What's in Investors' Information Sets?

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Motivation-I

- Modern Technology has made financial information abundant
- Major constraint: investors' ability to acquire and process information
- Literature focused on effects of investors' attention on markets:
  - Stock Returns, Trading volume, News
    (Barber and Odean (2008), Gervais, Kaniel & Mingelgrin (2001), Hou, Peng & Xiong (2009))
  - Google's Aggregate Search Volume Index
    (Da, Engelberg and Gao, 2011)
  - Attention on Bloomberg Terminals
    (Ben-Raphael, Da, and Israelsen, 2017; Liu, Peng, and Tang, Forthcoming)
  - Logins and web searches on retirement and brokerage accounts
    (Sicherman et al., 2016, Gargano and Rossi, 2018)

$\rightarrow$ All proxies for instantaneous information acquisition

Motivation-II

However:

- Most theoretical models focus on investors' information set
  (Merton (1987), Van Nieuwerburgh & Veldkamp (2009), Van Nieuwerburgh & Veldkamp (2010))
- Investors are unlikely to track the universe of stocks

Important to understand:

- Which stocks different investors focus on
- The effect of stock following on asset prices

For example:

— The more information sets are sticky, the more they affect asset prices

— If investors correctly incorporate new info:
Higher stock following $\rightarrow$ Greater informational efficiency

This Paper-I

- Determinants and Effects of stock following using watchlists
- Seeking Alpha: crowdsourced content provider for financial markets
- 20 million monthly users
- Used in the past to explore the effects of opinions in social media
  (Chen et al. (2014), Campbell et al (2019), Kogan et al (2021), Dyer and Kim (2021))
- Since 2011, registered users have been allowed to create watchlists
- While in watchlist, subscribers receive emails regarding the stock
- We observe when stocks enter and exit users' information sets
- 70 designations (part-time investor, hedge fund employee, etc...)

This Paper-II

Main Findings on how Investors form Information Sets:

- Investors engage in *generalized*, not *specialized* learning (Van Nieuwerburgh and Veldkamp, 2009 & 2010)
- Sophistication & opportunity cost of time affect investors' watchlists
- Stock following is driven by different types of news compared to
  - Google's Search Volume Index
  - Bloomberg's Abnormal institutional investor Attention (AIA)

$\rightarrow$ adding security to information set $\neq$ instantaneous attention

This Paper-III

Main Findings on Asset Pricing Implications of Stock Following:

- Changes in stock following predicts returns:
  - positively up to 3-4 weeks
  - negatively thereafter
- Stocks with high stock following tend to be overvalued
- Stocks that co-appear more often in watchlists co-move more (consistent with Peng and Xiong, 2006)
- Higher stock following is associated with:
  - stronger short-term reversal
  - an amplification of the effect of news on stock prices
  - greater post-earnings announcement drift

$\rightarrow$ stock following $\neq$ more efficient incorporation of news into prices

Related Literature

- Many theories predict behavior of investors with limited attention

  (Van Nieuwerburgh & Veldkamp (2009, 2010), Merton (1987), Peng & Xiong (2006))

  $\rightarrow$ provide direct tests of these theories

- Attention literature has focused on instantaneous attention

  (Barber and Odean (2008), Gervais, Kaniel & Mingelgrin (2001), Hou, Peng & Xiong (2009) Da, Engelberg, and Gao (2011), Ben-Raphael, Da, and Israelsen (2017); Liu, Peng, and Tang (Forthcoming), Sicherman et al. (2016), Gargano and Rossi (2018)

  $\rightarrow$ focus on the cont. process of information collection & processing,

- News and Attention

  (Da, Engelberg, and Gao (2011), Barber and Odean (2008), Ben-Rephael, Da, and Israelsen (2017), Liu, Peng, and Tang (Forthcoming), Madsen and Niessner (2019))

  $\rightarrow$ rank effect of different types of news on stock following

- Capital Market Effects of Limited Attention

  (Ben-Rephael, Da, and Israelsen (2017))

  $\rightarrow$ show relation between stock following and reaction to news

Data and Setting-I

Data from *Seeking Alpha*

- July 2011 to December 2018
- All watchlist additions
- Removals possible from October 2015
- 6.1M users but focus on 1.9M who change watchlist after creation

