Price Limit and Attention Grabbing

Impact of price limit hit on return, volume, and behavior of investors

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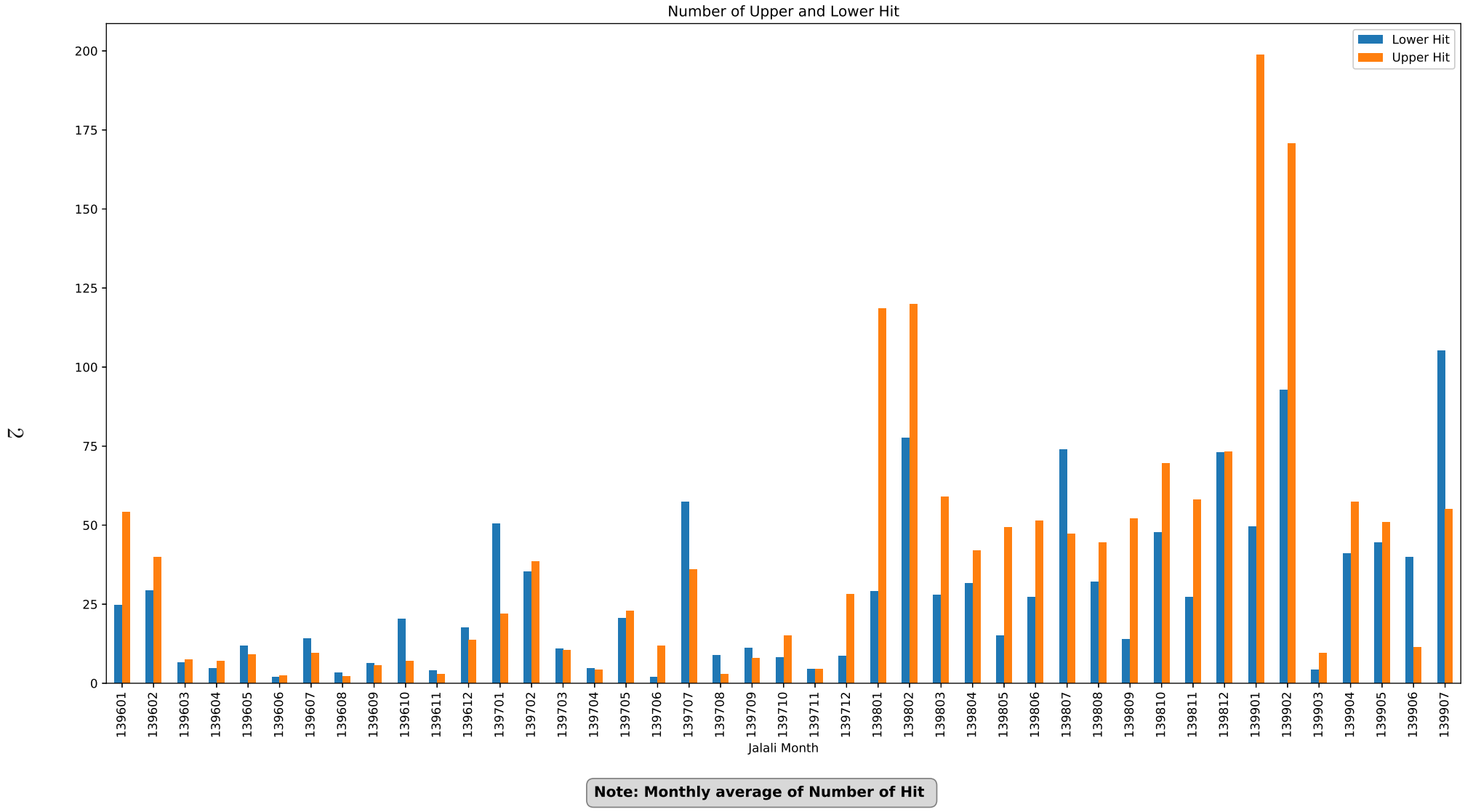
Stocks in the Tehran Securities Exchange that hit upper price limits typically exhibit two characteristics: high returns and high volumes. We show that these price limit events attract investors' attention. Attention-grabbing events lead active individual investors to buy stocks. Upper price limit events coincide with initial price increases, followed by statistically significant price mean reversion over the following week. Rational traders profit in response to attention-based buying. Smart traders accumulate shares on date t, sell shares on date t+1, and earn an average daily profit of 3.8%.

Furthermore, we study the effect of the lower price hit on return and volumes. Literature often ignores this event as attention-grabbing because where investors are restricted for short selling, they do not have any selling problem. However, we show that this event can drive investors to sell their portfolios.

1 Probabilty of event


Number of Upper and Lower Hit
Lower Hit
Upper Hit
200
175
150
125
100
75
50
25
0
139601
139602
139603
139604
139605
139606
139607
139608
139609
139610
139611
139612
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139702
139703
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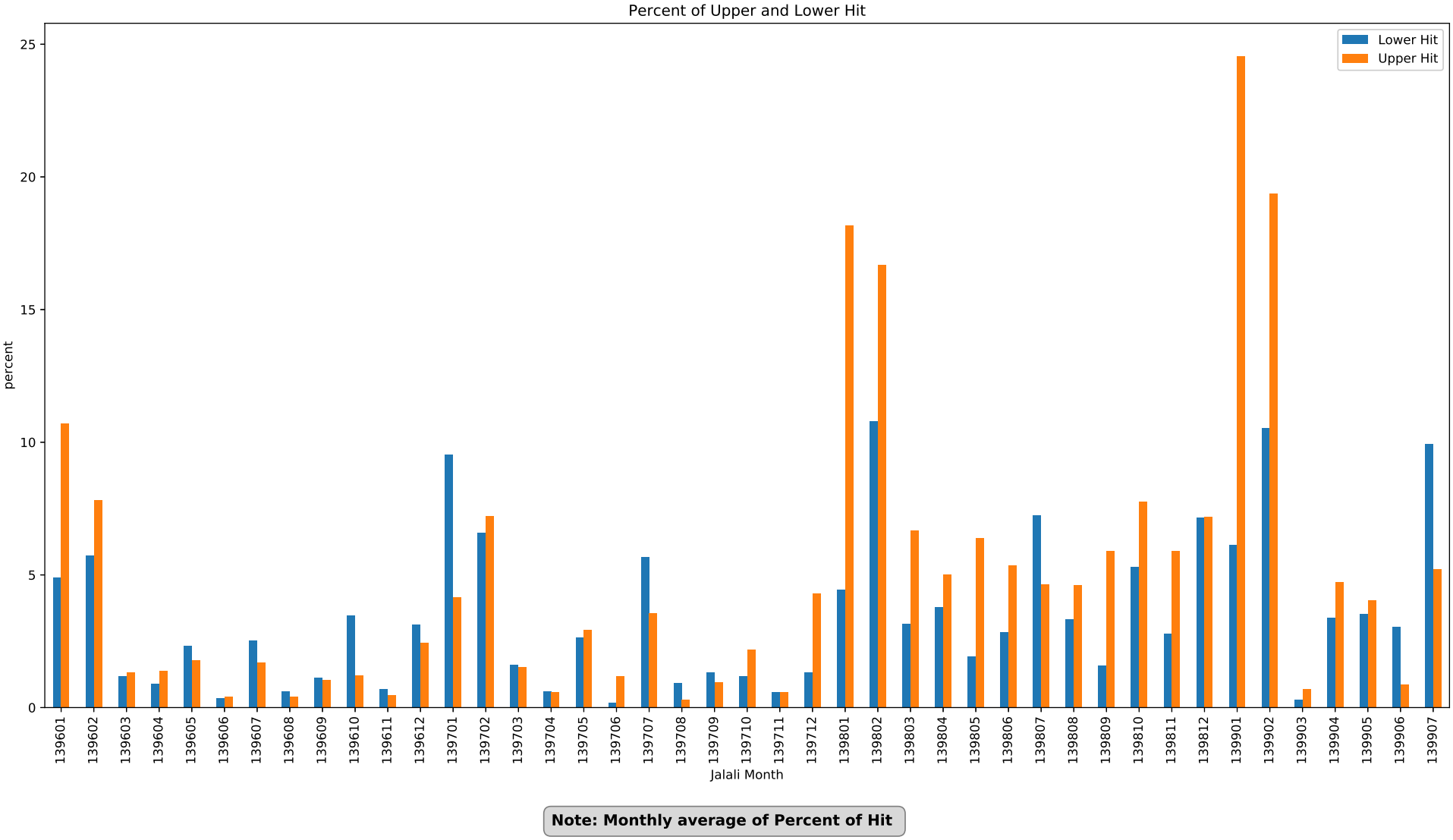
Jalali Month
Note: Monthly average of Number of Hit

Figure 1


Percent of Upper and Lower Hit
Lower Hit
Upper Hit
percent
0
5
10
15
20
25
139601
139602
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139606
139607
139608
139609
139610
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Jalali Month
Note: Monthly average of Percent of Hit

Figure 2

Event	count	mean	std	min	25%	50%	75%	max
upperHit	449	11.33	6.42	0	7.17	10.08	13.61	50.00
lowerHit	449	7.88	4.24	0	4.68	7.34	10.18	29.15
$u\|u$	448	51.64	11.70	15.38462	44.29	51.23	58.38	94.44
$l\|u$	448	12.73	6.21	0	9.32	12.44	16.00	94.44
$u\|l$	447	16.96	7.72	0	12.50	16.67	20.930233	91.89
$l\|l$	447	37.74	10.97	0	31.0961	37.50	44.12	91.89
$u\|(u\|u)$	448	7.19	5.54	0	4.09	5.89	8.71	46.72
$l\|(l\|l)$	444	1.71	1.36	0	0.88	1.47	2.21	12.12
$u\|(l\|l)$	448	1.77	1.28	0	0.98	1.53	2.27	11.73
$l\|(u\|u)$	444	3.73	2.73	0	1.83	3.25	4.86	16.95

