471***	0.0421***

Securities Misconduct

30 Min Number of Alerts / Number of Intervals (bps)

30 Min Value Ratio (BPS)

30 Min Avg. Number of Alerts
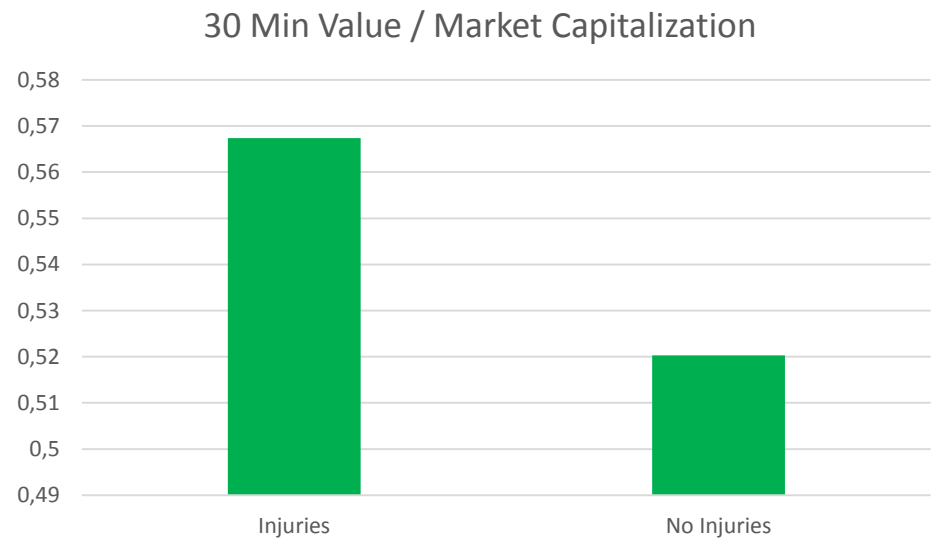

30 Min Value / Market Capitalization

Douglas Cumming (2022)   Securities Misconduct

Comparisons of Means for Disasters w Injuries. All significant ***

30 Min Number of Alerts / Number of Intervals (bps)

30 Min Value Ratio (bps)

30 Min Number of Alerts

30 Min Value / Market Capitalization

Douglas Cumming (2022)

Securities Misconduct

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Panel Regressions, Firm and Month Fixed Effects

- ## Full sample
  - – Manipulated and non-manipulated firms
  - – Disaster and non-disaster firms

- ## Subsamples
  - – Only manipulated firms (compare disaster and non-disaster months)
  - – Selected sectors