Year	Occasional Investor	Retiree	Full Time Investor	Finance Professional	Student	Academic	Executive	Journalist/ Other	Undeclared	Total
2011	34,184	17,531	20,615	14,232	4,963	917	4,591	11,834	30,910	139,777
2012	49,778	22,081	19,777	15,347	7,709	1,268	6,747	3,323	57,392	183,422
2013	144,354	38,906	45,662	51,106	32,332	4,752	20,321	9,695	151,602	498,730
2014	96,859	22,752	20,637	29,360	16,586	1,362	10,282	23,521	156,610	377,969
2015	45,165	9,189	7,977	16,319	9,519	482	5,028	15,020	110,220	218,919
2016	40,842	7,800	6,401	13,759	7,562	377	4,634	14,151	114,286	209,812
2017	36,087	6,712	5,740	9,108	5,137	222	2,886	9,703	108,450	184,045
2018	17,070	3,580	3,094	3,751	2,022	84	1,067	3,971	84,728	119,367
Total	464,339	128,551	129,903	152,982	85,830	9,464	55,556	91,218	814,198	1,932,041

(COMPUSTAT, CRSP, IBES, GOOGLE SVI, Bloomberg's AIA)

Data and Setting-II

Number of Stocks Followed by Years of Attention

	# Obs	Mean	Std. Dev.	25%	Median	75%
# At initiation	1,932,041	5.9	5.0	4	5	6
1 year	1,932,041	10.3	11.0	5	7	12
2 years	1,279,949	12.8	15.0	5	8	14
3 years	920,536	14.8	17.8	6	9	17
4 years	647,341	16.9	20.71	6	10	19
5 years	411,733	19.7	24.4	7	12	22
6 years	213,162	23.7	28.8	8	15	27
7 years	81,158	27.9	32.8	10	18	32
8 years	23,339	34.7	40.1	13	22	40

