Surprise in Short Interest

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March 17, 2017

Motivation

- Short-selling activity predicts stock returns

  (e.g., Desai et al., 2002; Boehmer, Jones, and Zhang, 2008; Diether, Lee, and Werner, 2009; Akbas et al., 2013; Rapach, Ringgenberg, and Zhou, 2016)
- Main measure - number of shares shorted relative to shares outstanding (short interest ratio).
- Different interpretations of this predictability:
  - Binding short sale constraints result in overpricing

    (e.g., Miller, 1977; Asquith, Pathak, and Ritter, 2005)
  - Short-selling is risky and costly

    (e.g., Drechsler and Drechsler, 2016; Hong et al., 2016; Engelberg, Reed, and Ringgenberg, 2016)
  - Persistent mispricing

    (e.g., Boehmer, Huszar, and Jordan, 2010)
- Little evidence on predictive ability for changes in short interest

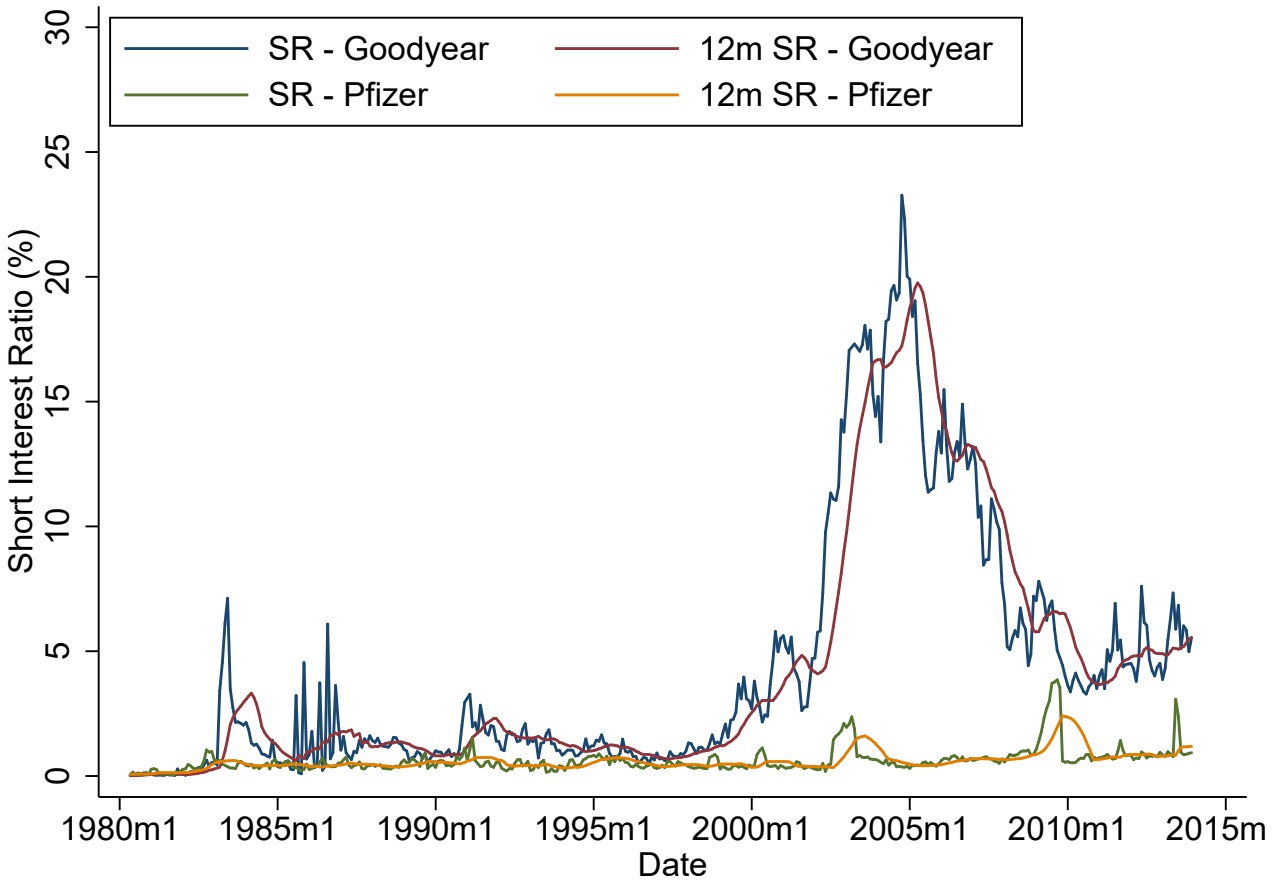
  (Boehmer, Huszar, and Jordan, 2010)

This paper

- ...proposes a new measure of informed short selling - **surprise in short interest** - that
  - reflects changes in short-sellers' positions
  - associated with strong price drift around short interest announcement
  - predicts stock's future fundamental news
  - not explained by short-sale constraints, common mispricing and risk factors
  - related to other proxies for limits to arbitrage

$\Rightarrow$ Mispricing-based interpretation of return predictability.