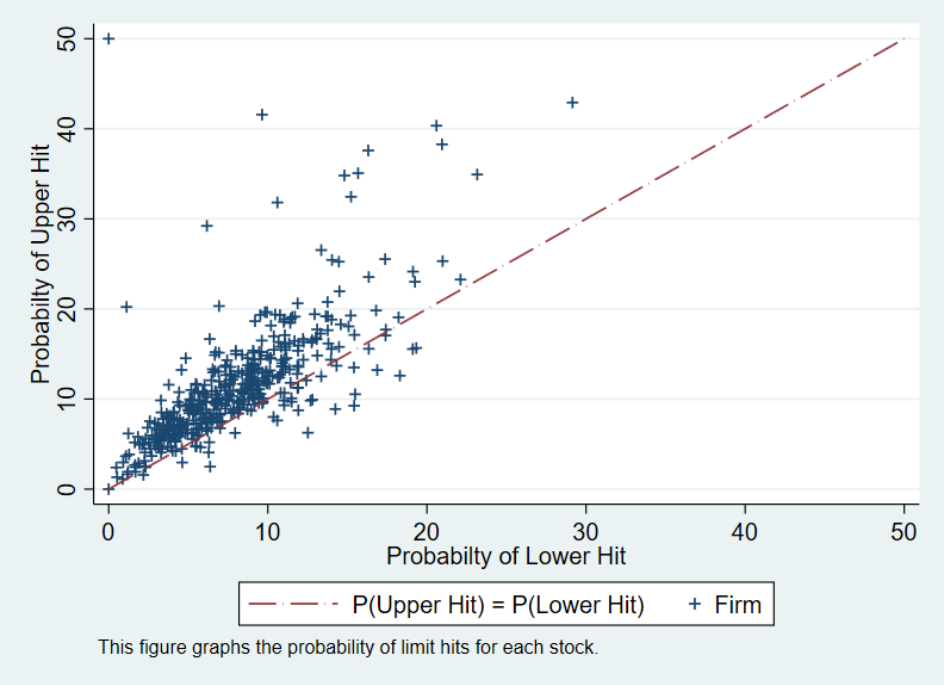


Figure 3

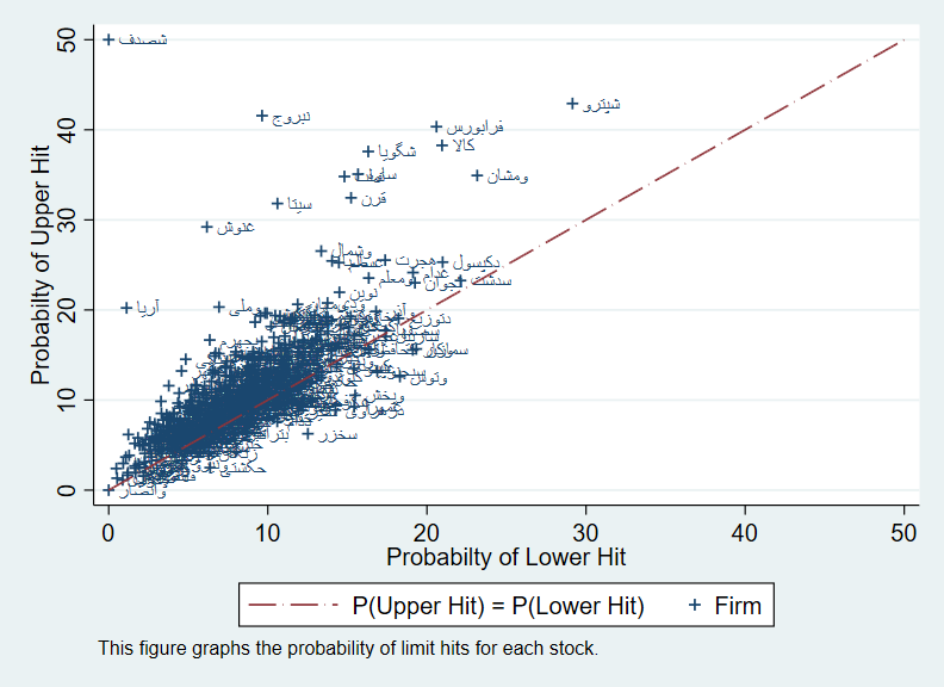


Figure 4

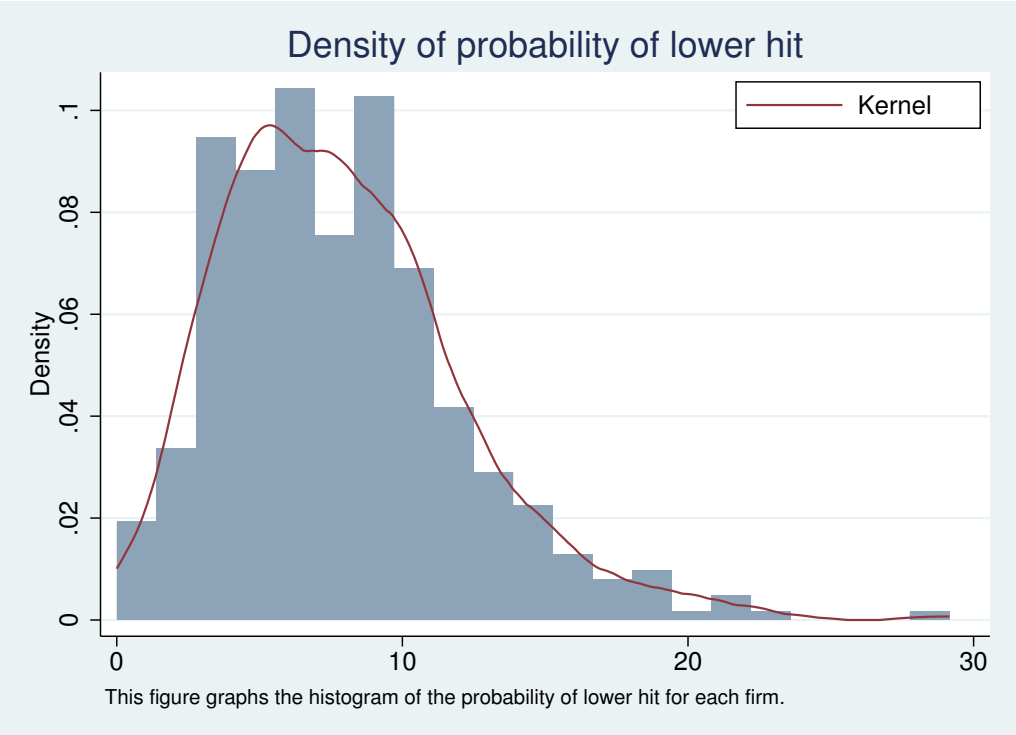


Figure 5

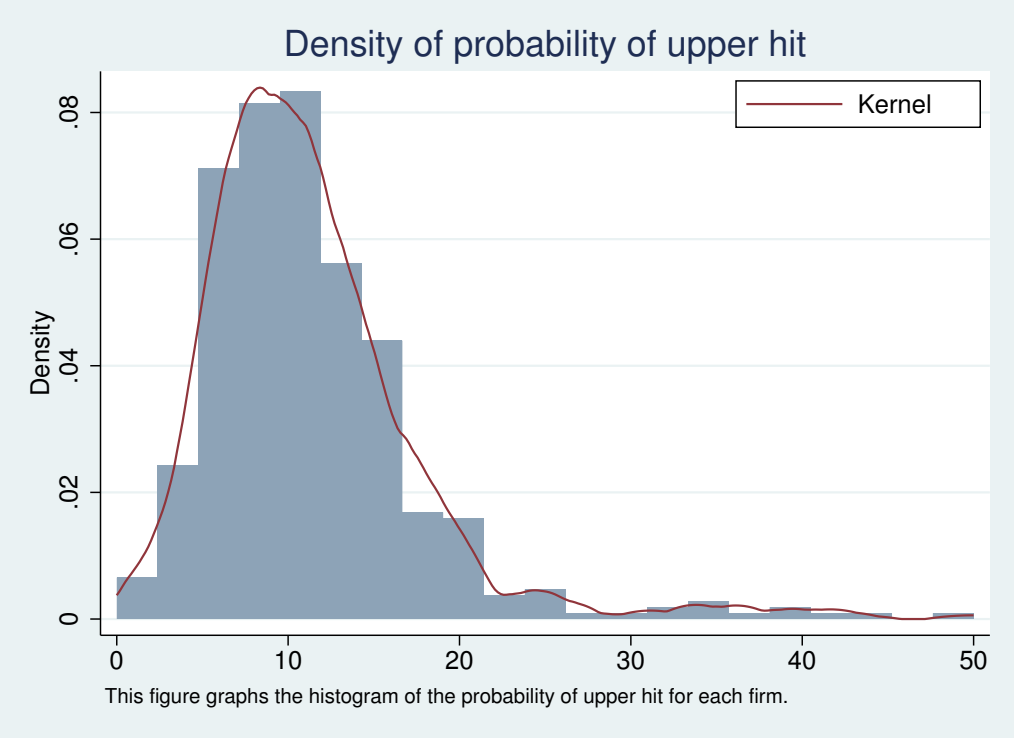


Figure 6

2 Abnormal Return

Abnormal Returns are defined as a difference between the actual return for a stock and the return based on the CAPM equation's 60-day market expectations. The first step is to calculate the CAPM model coefficients for the asset and then, from that equation, measure the expected return for the asset. After that, for calculating abnormal return minus expected return from the actual return of date t+1.

$$AbR_{t+1} = R_{t+1} - (\hat{\alpha}_{60} + \hat{\beta}_{60} \times (R_{M,t+1}))$$