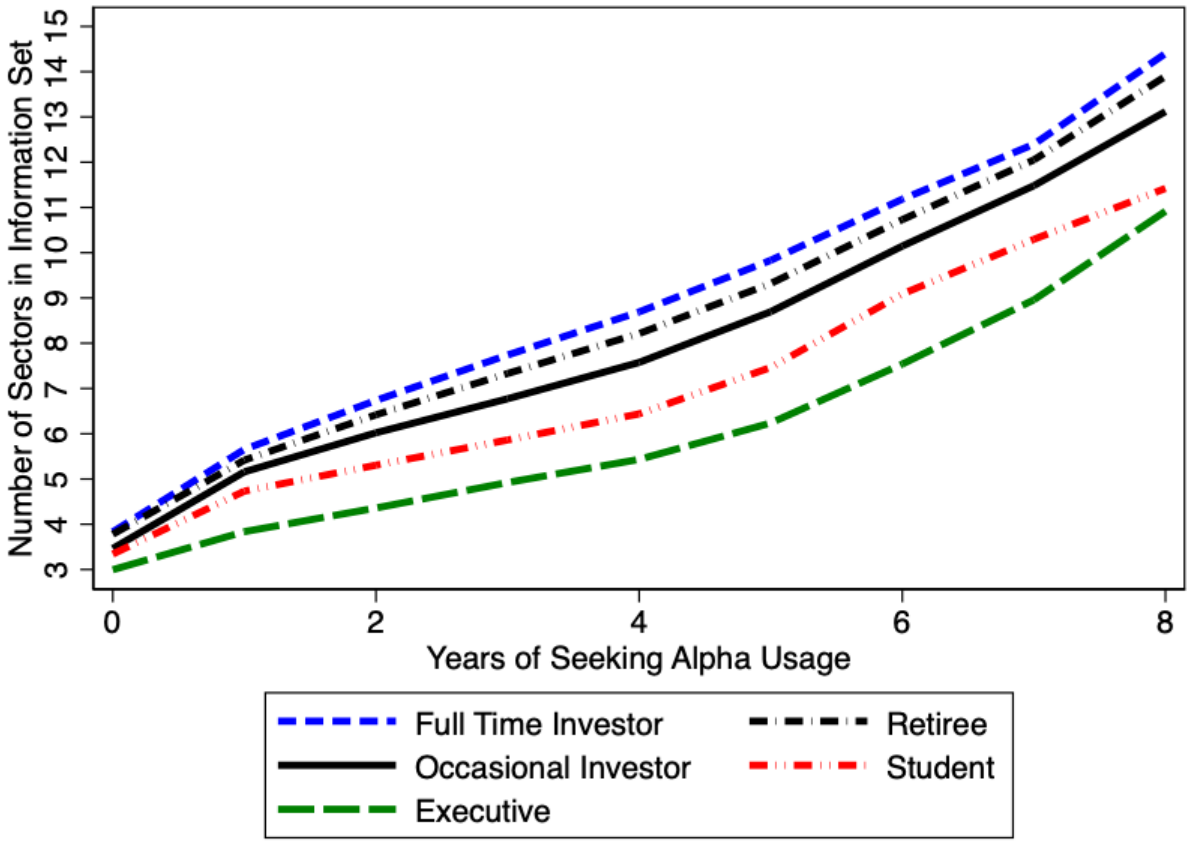
Data and Setting-III

Ravenpack: Average number of news weeks per firm per year

	All	Positive	Neutral	Negative
Trading	0.518	0.487	0.000	0.031
Stock_Price	1.094	0.621	0.000	0.473
Stock_Restructure	0.021	0.015	0.000	0.006
Indexes	0.034	0.033	0.000	0.001
Trans_firm_stocks	0.749	0.442	0.006	0.301
Legal	0.255	0.053	0.000	0.201
Guidance	1.630	0.499	0.989	0.142
M_A	0.653	0.092	0.000	0.561
Analysts_Actions	3.752	2.331	0.060	1.362
Firm_Event	4.144	0.048	4.096	0.000
Earnings_Release	5.256	2.644	1.345	1.267
Products_and_Services	1.326	1.260	0.004	0.062
Credit_Rating	0.871	0.457	0.076	0.338
Partnership	0.532	0.532	0.000	0.000
Insider_Trading	7.172	2.791	0.000	4.381
Dividends	1.411	0.267	1.131	0.013
Executive_Turnover	1.981	1.642	0.002	0.336
Exec_Comp	0.064	0.055	0.000	0.008
Accidents_Wars_Crime	0.011	0.001	0.000	0.010
Labor_Issues	0.072	0.025	0.000	0.046
Major_S_holders_Disc	3.487	0.000	3.487	0.000
Technical_Analysis	13.829	6.301	2.995	4.532
Other	8.399	1.960	4.554	1.884

Stock Following and Attention Constraints-I

Relevant Theory Models: Van Nieuwerburgh and Veldkamp (2009, 2010)



Most investors are *generalized learners* and not *specialized learners*
(Individual stock results are similar and consistent)

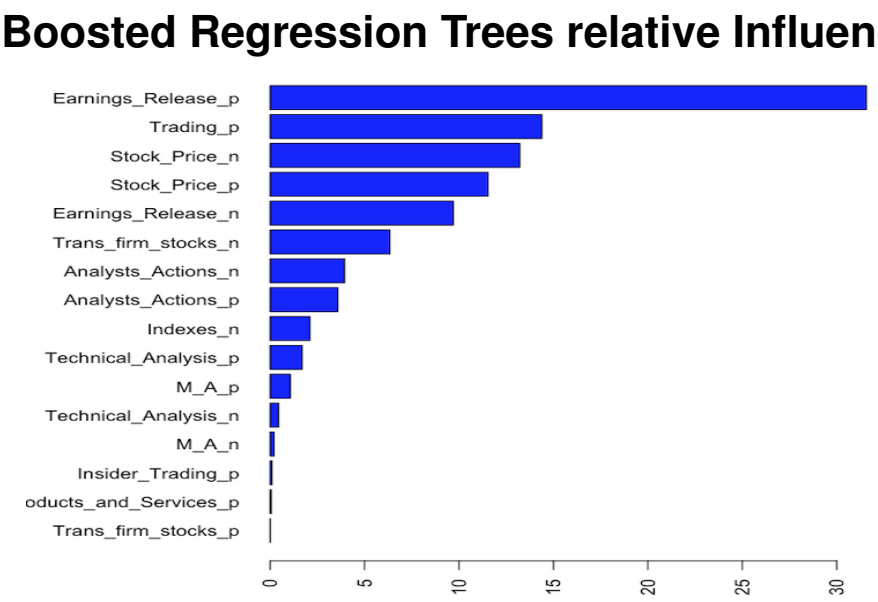
Stock Following, News and Company Characteristics-I