Surprise in Short Interest



- High time-series persistence of short interest within stocks
- Difference in the volatility of short interest across stocks

$\Rightarrow$ Non-informative short-selling contaminates informativeness of short interest ratio

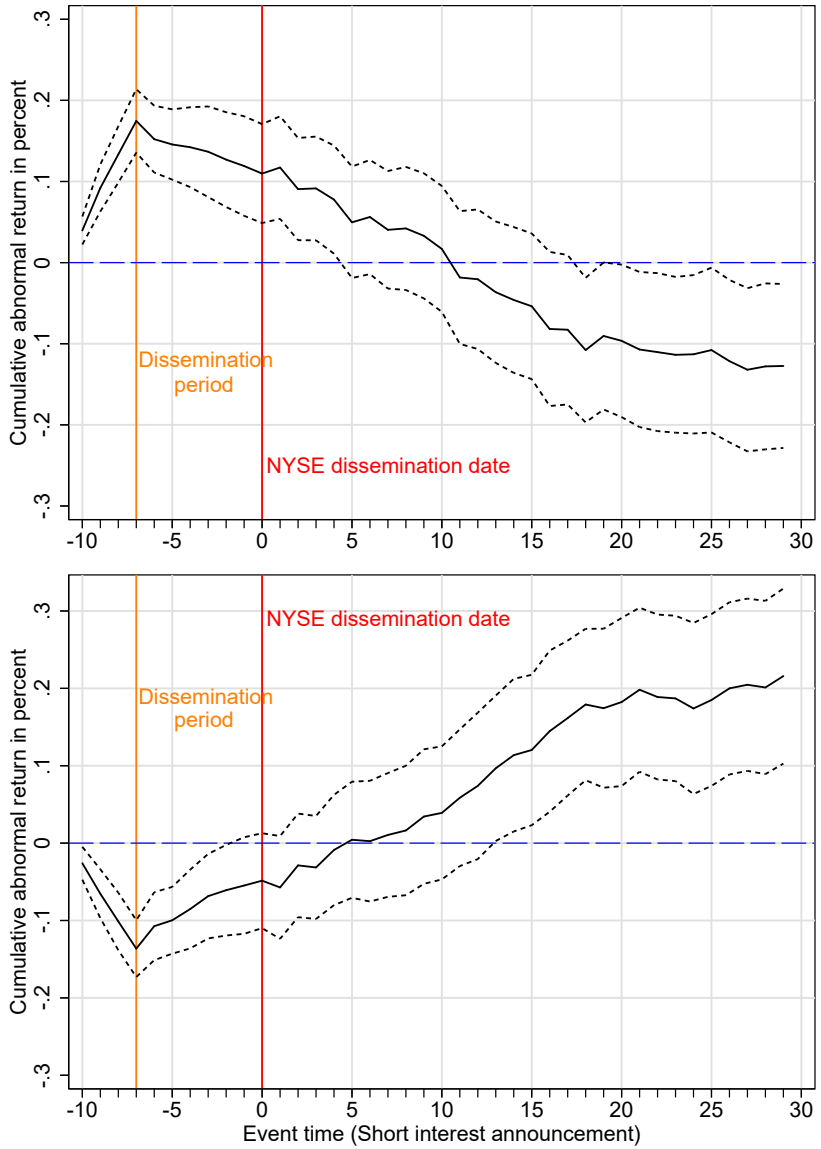
Surprise in Short Interest

- **Suprise in short interest** defined as the standardized unexpected short interest ratio (SUSIR)

$$SUSIR_{i,t} = \frac{SR_t - \overline{SR}_{t-1,t-12}}{\sigma^{SR}_{t-1,t-12}},$$

1. Extract unexpected component of short interest ratio by subtracting 12-months moving mean
2. Relate this component to the variation of the short interest ratio

Surprise in Short Interest - Announcement



Top 30% (upper graph) and bottom 30% (lower graph) surprises, NYSE stocks over 1995-2013

Data sources

- Sample period: March 1980 – December 2013
- Sample selection:
  - stocks with share code 10 and 11
  - AMEX, NYSE, NASDAQ traded stocks
  - Price greater than USD 5 and market cap greater than the 5th percentile of the NYSE distribution