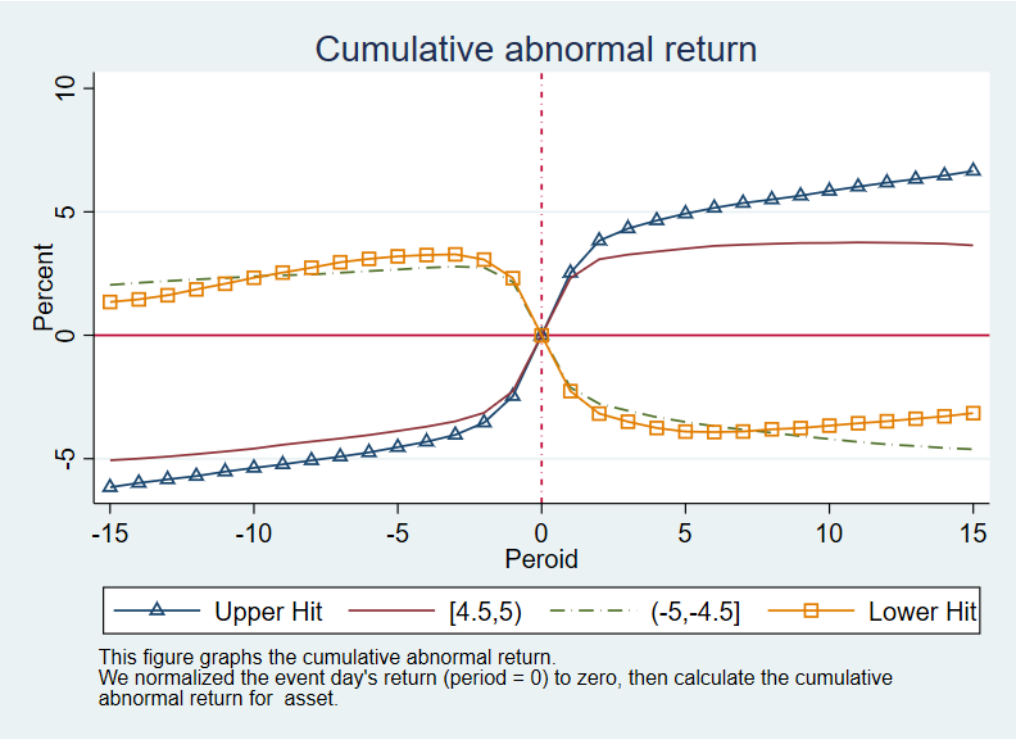


Figure 7

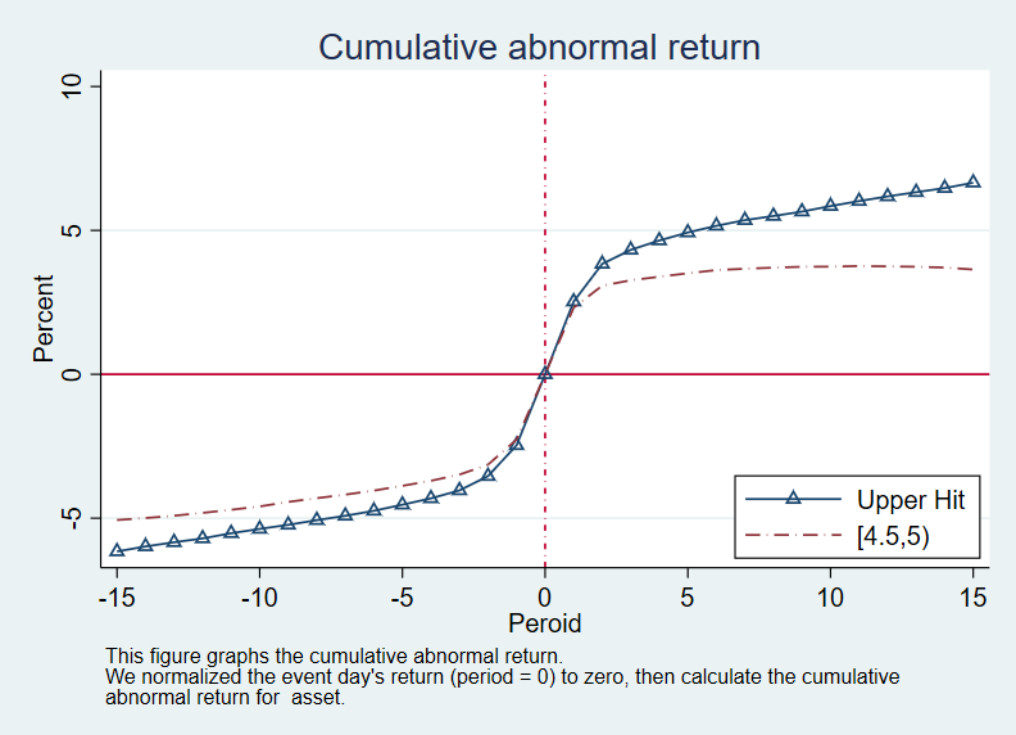


Figure 8

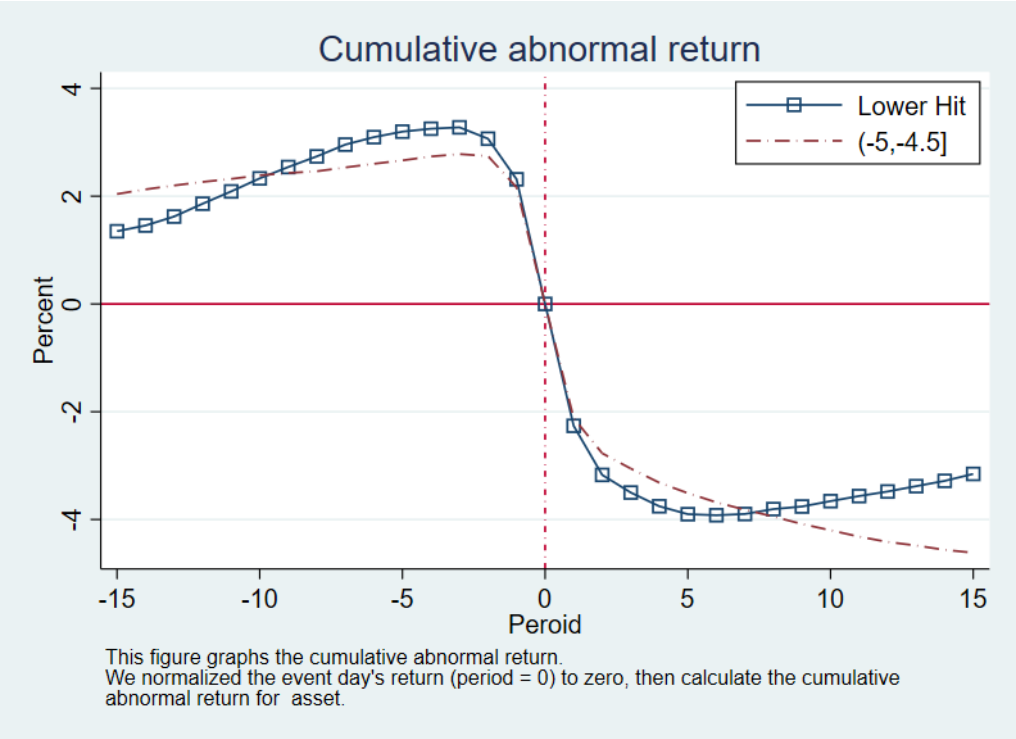


Figure 9

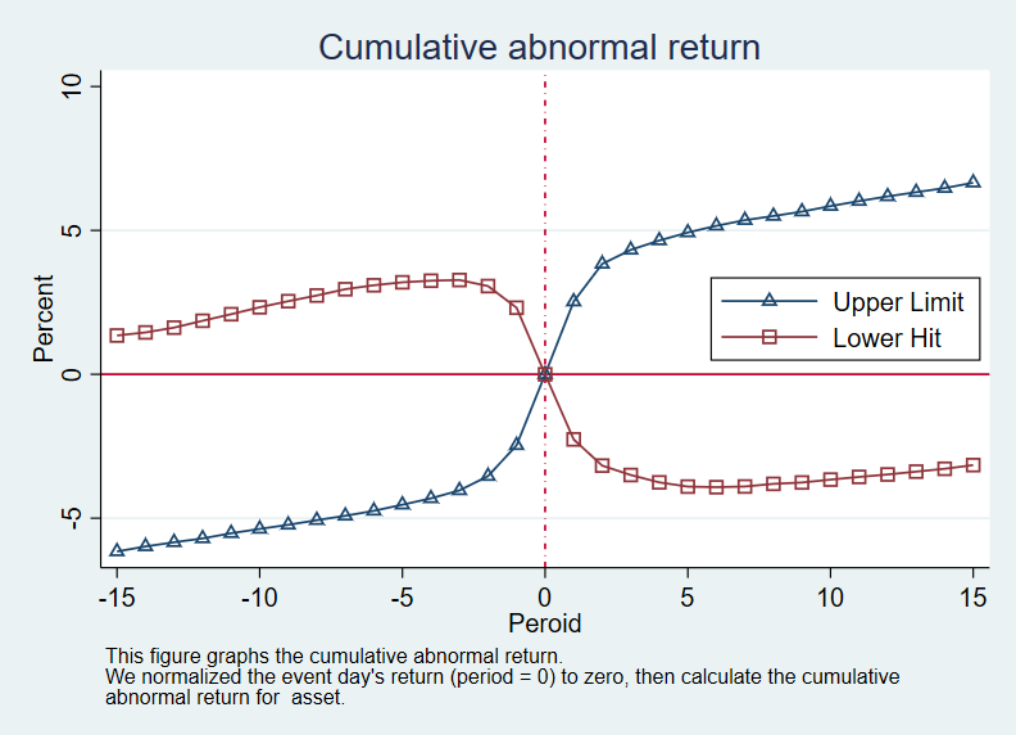


Figure 10

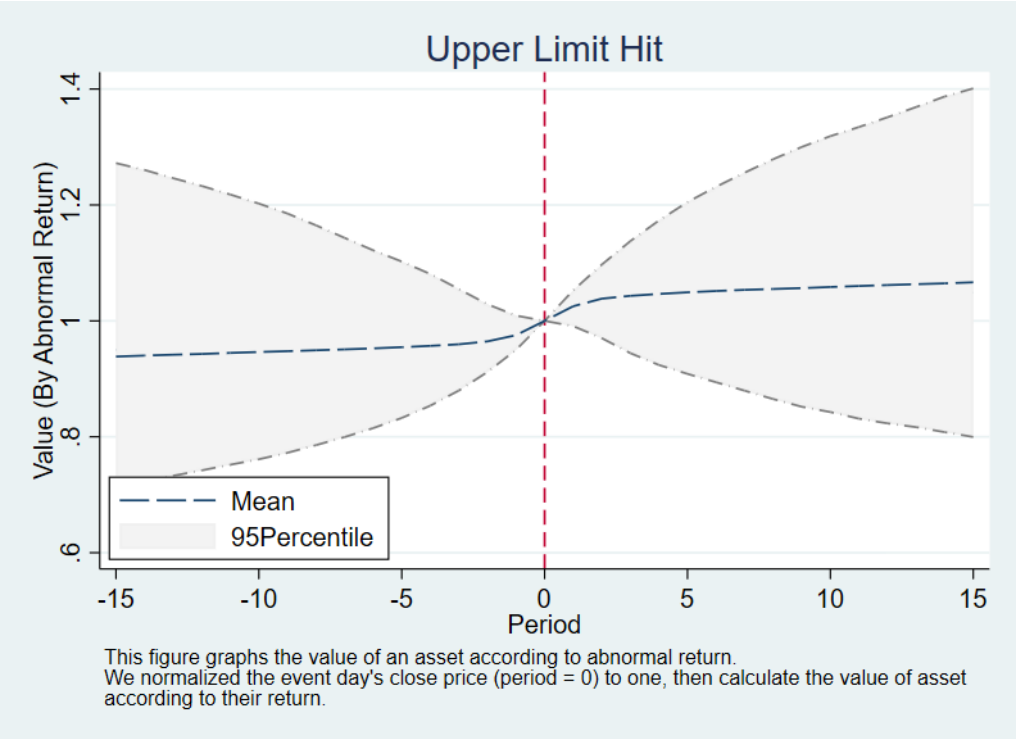


Figure 11

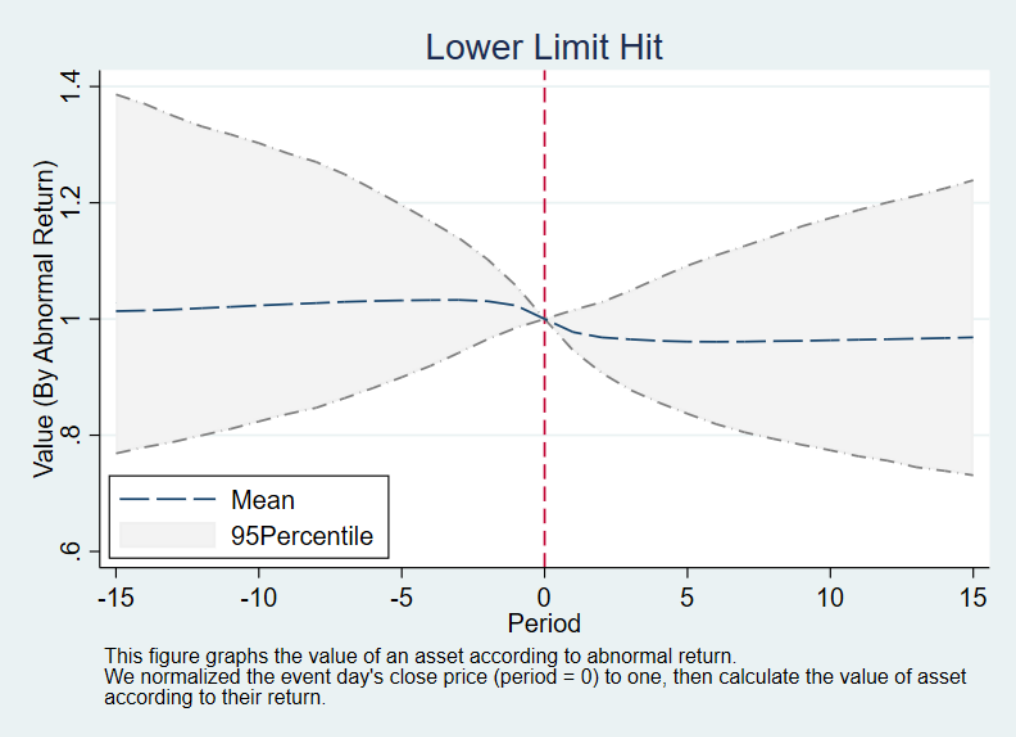


Figure 12

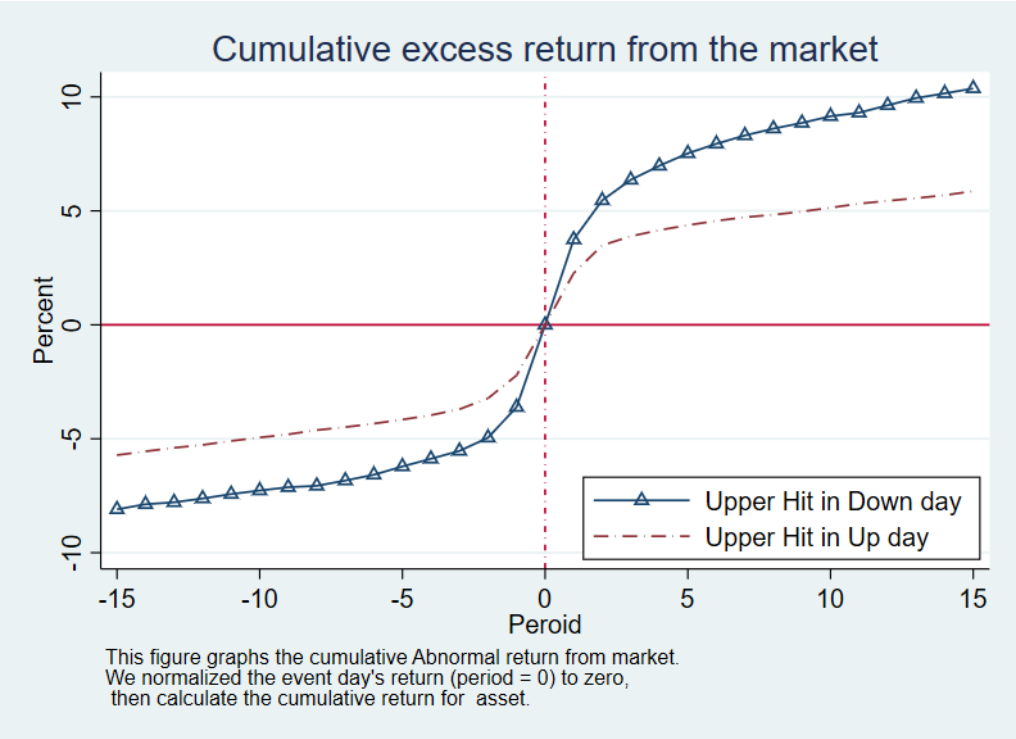


Figure 13

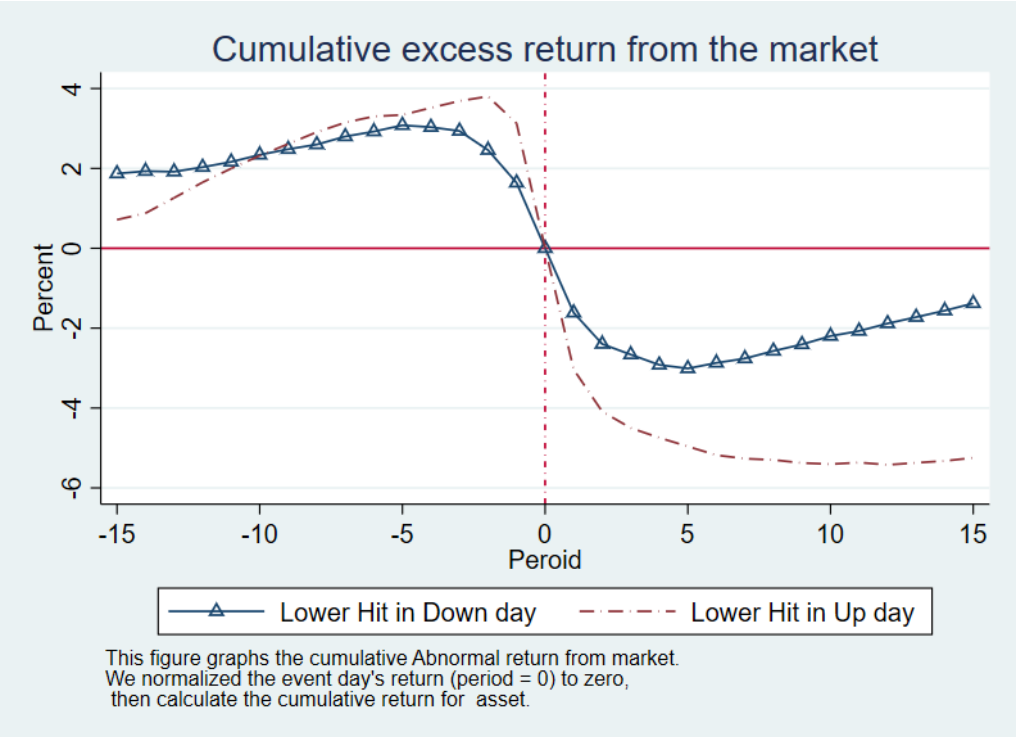


Figure 14

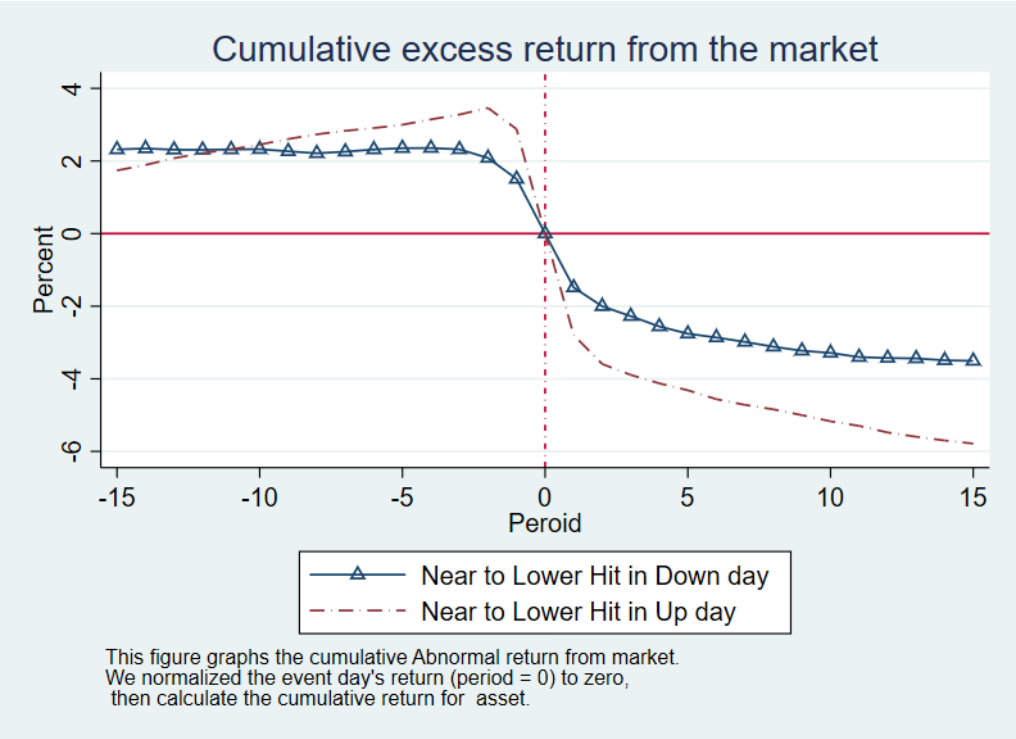


Figure 15

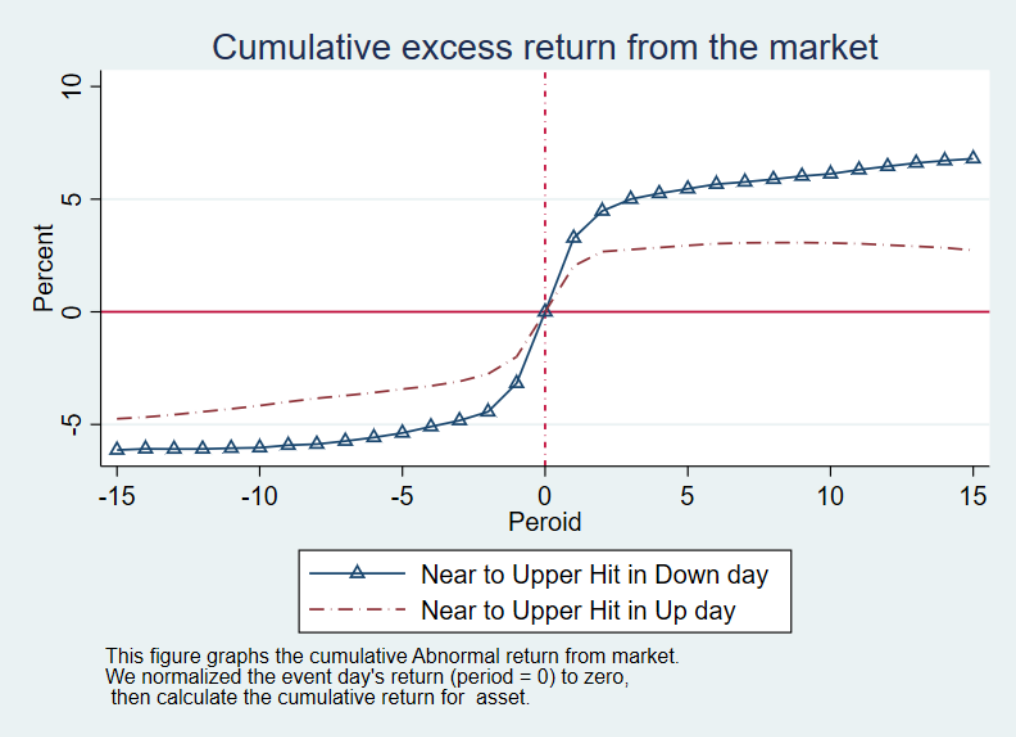


Figure 16

	(1)	(2)	(3)	(4)	(5)	(6)
	AbRet_1	AbRet_2	Ab[2,5]	Ab[5,50]	Ab[50,100]	Ab[100,300]
upperHit	3.084***	4.407***	0.766***	19.95***	-4.876***	-19.32***
	(62.59)	(63.66)	(9.47)	(16.49)	(-6.64)	(-9.73)