In terms of fundamentals, investors follow stocks:

- of large and more profitable firms
- with high past returns, volatility, skewness, market-to-book ratios

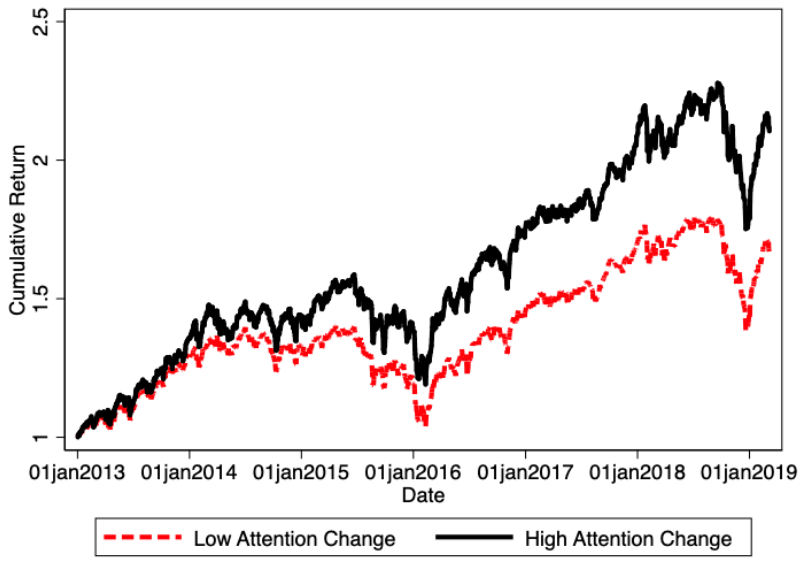
In terms of news (Barber and Odean, 2008):

- Different measures of attention relate to different sources of news
- Different types of investors react to news similarly
- Positive and negative news affects stock following differently (consistent with investors thinking stocks under-react to news)

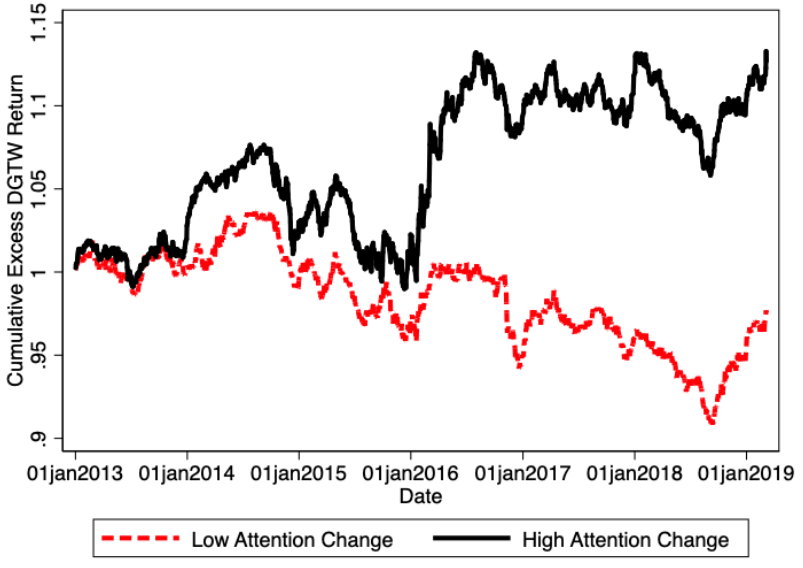


Stock Following and Stock Returns-I

- Compute scaled changes in stock following for every stock
- Divide the stocks in three quantiles using changes in stock following
- Compute daily returns for each portfolio and cumulate them