- Equity market data on stock level: CRSP
- Accounting data: Compustat annual file
- Short interest: Compustat supplementary short interest file
- Institutional ownership: TR 13F Filings
- Mispricing score and risk factors: Authors' website

- Variables are standardized with zero mean and unit standard deviation

Predictability of Stock Returns

Fama-MacBeth Regression Approach

	(1) $Ret_{i,t}$	(2) $Ret_{i,t}$	(3) $Ret_{i,t}$	(4) $Ret_{i,t}$	(5) $Ret_{i,t}$
SUSIR	-0.114***	-0.0852***	-0.0928***	-0.0812***	-0.0766***
	(-5.73)	(-4.55)	(-4.60)	(-3.97)	(-4.04)
SR		-0.404***			0.168*
		(-4.77)			(1.70)
DTC			-0.169***		-0.0998**
			(-4.98)		(-2.28)
SR_{IO}				-0.234***	-0.168***
				(-6.55)	(-3.14)
INV					0.0280
					(0.85)
ROA					-0.0673
					(-1.20)
MISP					-0.222***
					(-4.75)
IVOLA					-0.318***
					(-4.95)
Controls	Yes	Yes	Yes	Yes	Yes
N	577088	577088	577056	475372	470396
R^2	0.058	0.062	0.061	0.061	0.084

Predictability of Stock Returns

Portfolio Sorts

	Equal-Weighted Portfolio			Value-Weighted Portfolio		
Decile	RawRet	CAPM	C4	RawRet	CAPM	C4
1 (Long)	1.002	0.359	0.239	0.862	0.278	0.220
2	0.936	0.290	0.121	0.830	0.249	0.249
3	0.875	0.233	0.079	0.640	0.048	-0.051
4	0.849	0.215	0.032	0.636	0.019	-0.045
5	0.786	0.151	-0.018	0.598	0.004	-0.017
6	0.790	0.151	-0.006	0.729	0.124	0.104
7	0.659	-0.002	-0.172	0.604	0.040	-0.040
8	0.634	-0.031	-0.208	0.356	-0.229	-0.339
9	0.517	-0.149	-0.276	0.580	-0.016	-0.054
10 (Short)	0.572	-0.098	-0.250	0.515	-0.073	-0.147
1-10	0.430	0.458	0.489	0.347	0.350	0.368
	(5.287)	(5.498)	(5.703)	(3.304)	(3.012)	(3.132)
L 30% - H 30%	0.363	0.387	0.391	0.293	0.297	0.313
	(6.633)	(6.892)	(6.526)	(3.582)	(3.186)	(3.538)

Performance Over Time

$\Rightarrow$ No strategy crashes

Biased Expectations and Fundamental News

$$Earnings\_Surprise_{i,t} = \alpha_t + \beta_t SUSIR_{i,t-1} + \mathbf{x'_{i,t-1}b_t} + \varepsilon_{i,t},$$

	(1) SUE^{PE}	(2) SUE^{AF}	(3) CAR
SUSIR	-0.0254***	-0.0419***	-0.0364**
	(-3.31)	(-3.09)	(-2.17)
MISP	-0.110***	-0.311***	-0.0815***
	(-9.94)	(-16.92)	(-3.59)
SR	-0.0539***	-0.0413**	-0.111***
	(-4.90)	(-2.05)	(-3.40)
Controls	Yes	Yes	Yes
FixedEffects	Month	Month	Month
N	140366	119874	189153
R^2	0.084	0.038	0.007

Limits to Arbitrage

$$Ret_{i,t} = \alpha_t + \beta_1 SUSIR_{i,t-1} + \sum_{k=2}^{5} \beta_k M_{Quintile=k,i,t-1} + \sum_{k=2}^{5} \gamma_k SUSIR_{i,t-1} \times M_{Quintile=k,i,t-1} + \mathbf{x_i'b} + \varepsilon_{i,t}$$