[4.5,5)	1.630***	2.663***	0.393***	-0.133	-1.415***	-1.500
	(71.94)	(60.07)	(5.25)	(-0.18)	(-3.40)	(-1.66)
[4,4.5)	0.686***	0.529***	-0.308***	1.697**	0.338	-0.831
	(40.16)	(15.74)	(-4.96)	(3.13)	(0.97)	(-1.02)
[2,4)	0.641***	0.581***	0.313***	5.033***	0.131	-4.315***
	(26.84)	(19.71)	(7.71)	(12.37)	(0.53)	(-6.44)
(-2,2)	-0.211***	-0.423***	0.0324	-2.585***	-1.016*	-1.389
	(-8.38)	(-11.43)	(0.62)	(-4.41)	(-2.56)	(-1.67)
(-4,-2]	-1.181***	-1.662***	-0.193***	3.797***	-0.248	-3.154***
	(-58.68)	(-54.28)	(-4.81)	(9.32)	(-0.97)	(-5.72)
(-4.5,-4]	-0.599***	-0.686***	-0.134*	3.222***	-0.262	-1.132
	(-33.66)	(-20.49)	(-2.35)	(6.10)	(-0.83)	(-1.61)
(-5,-4.5]	-1.161***	-1.614***	-0.820***	1.134	-0.599	1.716
	(-44.06)	(-40.63)	(-13.27)	(1.74)	(-1.49)	(1.67)
lowerHit	-3.049***	-4.350***	-1.344***	12.10***	-1.904**	-3.755*
	(-83.61)	(-81.26)	(-17.95)	(10.91)	(-3.02)	(-2.32)
Up Market	-1.300***	-1.688***	-0.229***	2.776***	-1.886***	-3.398***
	(-54.60)	(-54.66)	(-7.96)	(11.47)	(-10.50)	(-9.23)
Constant	0.771***	1.257***	0.836***	26.29***	8.578***	29.24***
	(26.62)	(30.04)	(10.64)	(16.01)	(8.77)	(15.06)
Observations	305154	304705	303358	282712	260818	174705
R^2	0.428	0.327	0.011	0.033	0.008	0.029

t statistics in parentheses

This table reports fixed effect estimates of abnormal returns. The independent variables are dummies that control for events . We calculate standard errors by using fixed effect on stock level