Full Sample	Continuous Trading Manipulation 30 mins Number of Alerts to Number of Intervals Ratio (bps)		Continuous Trading Manipulation 30 mins Value Ratio (bps)		Continuous Trading Manipulation 30 mins Number of Alerts		Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization Winsorized 5/95	
Disaster Variables								
Damage Property Direct scaled by GDP	-1.41E-06	-0.03	9.83E-06	0.11	-4.6E-05	-0.08	-0.0002	-0.74
Damage Crops Direct scaled by GDP	0.0002	0.22	0.0006	0.49	0.0021	0.23	0.0006	0.16
Deaths Direct	0.0004	0.9	0.0009*	1.78	0.0046	0.92	0.0049**	2.34
Injuries Direct	4.97E-05***	3.27	5.36E-05***	2.95	5.92E-04***	3.17	0.0002***	4.39
Firm Specific Variables								
ln_Analyst Coverage	-0.0049***	-11.21	-0.0038***	-4.42	-0.062***	-11.27	-0.0212***	-6.22
ln_Returns	0.0016***	13.04	0.0014***	7.19	0.0198***	12.8	0.0109***	14.69
Idiosyncratic Risk	-0.2177***	-6.35	-0.2636***	-5.37	-2.6257***	-6.32	-1.0938***	-5.55
Systematic Risk	-0.8492***	-3.99	-1.7545***	-5.02	-9.0141***	-3.48	-15.7938***	-10.2
ln_Share Trade Volume	1.16E-02***	16.53	0.0132***	15.22	0.1416***	16.41	0.1346***	22.18
ln_Market Capitalization	-2.06E-05	-0.04	-0.0005	-0.65	0.0012	0.17	-0.0374***	-9.36
Debt / Equity	-2.00E-12	-0.02	-2.10E-11	-0.09	-1.41E-10	-0.09	-1.69E-10	-0.15
Net Income to Sales	-9.28E-07	-0.93	1.99E-07	0.16	-1.1E-05	-0.91	-2.59E-06	-6.70E-01
ln_Sales Turnover	4.69E-04	0.99	3.74E-03***	3.78	0.0057	0.99	1.75E-02	5.30E+00
Market to Book	1.87E-09	0.97	1.54E-09	0.49	2.28E-08	9.90E-01	9.91E-09	0.69
ln_Asset	3.16E-03***	5.97	8.05E-03***	7.73	3.87E-02***	5.9	0.032049***	7.86E+00
Company Age	0.0015***	7.68	0.0022***	6.77	0.0185***	7.51	9.52E-03***	5.92
Current Ratio	7.57E-07	0.36	4.85E-06	1.05	1.13E-05***	4.50E-01	3.52E-05	1.41
Acquisitions	-0.0028***	-3.99	-1.50E-03	-1.23	-3.49E-02***	-3.89	-0.0121***	-2.67
Legislation	-0.0012	-1.19	-0.0012	-1.17	-0.0129	-1.05	-0.0034	-0.55
Governance_score	-0.0012**	-2.29	-0.0012	-1.27	-1.51E-02**	-2.42	-0.0038	-0.92
Return S&P	0.0982***	3.9	0.1541***	3.87	1.25E+00***	4.09	0.5984***	4.54
Intercept	-0.0981***	-8.84	-0.1293***	-7.73	-1.1535***	-9.06	-0.8088***	-8.71
Month Fixed Effects	Yes		Yes		Yes		Yes	
Firm Fixed Effects	Yes		Yes		Yes		Yes	
Industry Fixed Effects	Yes		Yes		Yes		Yes	
Model Diagnostics								
Number of Observations	415,845		415,845		415,845		415,845	
Number of Groups	7,655		7,655		7,655		7,655	
R² within	0.0426		0.026		0.0427		0.0655	
R² between	0.3087		0.1768		0.317		0.2175	

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Economic Significance Main Variables

- A 1-std.dev increase in direct property damage causes a

  - 0.51% increase in continuous trading manipulation 30 min total trade value / market capitalization

  - 0.90% increase in continuous trading manipulation alerts to number of intervals

- A 1-std.dev increase in deaths causes a

  - 0.63% increase in continuous trading manipulation 30 min total trade value / market capitalization

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Economic Significance Select Control Variables

- A 1-std.dev increase in analyst coverage causes a
  - 5.02% decrease in continuous trading manipulation 30 min total trade value / market capitalization

- A 1-std.dev increase in idiosyncratic risk causes a
  - 22.1% decrease in continuous trading manipulation 30 min total trade value / market capitalization

- A 1-std.dev increase in governance score causes a
  - 2.2% reduction in continuous trading alerts / intervals