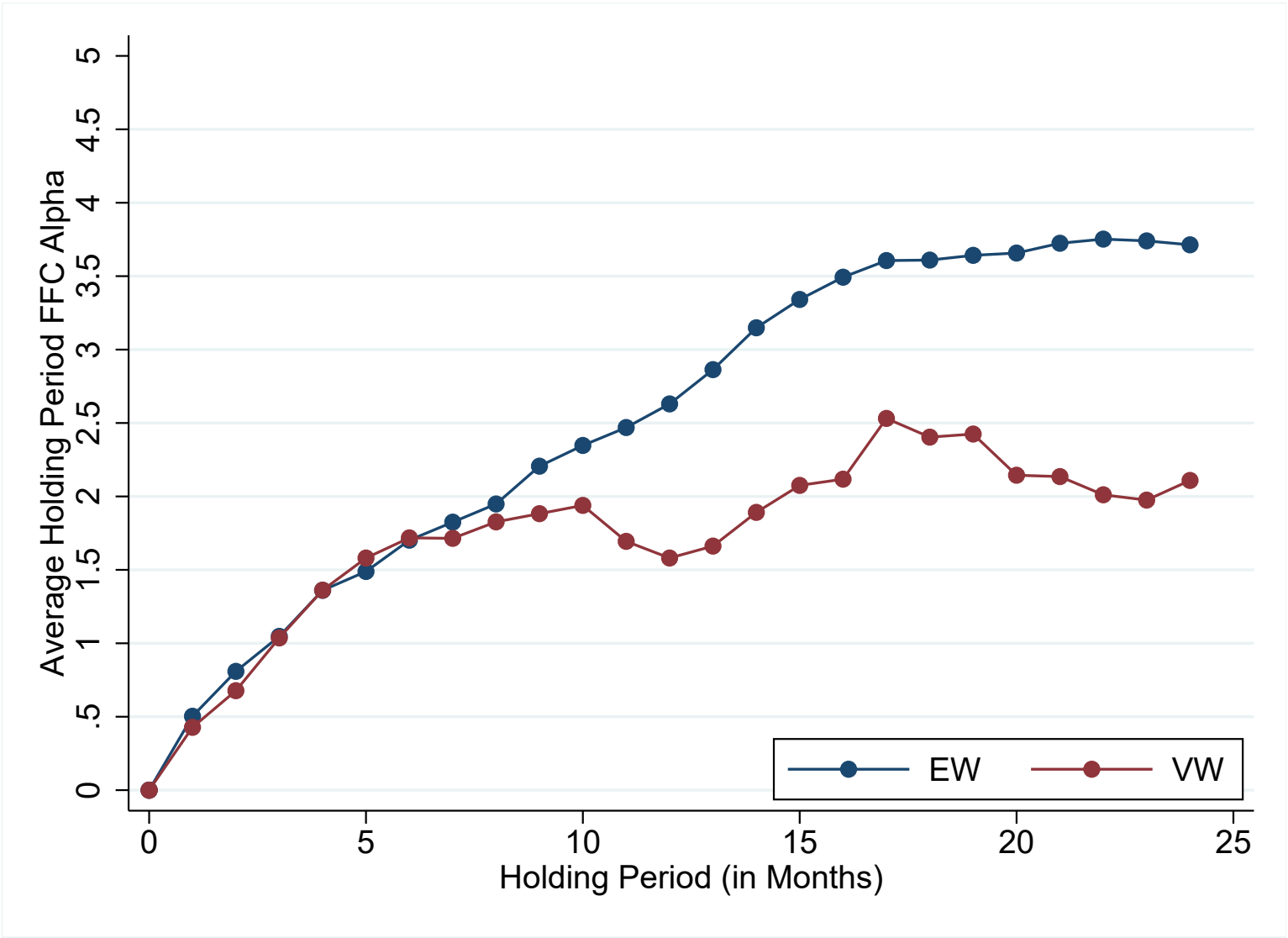
	$M = HLSPREAD$ (1)	$M = IVOLA$ (2)	$M = RIO$ (3)
$SUSIR$	-0.0816**	-0.0352	-0.0893***
	(-2.49)	(-1.06)	(-2.84)
$SUSIR \times M_{Quintile=2}$	0.0339	-0.0618*	-0.0164
	(0.87)	(-1.74)	(-0.35)
$SUSIR \times M_{Quintile=3}$	-0.0287	-0.0837*	-0.0267
	(-0.57)	(-1.79)	(-0.58)
$SUSIR \times M_{Quintile=4}$	-0.0545	-0.0928*	-0.0687
	(-1.16)	(-1.87)	(-1.35)
$SUSIR \times M_{Quintile=5}$	-0.154***	-0.141**	-0.0209
	(-3.07)	(-2.38)	(-0.32)
$M_{Quintile=2}$	0.0348	0.0551	0.260***
	(0.75)	(0.92)	(4.77)
$M_{Quintile=3}$	0.0120	-0.00641	0.205***
	(0.26)	(-0.08)	(2.91)
$M_{Quintile=4}$	0.00578	-0.0927	0.254***
	(0.08)	(-0.91)	(3.10)
$M_{Quintile=5}$	-0.298**	-0.641***	0.189*
	(-2.55)	(-3.81)	(1.83)
Controls	Yes	Yes	Yes
R^2	0.0684	0.0719	0.0689
N	577088	576894	575995

Conclusion

- Paper contributes to the ongoing discussion about the impact of short sellers on the informational efficiency of capital markets
- Short sellers trade on previously undocumented mispricing
- Mispricing persists long after short positions become public
- Trading impediments, such as illiquidity and idiosyncratic risk, but not short sale constraints hinder arbitrage
- Overall, our results suggest that the market does not efficiently price the information from short sale reports.