3 Trading Strategy

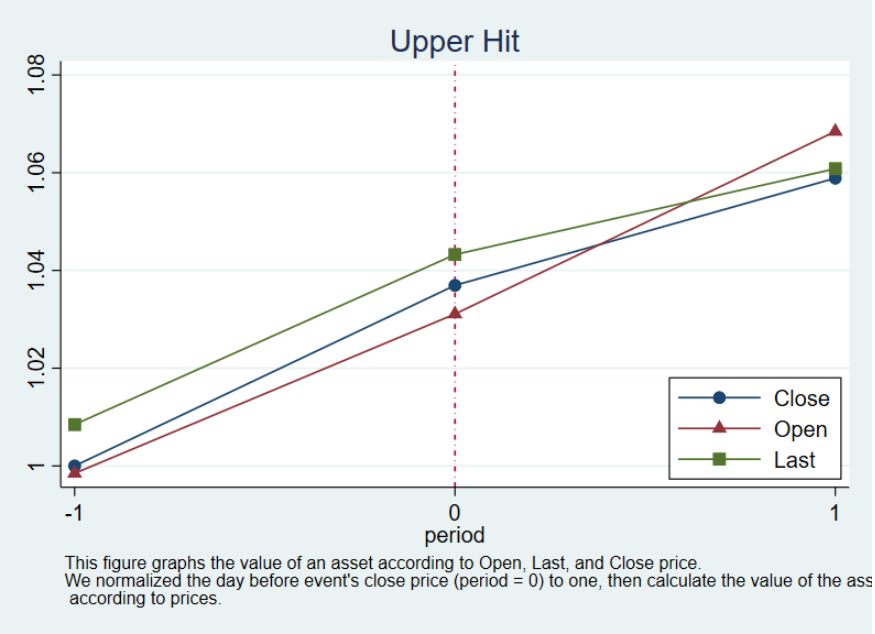


Figure 17

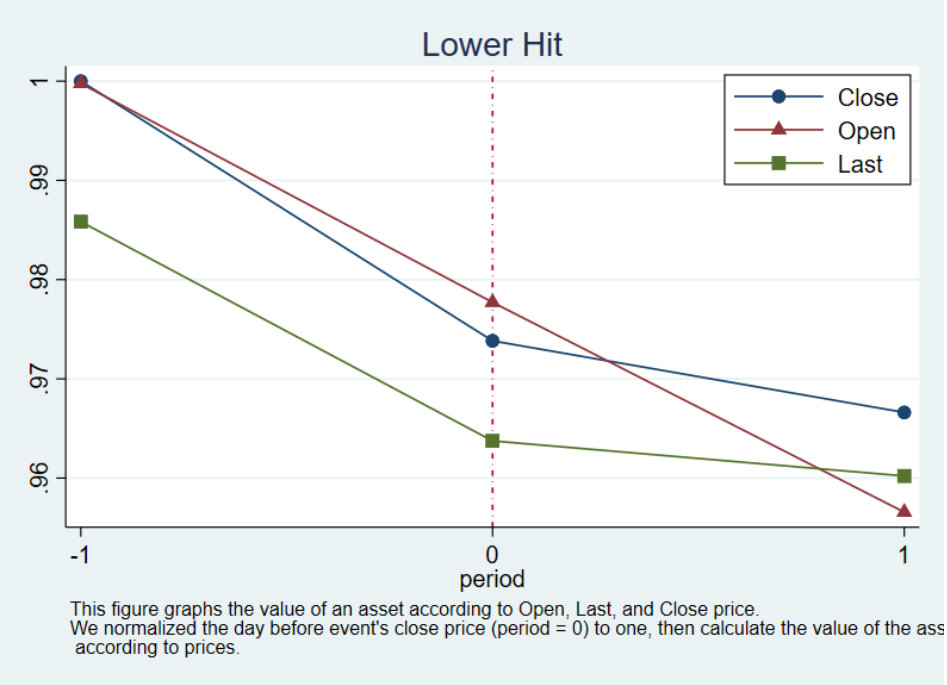


Figure 18

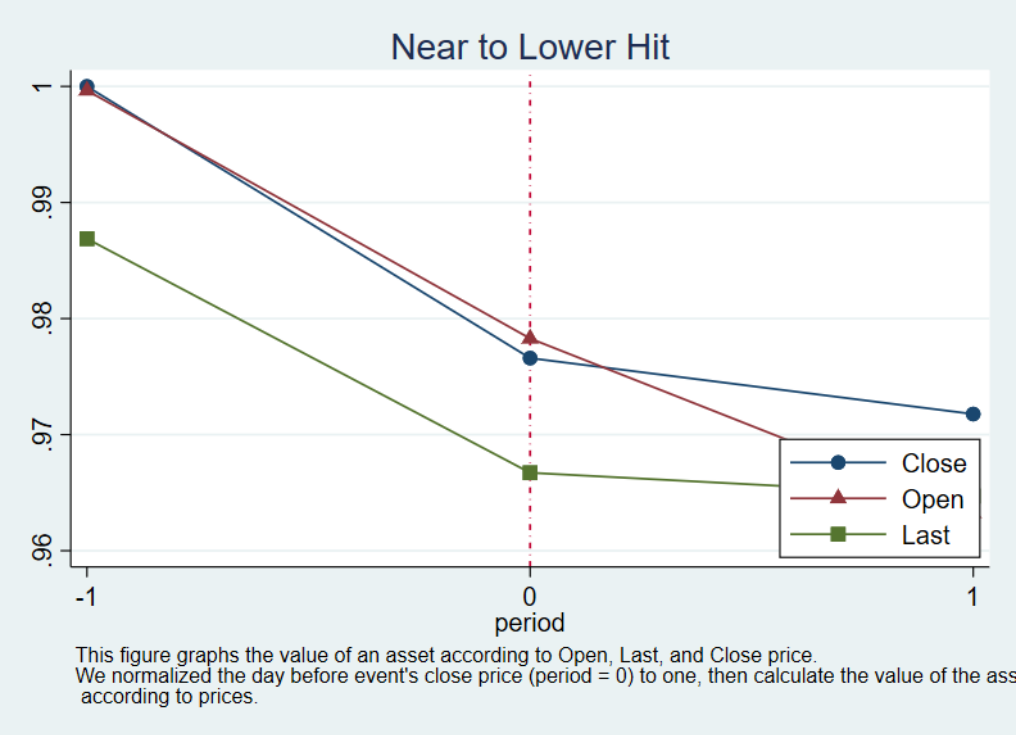


Figure 19

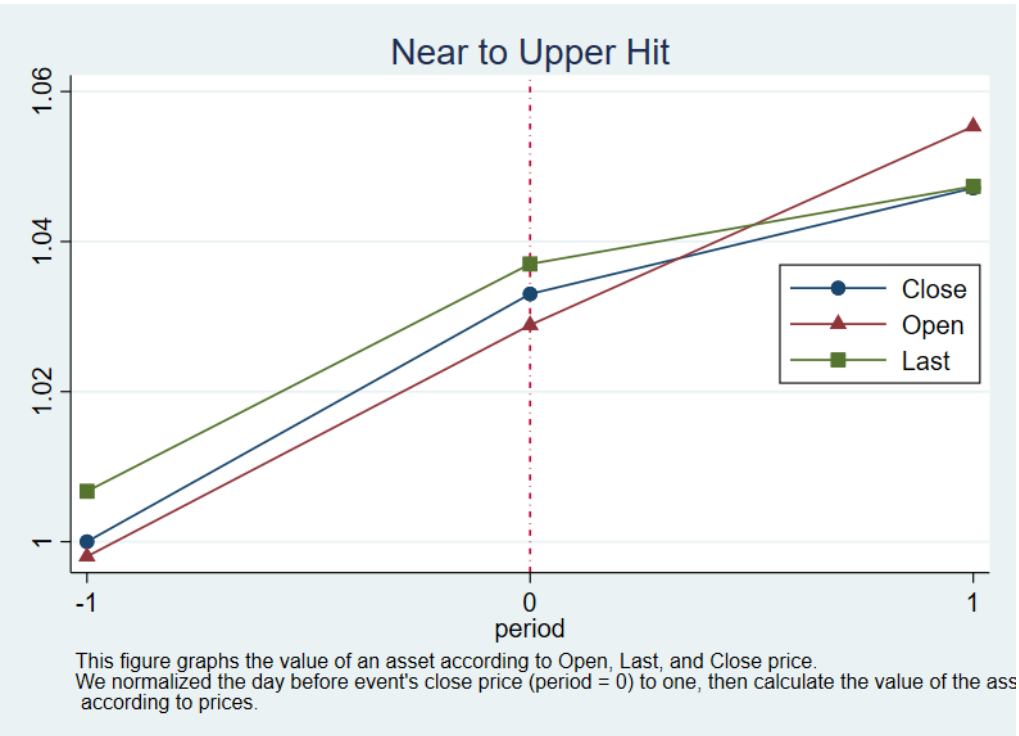


Figure 20

	(1)	(2)	(3)	(4)	(5)	(6)
	Close-Open	Last-Open	TOpen-Last	TOpen-Close	TClose-TOpen	TLast-TOpen
upperHit	0.290***	1.416***	2.080***	3.142***	-1.292***	-0.753***
	(4.21)	(37.18)	(71.88)	(63.79)	(-29.25)	(-30.79)
[4.5,5)	0.736***	1.054***	1.266***	1.591***	-0.305***	-0.240***
	(20.03)	(26.58)	(41.46)	(44.36)	(-10.20)	(-7.57)
[4,4.5)	0.205***	0.254***	0.124***	0.167***	-0.264***	-0.314***
	(6.31)	(6.47)	(4.49)	(5.35)	(-9.78)	(-10.06)
[2,4)	-0.910***	-0.305***	0.0716***	0.611***	-0.644***	-0.193***
	(-19.19)	(-11.32)	(3.84)	(18.77)	(-22.48)	(-10.14)
(-2,2)	-0.574***	-0.191***	-0.276***	0.0302	-0.292***	0.0275
	(-17.41)	(-7.52)	(-12.22)	(0.95)	(-12.14)	(1.23)
(-4,-2]	-0.249***	-0.408***	-0.289***	-0.506***	-0.000351	0.0118
	(-8.74)	(-16.00)	(-16.15)	(-17.49)	(-0.02)	(0.63)
(-4.5,-4]	-0.128***	-0.252***	0.0440	-0.0851**	0.0615*	0.0390
	(-3.55)	(-6.52)	(1.63)	(-2.70)	(2.35)	(1.31)
(-5,-4.5]	-0.0831	-0.559***	-0.796***	-1.251***	0.717***	0.250***
	(-1.95)	(-15.04)	(-27.07)	(-31.02)	(21.16)	(8.14)
lowerHit	-0.645***	-1.419***	-1.378***	-2.189***	0.874***	0.427***
	(-11.15)	(-39.01)	(-46.87)	(-47.96)	(24.79)	(15.58)
Up Market	0.133***	0.116***	0.260***	0.240***	-0.176***	-0.252***
	(7.56)	(8.79)	(22.34)	(16.49)	(-13.78)	(-22.40)
Constant	0.169***	-0.177***	0.252***	-0.0135	0.453***	0.284***
	(4.80)	(-5.62)	(10.72)	(-0.38)	(16.24)	(11.08)
Observations	305298	305298	304849	304849	304839	304839
R^2	0.031	0.100	0.125	0.204	0.085	0.024

t statistics in parentheses

This table reports fixed effect estimates of Open, Last and Close returns.

The independent variables are dummies that control for events . We calculate standard errors by using fixed effect on stock level

4 Buy-Sell Imbalances

Buy-sell imbalances for each type is defined as the net buying ratio of stock k on date t by a particular type to the amounts bought and sold by that type.

$$\text{Imbalance}^{\text{Indiv}}_{k,t} = \frac{\text{Buys}^{\text{Indiv}}_{k,t} - \text{Sells}^{\text{Indiv}}_{k,t}}{\text{Buys}^{\text{Indiv}}_{k,t} + \text{Sells}^{\text{Indiv}}_{k,t}} \qquad \text{Imbalance}^{\text{Inst}}_{k,t} = \frac{\text{Buys}^{\text{Inst}}_{k,t} - \text{Sells}^{\text{Inst}}_{k,t}}{\text{Buys}^{\text{Inst}}_{k,t} + \text{Sells}^{\text{Inst}}_{k,t}}$$