Subset of Only Manipulated Firms	Continuous Trading Manipulation 30 mins Number of Alerts to Number of Intervals Ratio (bps)		Continuous Trading Manipulation 30 mins Value Ratio (bps)		Continuous Trading Manipulation 30 mins Number of Alerts		Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization Winsorized 5/95	
Disaster Variables	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Damage Property Direct scaled by GDP	-8.14E-06	-0.17	-4.75E-06	-0.05	0.0006	0.828	-0.0002	-0.88
Damage Crops Direct scaled by GDP	3.78E-05	0.06	0.0004	0.37	0.0007	0.08	-0.0003	-0.08
Deaths Direct	0.0004	0.85	0.0007	1.5	0.0044	0.86	0.0048**	2.21
Injuries Direct	5.79E-05**	2.44	6.96E-05**	2.24	0.0007**	2.38	0.0003***	3.95
Firm Specific Variables								
ln_Analyst Coverage	-0.0049***	-10.98	-0.0033***	-3.95	-0.0609***	-1.11E+01	-0.0201***	-5.88
ln_Returns	0.0017***	13.26	0.0014***	7.7	0.0208***	13.01	0.0114***	14.69
Idiosyncratic Risk	-0.2186***	-6.28	-0.2625***	-5.17	-2.6371***	-6.26	-1.0737***	-5.3
Systematic Risk	-8.81E-01***	-4.10E+00	-1.805***	-5.13	-9.3801***	-3.59	-15.9467***	-10.06
ln_Share Trade Volume	1.19E-02***	1.62E+01	0.0130***	14.82	0.1454***	16.09	0.1384***	21.77
ln_Market Capitalization	-0.0007	-1.24E+00	-0.0021**	-2.56	-0.0073	-1.01	-0.0444***	-10.53
Debt / Equity	1.20E-11	9.00E-02	2.45E-12	0.01	2.47E-11	0.02	-4.45E-11	-4.00E-02
Net Income to Sales	-8.81E-07	-8.90E-01	3.23E-07	0.26	-1.1E-05	-8.70E-01	-2.23E-06	-5.90E-01
ln_Sales Turnover	0.001	9.30E-01	3.69E-03***	3.63	0.0055	9.40E-01	1.75E-02***	5.03E+00
Market to Book	2.19E-09	1.06E+00	2.15E-09	0.63	2.66E-08	1.08	1.30E-08	8.30E-01
ln_Asset	0.0034***	6.4	8.65E-03***	8.19	0.0418***	6.31E+00	0.0349***	8.71E+00
Company Age	0.0013***	6.87E+00	1.76E-03***	5.44	0.0162***	6.71E+00	7.67E-03***	4.8
Current Ratio	1.04E-06	0.52	5.33E-06	1.21	1.48E-05	0.61	3.97E-05	1.53
Acquisitions	-0.0031***	-4.2	-2.00E-03	-1.64	-0.0377***	-4.09E+00	-0.0142***	-3.06
Legislation	-0.0011	-1.19	-1.84E-03	-1.24	-0.0126	-1.04E+00	-0.0029	-0.46
Governance_score	-0.0011**	-2.19	-0.0011	-1.21	-0.0146**	-2.33	-0.0034	-0.78
Return S&P	0.0941***	3.53	0.1436***	3.39	1.1999***	3.72E+00	0.5571***	4.16
Intercept	-0.0843***	-7.90	-0.1052***	-6.16	-1.0607***	-8.11	-0.7527***	-7.84
Firm Fixed Effects	Yes		Yes		Yes		Yes	
Industry Foxed Effects	Yes		Yes		Yes		Yes	
Month Fixed Effects	Yes		Yes		Yes		Yes	
Model Diagnostics								
Number of Observations	401,141		401,141		401,141		401,141	
Number of Groups	7,066		7,066		7,066		7,066	
R² within	0.0433		0.0259		0.0433		0.0707	
R² between	0.2831		0.1241		0.2921		0.1940	
R² overall	0.1126		0.0746		0.1151		0.1119	

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Subsample of only manipulated firms

- Subsample of only manipulated firms

    - (compare disaster and non-disaster months)

    - Statistical significance of similar as to full sample

    - Economic significance of disaster variables slightly larger

	Agricultural Production - Crops, and Industries in the Office of Life Sciences		Finance and Insurance Sector Industries	
Disaster Variables				
Damage Property Direct scaled by GDP	0.020**	2.140	0.000	-1.340
Damage Crops Direct scaled by GDP	0.430***	37.920	0.000	0.050
Deaths Direct	0.003	0.410	-0.003	-0.400
Injuries Direct	0.000	0.610	0.001**	2.240
Firm Specific Variables				
ln_Analyst Coverage	-0.013	-1.760	-0.015	-1.800
ln_Returns	0.014***	7.810	0.008***	6.870
Idiosyncratic Risk	0.311	0.500	-0.967***	-2.870
Systematic Risk	-9.561***	-2.780	-6.539	-1.490
ln_Share Trade Volume	0.151***	18.590	0.094***	10.950
ln_Market Capitalization	-0.005	-0.740	-0.050***	-6.130
Debt / Equity	0.000***	-9.180	0.000***	-4.480
Net Income to Sales	0.000	-0.640	0.000	-0.480
ln_Sales Turnover	0.017***	3.310	0.010	0.530
Market to Book	0.000	1.130	0.000	-1.930
ln_Asset	0.037***	5.430	0.029	1.570
Company Age	0.013***	3.500	0.004	1.500
Current Ratio	0.001	1.250	-0.021	-1.490
Acquisitions	0.001	0.110	0.003	0.260
Legislation	0.004	0.350	0.013	1.360
Governance_score	-0.014	-1.430	0.019**	2.330
Return S&P	0.763***	4.260	0.464	1.810
Intercept	-1.6743***	-11.13	-0.196	-1.22