Appendix

Holding Period Return



Fundamental News and Correction of Mispricing

$$Ret_{i,t} = \alpha_t + \beta_{1,t} EAP_{i,t} + \beta_{2,t} SUSIR_{i,t-1} + \beta_{3,t} SUSIR_{i,t-1} \times EAP_{i,t} + \mathbf{x'_{i,t-1}} \mathbf{b_t} + \varepsilon_{i,t},$$

	(1)	(2)	(3)	(4)	(5)
EAP	0.0633***	0.0611***	0.0612***		0.0460***
	(9.26)	(8.93)	(9.00)		(4.71)
SUSIR	-0.00441***	-0.00500***	-0.00361***	-0.00507***	-0.00410*
	(-3.79)	(-4.36)	(-3.21)	(-4.41)	(-1.90)
SUSIR × *EAP*	-0.0174***	-0.0180***	-0.0141**	-0.0151***	-0.0172***
	(-2.99)	(-3.11)	(-2.47)	(-2.68)	(-2.70)
MISP			-0.0109***		
			(-5.29)		
MISP × *EAP*			-0.0264***		
			(-3.84)		
SR			-0.0109***		
			(-3.43)		
SR × *EAP*			-0.0292***		
			(-3.14)		
MKT					1.005***
					(105.04)
MKT × *EAP*					0.00793
					(0.54)
MKT × *SUSIR*					-0.00567
					(-1.27)
MKT × *SUSIR* × *EAP*					0.0204**
					(2.35)
Controls	None	Yes	Yes	Yes	Yes
FixedEffects	Day	Day	Day	Day*EAP	None
R^2	0.207	0.208	0.208	0.210	0.181
N	12552943	12537383	12537383	12537348	12537383

Descriptive Statistics

Panel A: Summary Statistics

			Percentiles				
Variable	Mean	SD	1st	10th	Median	90th	99th
SUSIR	0.332	2.069	-2.935	-1.484	0.006	2.338	6.452
SR	0.035	0.049	0.000	0.001	0.016	0.091	0.239
DTC	6.085	7.509	0.015	0.496	3.721	13.951	37.831
SR_{IO}	0.067	0.122	0.000	0.003	0.033	0.153	0.498
MBETA	1.042	0.452	0.018	0.505	1.018	1.607	2.283
SIZE	4498.113	17182.012	33.312	126.298	826.032	8202.445	69739.656
BM	0.643	0.528	0.000	0.190	0.545	1.169	2.338
RET_RV	0.012	0.113	-0.291	-0.113	0.009	0.138	0.342
RET_MOM	0.196	0.518	-0.606	-0.280	0.121	0.688	2.126
INV	0.158	0.397	-0.327	-0.065	0.081	0.399	1.722
ROA	0.049	0.117	-0.386	-0.015	0.048	0.143	0.326
MISP	48.934	12.735	22.150	32.830	48.360	65.880	79.990
IVOLA	0.019	0.012	0.005	0.008	0.016	0.032	0.061
HLSPREAD	0.008	0.005	0.002	0.003	0.007	0.014	0.025
IO	0.561	0.261	0.026	0.184	0.578	0.903	1.000

Correlations

Panel B: Correlation Table

	$SUSIR$	SR	DTC	SR_{IO}
$SUSIR$	1.00			
SR	0.22	1.00		
DTC	0.26	0.76	1.00	
SR_{IO}	0.26	0.91	0.79	1.00
$MBETA$	0.00	0.17	0.05	0.15
$SIZE$	-0.02	0.22	0.04	0.07
BM	-0.03	-0.22	-0.13	-0.19
RET_RV	0.02	-0.02	-0.03	-0.02
RET_MOM	0.01	-0.07	-0.09	-0.06
INV	0.04	0.03	0.00	0.05
ROA	0.00	-0.05	-0.11	-0.09
$MISP$	0.02	0.13	0.13	0.19
$IVOLA$	0.03	0.12	-0.07	0.16
$HLSPREAD$	0.01	0.27	0.13	0.31
IO	-0.02	0.55	0.22	0.24