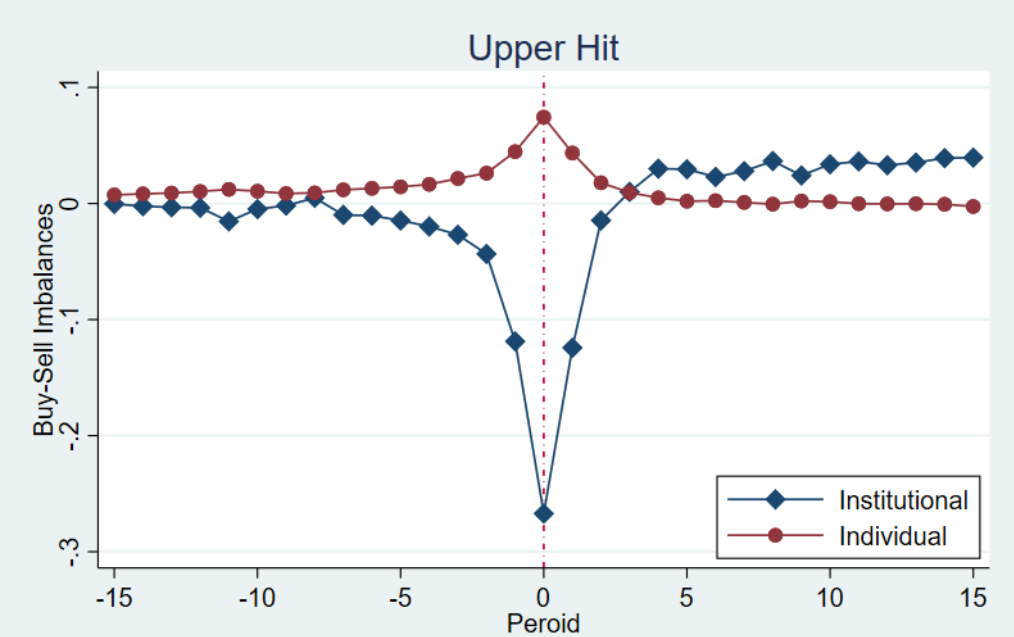


Figure 21

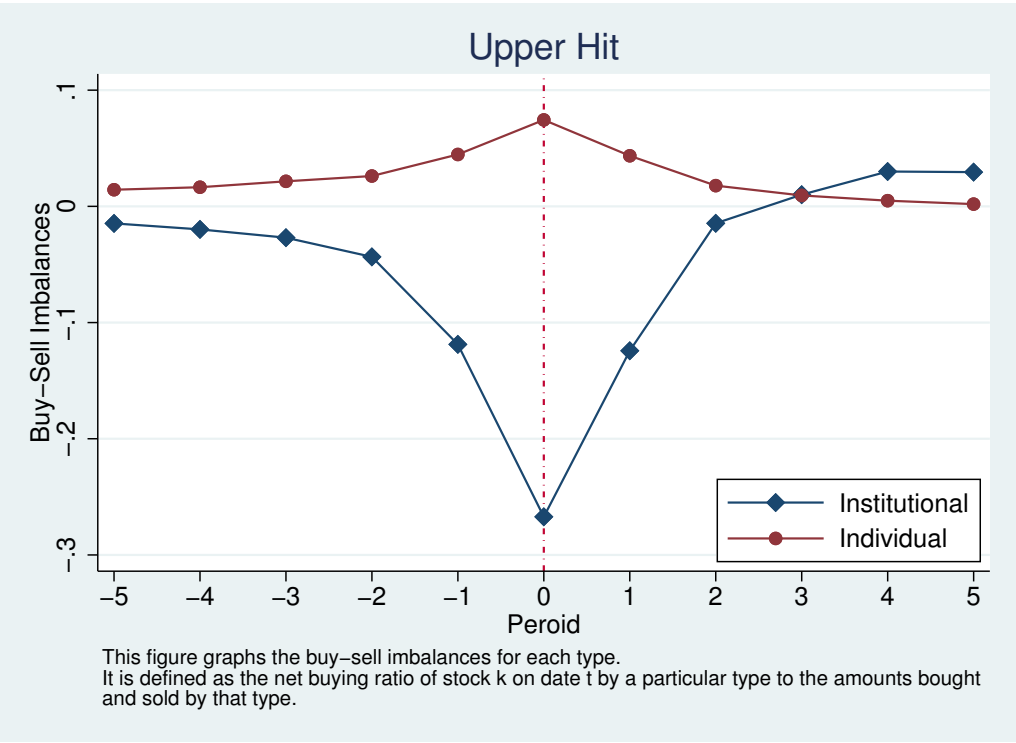


Figure 22

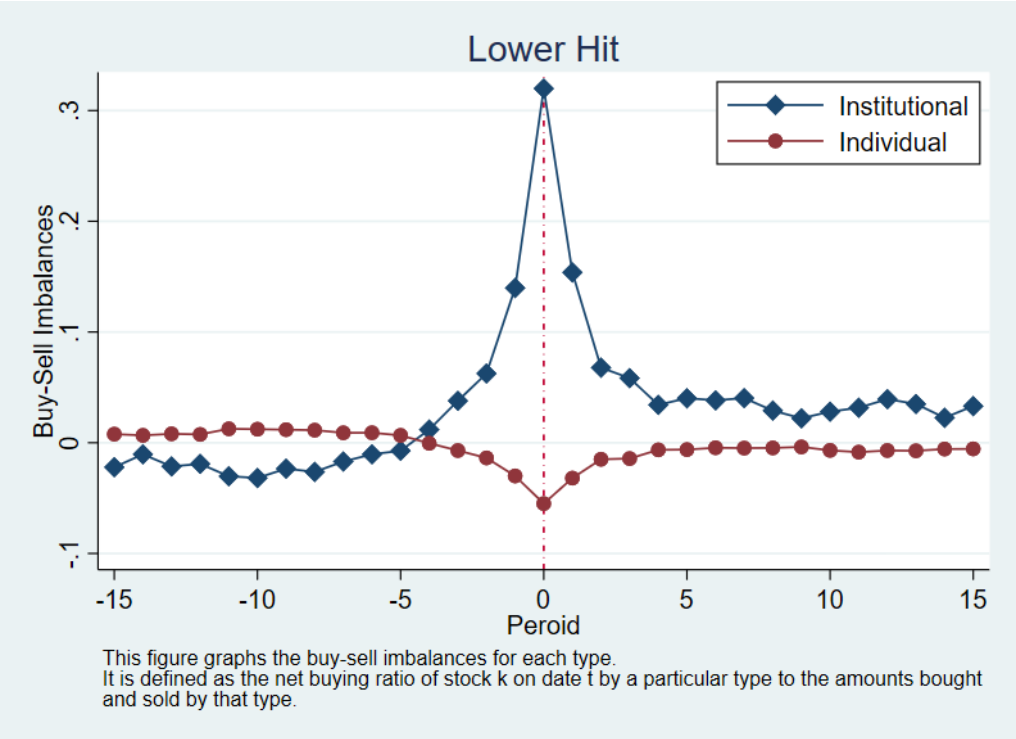


Figure 23

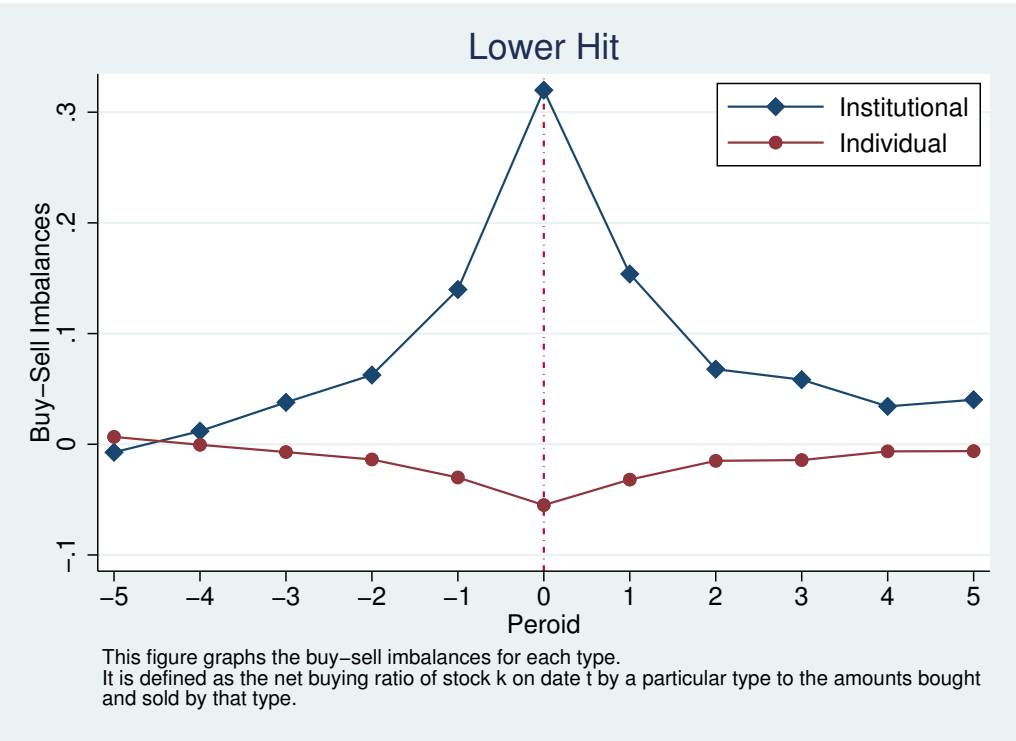


Figure 24

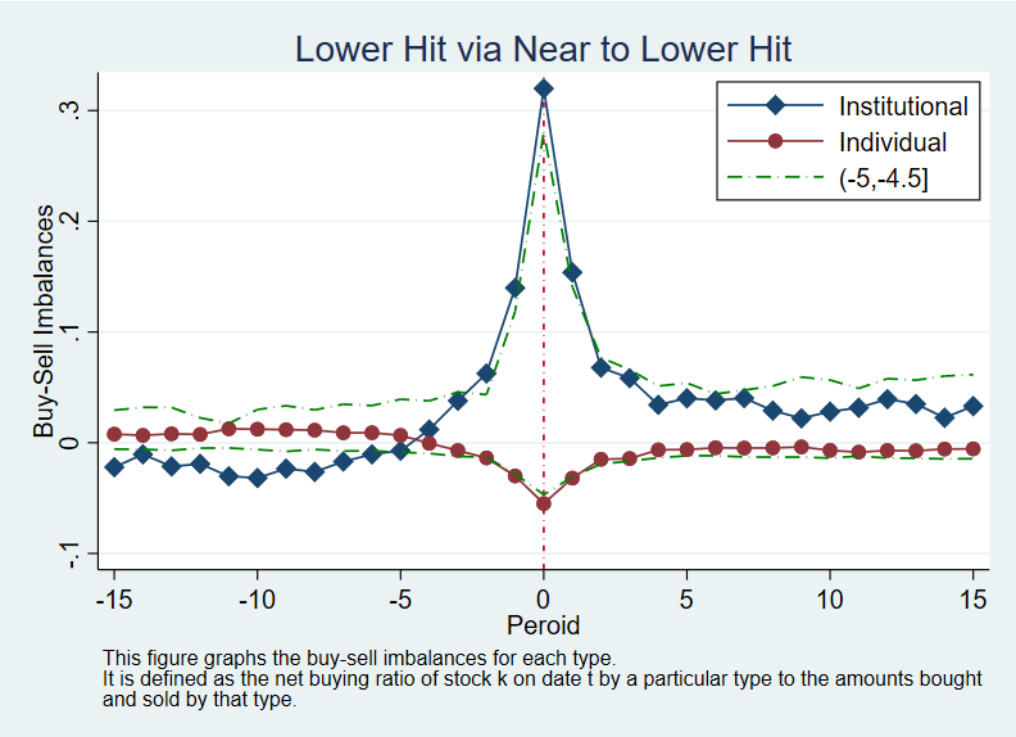


Figure 25

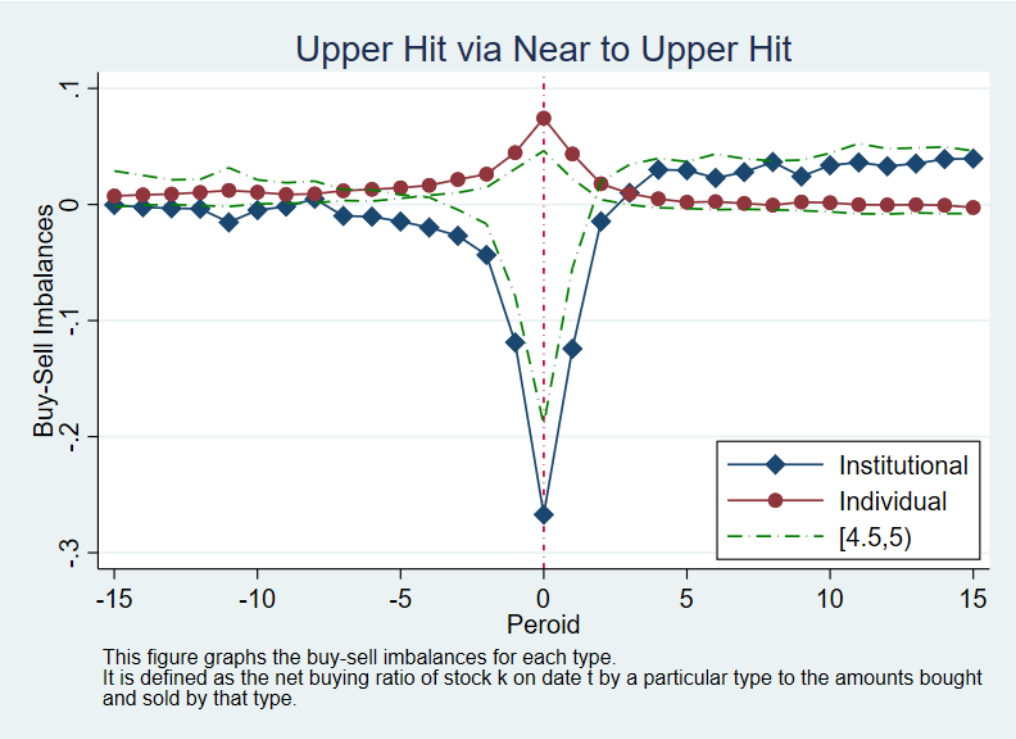


Figure 26

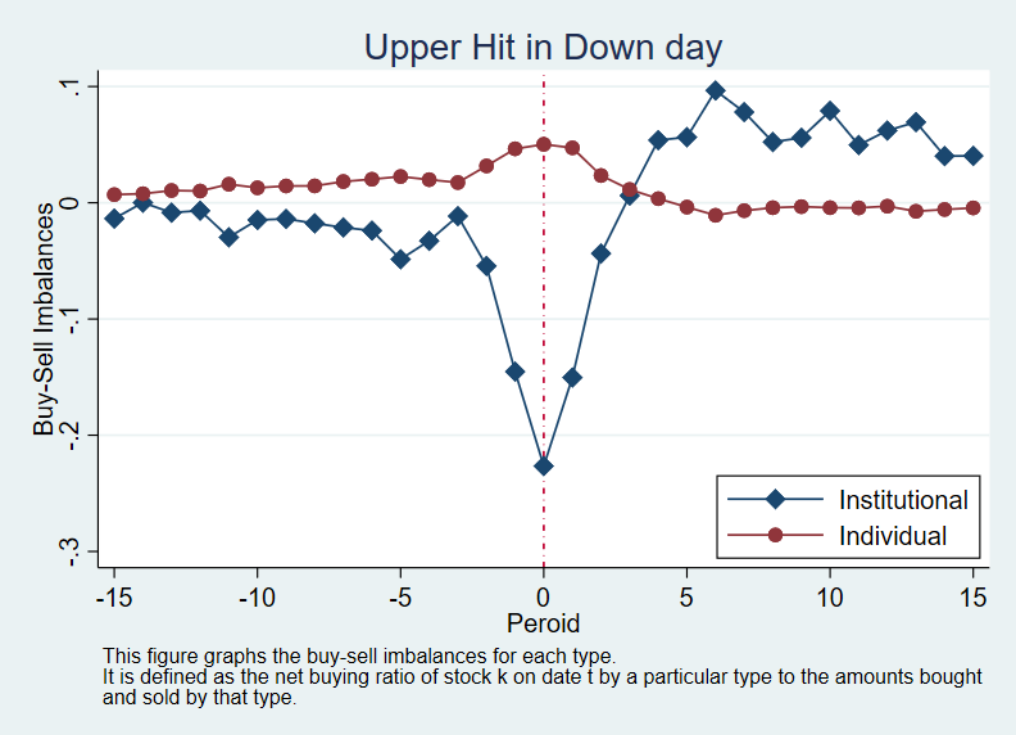


Figure 27

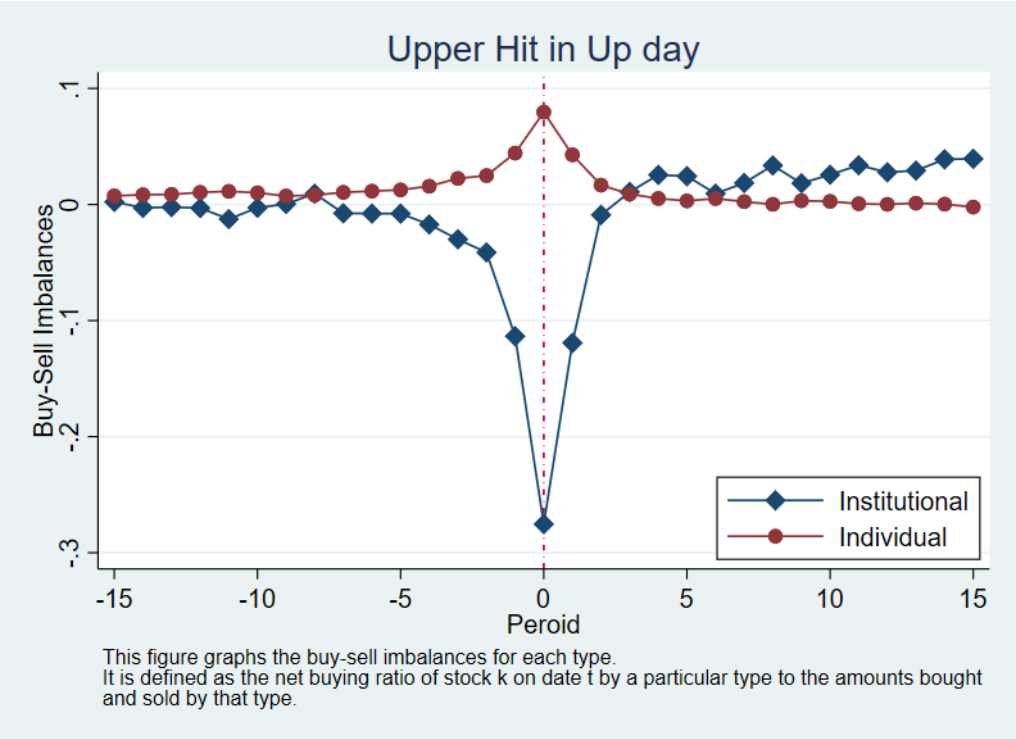


Figure 28

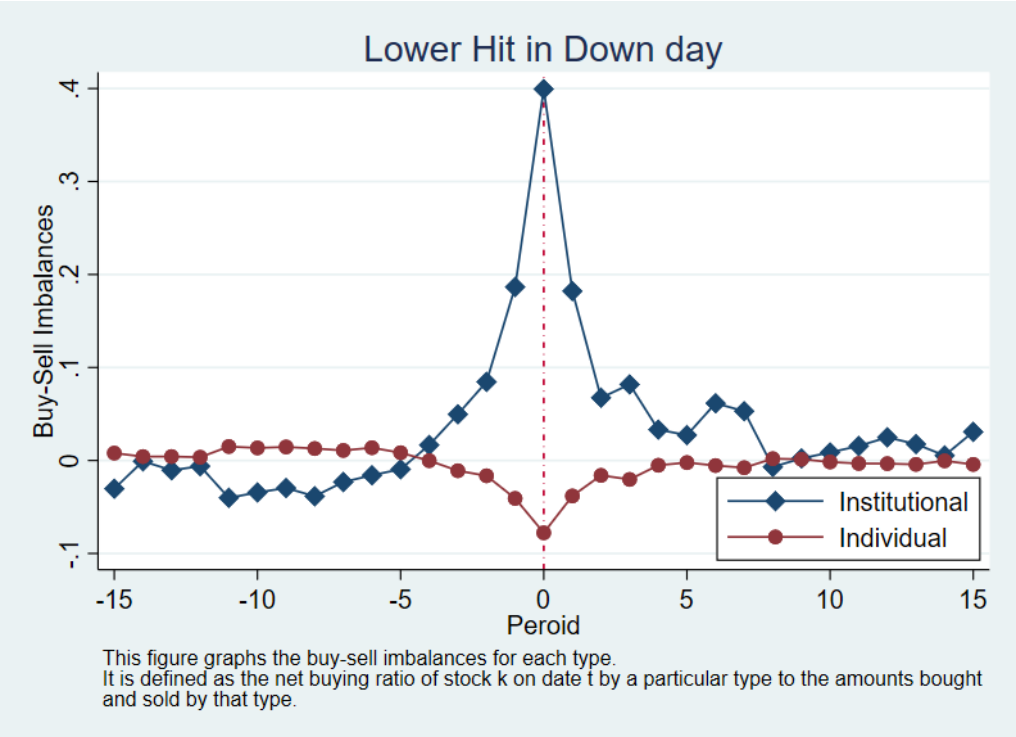


Figure 29

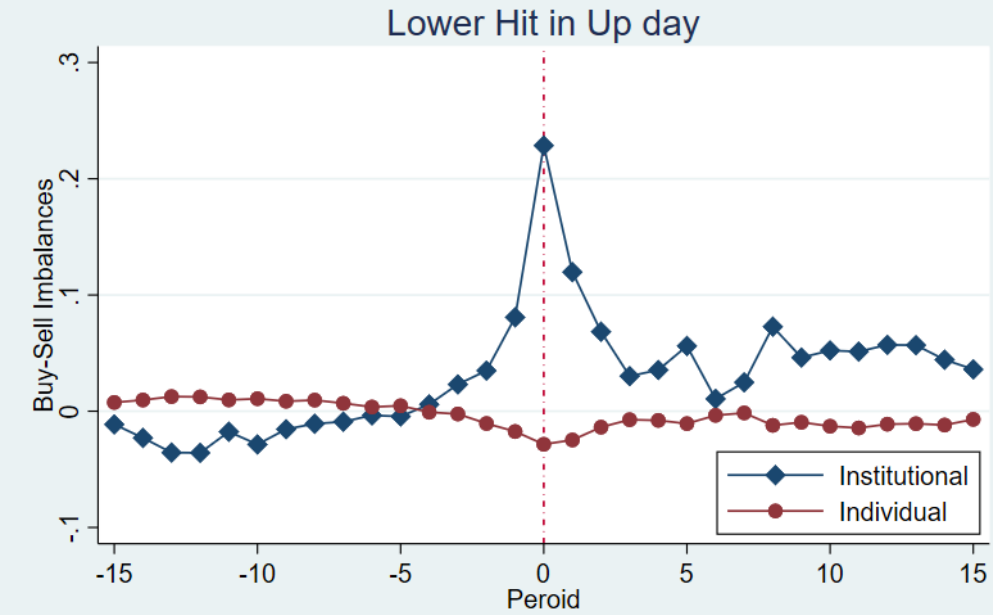

Lower Hit in Up day
Buy-Sell Imbalances
-.1
0
.1
.2
.3
-15
-10
-5
0
5
10
15
Peroid
Institutional
Individual
This figure graphs the buy-sell imbalances for each type.
It is defined as the net buying ratio of stock k on date t by a particular type to the amounts bought and sold by that type.

Figure 30

	(1)	(2)	(3)	(4)
	InslImbalance	FInslImbalance	IndlImbalance	FIndlImbalance
upperHit	-0.439***	-0.272***	0.101***	0.0834***
	(-31.90)	(-22.19)	(17.76)	(15.88)
[4.5,5)	-0.226***	-0.161***	0.0640***	0.0429***
	(-21.86)	(-14.92)	(18.69)	(14.17)
[4,4.5)	-0.0663***	-0.00975	0.00917***	0.00721**
	(-7.32)	(-0.98)	(4.16)	(2.89)
[2,4)	-0.0640***	-0.0218***	-0.00522*	0.00556**
	(-9.87)	(-3.33)	(-2.22)	(2.61)
(-2,2)	0.114***	0.0493***	-0.0765***	-0.0387***