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Industry Regressions

- Agricultural production:
  - Significant and positive association of property and crop damages with manipulation.
  - 1 standard deviation increase in property and crop damages scaled by GDP is associated with 1.74% increase in manipulation.

- Finance and Insurance:
  - Significant and positive association of injuries with manipulation.
  - 1 standard deviation increase in property and crop damages scaled by GDP is associated with 1.02% increase in manipulation.

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Additional Robustness Checks

- Propensity Score Matching

- Difference-in-Differences

- Outliers in RHS variables

- Other variables

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Table 6 – other variables

- **Hazard Mitigation Grant Program:**

  – Hazard Mitigation is any sustainable action that reduces or eliminates long-term risk to people and property from future damage.

  – Interacted the damages variable with a categorical variable that indicates 1 if the county is covered under the program and 0 otherwise.

  – Table 6 column III.

  – It shows that for the firms in the counties that are under the grant program, the positive association between property damages and manipulation becomes weaker

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A bit more on Propensity Score Matching

- Use hurricane Harvey and Irma as our case to see if there is any difference in manipulation before and after the events.

  - Select Texas, Florida as the treatment states.
  - Match the firms before the event with ones in Arizona, Colorado, New York, Illinois, Michigan, Maryland, Utah, and Pennsylvania
  - Look at subsets of young versus old firms (split at median of 11 years).

  - Disasters cause a 36.8% increase in manipulation.

- As robustness (placebo test), we tried the same period with the states Vermont, Illinois, Michigan, and Ohio (which are less prone to disaster).
  - And for them, our results are not significant. Thus, their manipulation did not differ before and after the period.

Table 7. Different in Difference Analysis on Matched Sample

This table presents the difference in difference regression results on the matched sample of disaster-affected states (treatment) and non-disaster affected states (control) during the year 2017. It satisfies that the treatment group is not affected by any disasters other than Harvey and Irma during the sample period, and the control group is not affected by any disasters during the sample period. The sample is matched based on the continuous trading manipulation scaled by market capitalization before the event of Harvey and Irma. Hence, the matched sample is used to observe the difference in difference estimate for the post-event period. We have divided the firms into two groups. The first group is regarded as young firms when their age is below the median age. The second group includes firms with age higher than the median age. The main independent variable is continuous trading manipulation scaled by market capitalization. Firm and county-level controls are explained in the appendix. The model controls for firm, industry, and time fixed effects. The standard errors are robust and clustered by counties. The full sample is used in each regression in this table. *, **, *** significant at the 10%, 5%, and 1% levels, respectively.

	Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization Winsorized 5/95 Firm age< 10.9 year (II)		Continuous Trading Manipulation 30 mins Total Trade Value / Market Capitalization Winsorized 5/95 Firm age≥10.9 years (II)	
After	-0.0933	-0.68	0.1350***	3.17
After * Treatment	0.1779**	2.55	0.0054	0.16
Intercept	3.5909	0.84	0.1477	0.34
Controls	Yes		Yes	
Month Fixed Effects	Yes		Yes	
Firm Fixed Effects	Yes		Yes	
Industry Fixed Effects	Yes		Yes	
State Fixed Effects	Yes		Yes	

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Concluding Remarks

- Market manipulation and fraud are pronounced problems

- Likely do not need more research on effect of regulation

- More gains from a focus on surveillance – improved technology

- Research that helps identify indicators of problems could be helpful

- Provided a possible example today with reference to **death** and **destruction**

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Thanks! Comments, Questions?

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