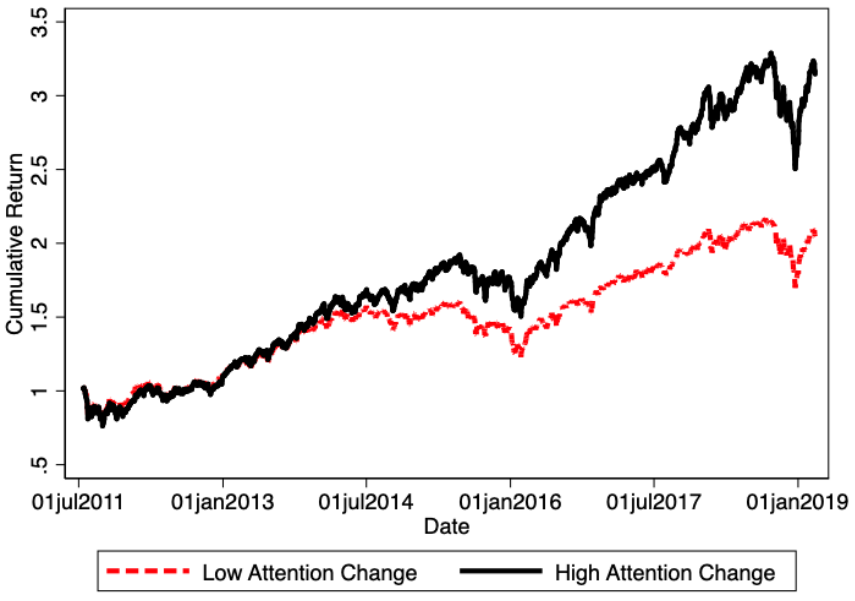
(a) All Stocks. Cumulative Returns



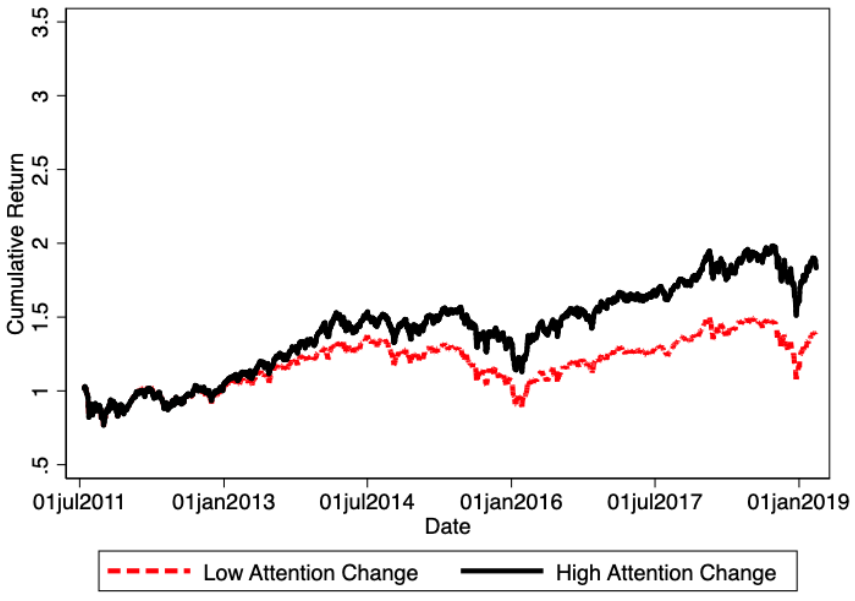
(b) All Stocks. Abnormal DGTW Returns

Stock Following and Stock Returns-II

- Higher unconditional following is related to over-valuation



(a) Low Following Stocks



(b) High Following Stocks

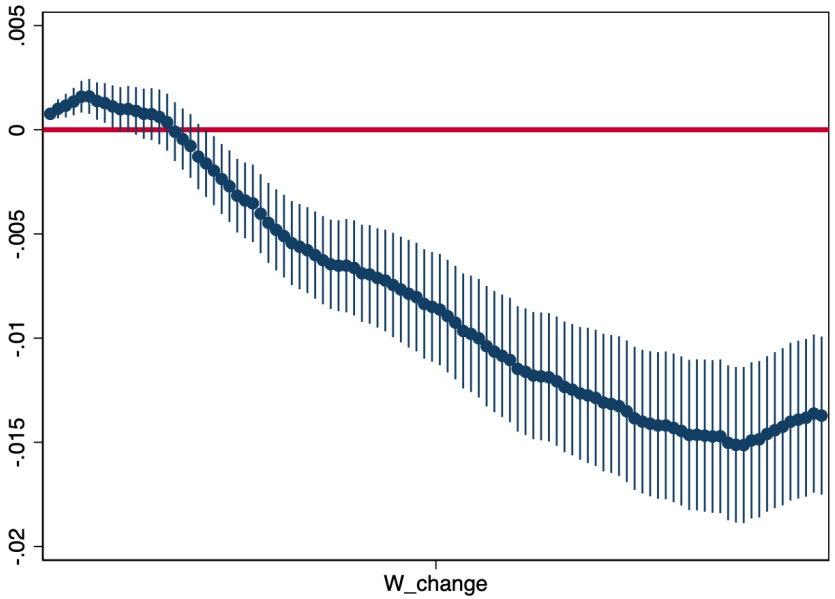
Results are seem partially inconsistent with each other

Stock Following and Stock Returns-III

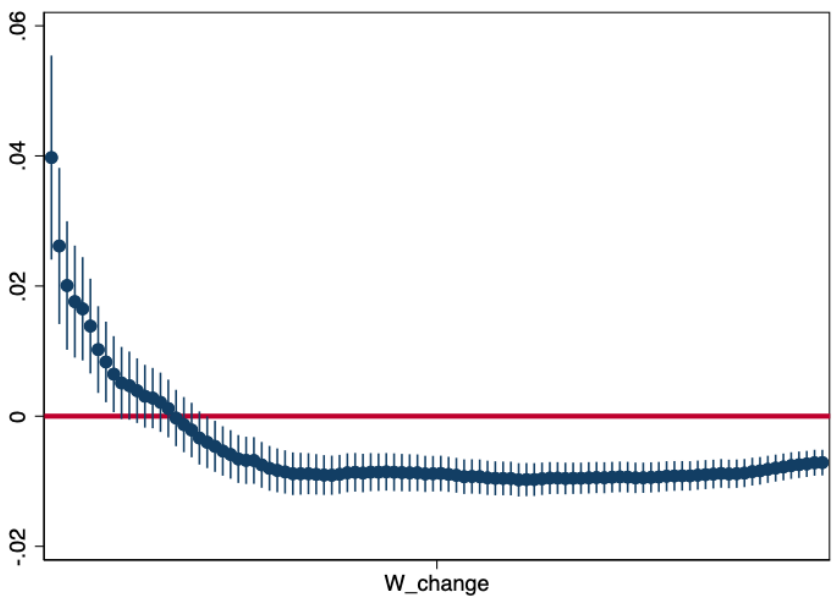
To reconcile findings, we estimate, at the weekly frequency:

$$Ret_{i,t:t+k} = \alpha_i + \alpha_t + \beta\ W\_Change_{i,t} + \epsilon_{i,t:t+k},\ \ where\ k \in [1, 100]$$

and $W\_Change_{i,t}$ is the percentage change in stock following



(a) β Estimates: Cumulated Returns



(b) β Estimates: Cumulated Annual Returns

$\rightarrow$ Watchlist changes predict positively future returns for 3-4 weeks

Commonality in Attention and Returns Comovement-I

Peng and Xiong (2006): attention-constrained individuals

- should focus on sector-wide news and not on stock-specific news $\rightarrow$ co-movement of security prices within sectors
- predictions supported with indirect tests (Huang et al, 2019)

Our data allows for *direct* tests of Peng and Xiong (2006)

- Use commonality in attention to specific tickers across watchlists
- Compute pairwise stock correlations, controlling for industries
- Estimate cross-sectional regressions of the form:

$$Corr_{i,j} = \alpha + \beta \times Comm\_Attention_{i,j} + \epsilon_{i,j}$$

Commonality in Attention and Returns Comovement-II

	All	Same 1-digit SIC	Different 1-digit SIC	Same 2-digit SIC	Different 2-digit SIC
Attention	0.225***	0.395***	0.148***	0.546***	0.164***
	(27.91)	(20.62)	(16.61)	(17.13)	(19.61)
Constant	0.123***	0.177***	0.116***	0.246***	0.120***
	(163.90)	(81.61)	(145.73)	(58.09)	(158.00)
R-Square	0.003	0.012	0.001	0.030	0.002
N	234,740	33,784	200,956	9,466	225,274

- Results are robust to using 4-digit SIC codes
- Results in line with Peng and Xiong (2006)

Stock Following and Short-Term Reversal-I

If investors correctly incorporate new information:

- Stock following should improve the speed and precision with which new information is incorporated into asset prices

If investors overreact to news:

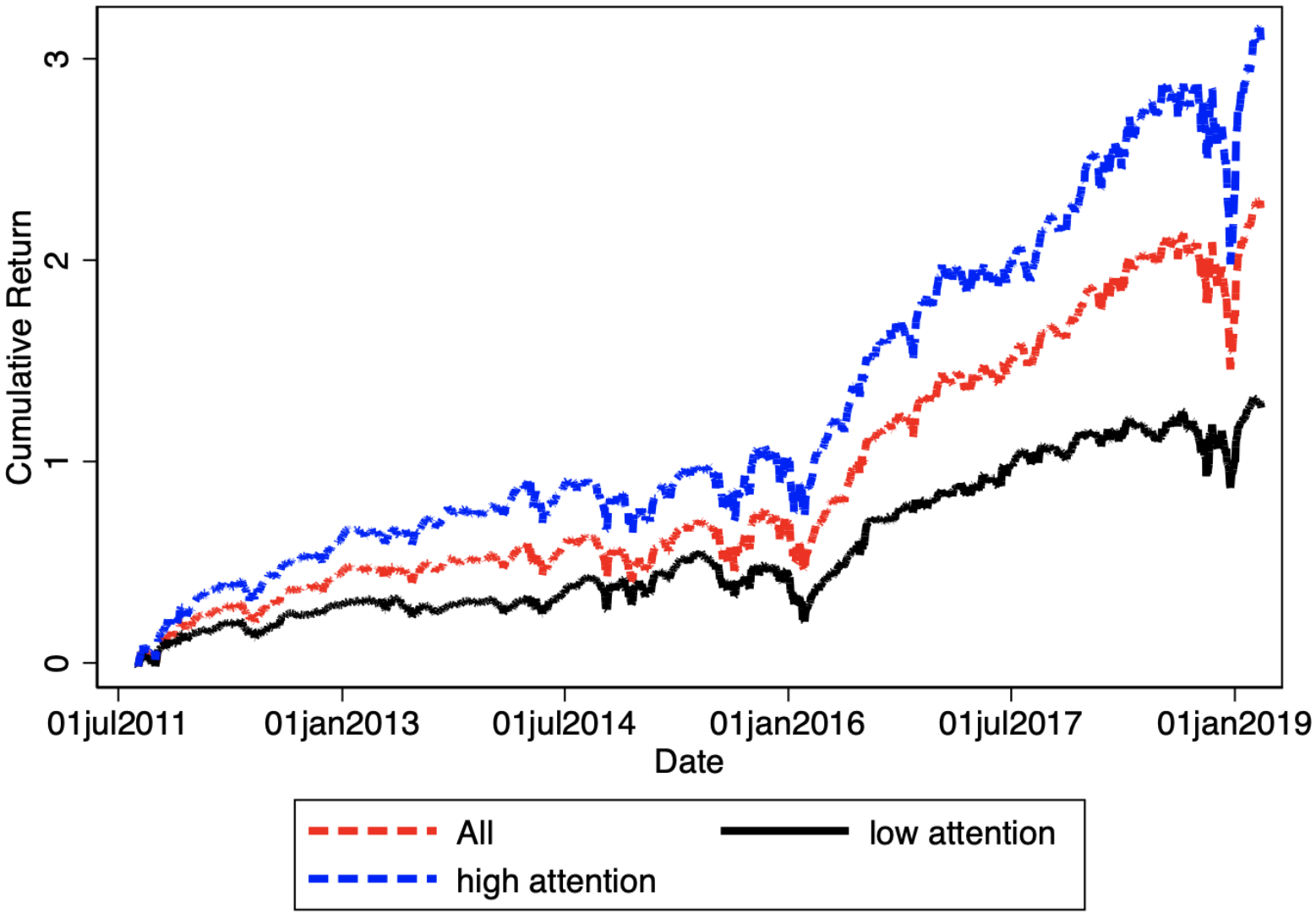
- Stock following may have destabilizing effects

Short-term reversal: often attributed to overreaction to news

(Shiller, Fischer, Friedman, 1984; Black, 1986; Da, Liu, Schaumburg, 2014; Summers & Summers, 1989)

$\rightarrow$ Construct short-term reversal for low and high-attention stocks

Stock Following and Short-Term Reversal-II



→ Stock following associated with more over-reaction to news

Stock Following and Reaction to News-I

We use:

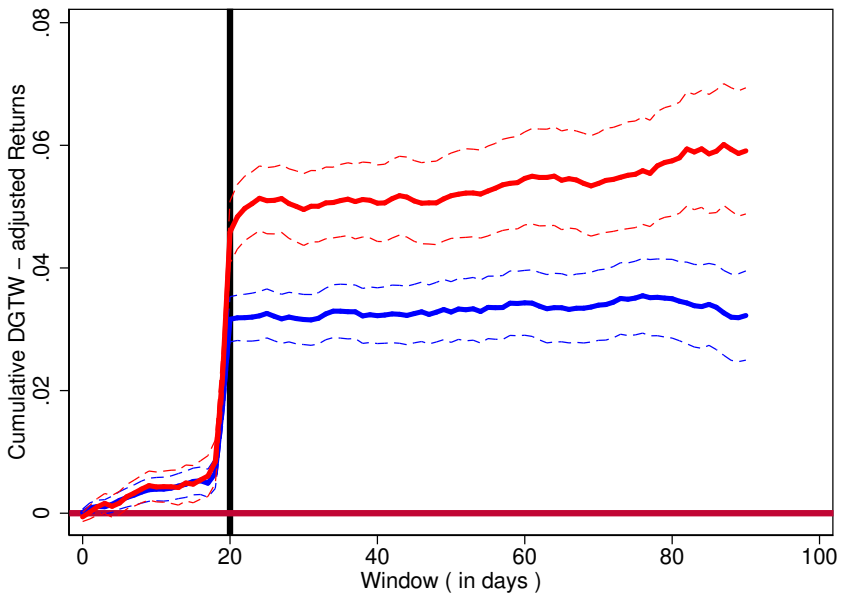
- Panel regressions
- Event-studies around earnings announcements

Higher stock following (when interacted with news):

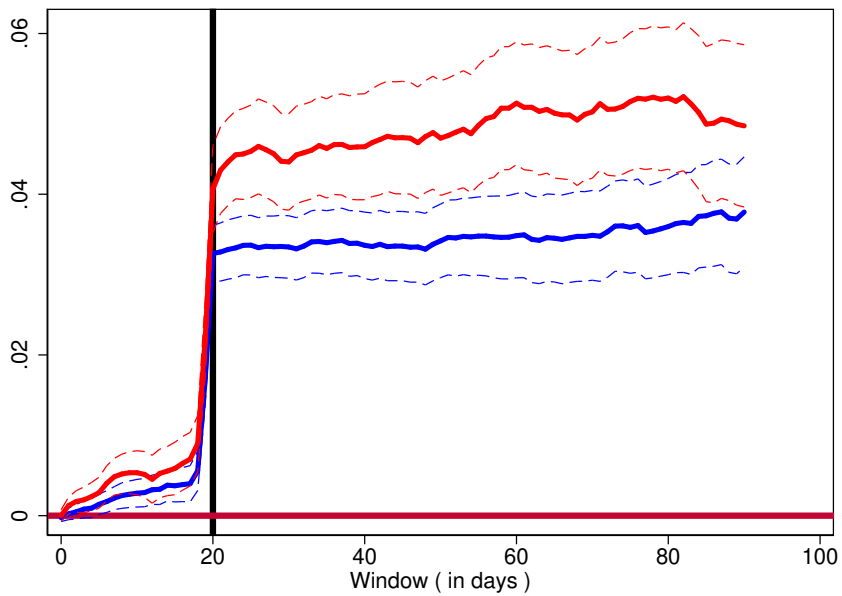
- Positively related to instantaneous attention (Google SVI)
- Positively related to disagreement (trading volume)
- Increases price reaction to positive news, but not negative news
- Does not reduce Post-Earnings-Announcement-Drift (PEAD)
- Type of follower (professional vs. non-professional) matters

Stock Following and Reaction to News-II

- Focus on high-earnings announcement surprises
- Aggregating following by professional and non-professional investors
- Distinguish between stock with high following and low following



(a) Non-professionals



(b) Professionals

High stock following by *non-professionals* associated with:

- **greater** instantaneous price adjustments
- **greater** Post-Earning-Announcement-Drift (PEAD)

Conclusions

- Investor sophistication is related to the size of their information set
- Stock following is driven by similar types of news for all investors
- Changes in stock following are:
  - positively related to short-term stock returns
  - negatively related to long-term stock returns
- Stocks with higher following are overvalued (lower expected returns)
- Stock following, particularly by retail investors, may have destabilizing effects on financial markets.