	(10.60)	(4.91)	(-13.61)	(-7.77)
(-4,-2]	0.144***	0.0413***	-0.0471***	-0.0159***
	(21.09)	(6.81)	(-16.86)	(-7.09)
(-4.5,-4]	0.00884	-0.00292	0.00944***	0.00509
	(0.99)	(-0.29)	(4.11)	(1.96)
(-5,-4.5]	0.0496***	-0.00940	0.00126	0.00675**
	(4.90)	(-0.91)	(0.55)	(2.62)
lowerHit	0.214***	0.0305**	-0.0329***	0.00288
	(18.16)	(2.78)	(-7.80)	(0.71)
Up Market	-0.0785***	-0.0290***	0.0359***	0.0176***
	(-18.33)	(-6.67)	(15.43)	(10.26)
Constant	0.207***	0.160***	-0.0410***	-0.0427***
	(17.59)	(13.25)	(-6.02)	(-6.07)
Observations	208681	208424	281909	281462
R^2	0.099	0.023	0.063	0.027

t statistics in parentheses

This table reports fixed effect estimates of net-buy imbalances.

The independent variables are dummies that control for events . We calculate standard errors by using fixed effect on stock level

5 Volume

Turnover of stock is defined as the amount traded in Rial divided by the stock's market capitalization. Based on this factor, we define Relative Turnover by the ratio of the turnover of stock k on date t to the 60 days average turnover of stock k.

$$\text{Turn}_{k,t} = \frac{\text{Volume(Rial)}_{k,t}}{\text{MarketCap}_{k,t}} \qquad \text{RelTurn}_{k,t} = \frac{\text{Turn}_{k,t}}{AVG_{60}(\text{Turn}_{k,t})}$$

5.1 Turnover

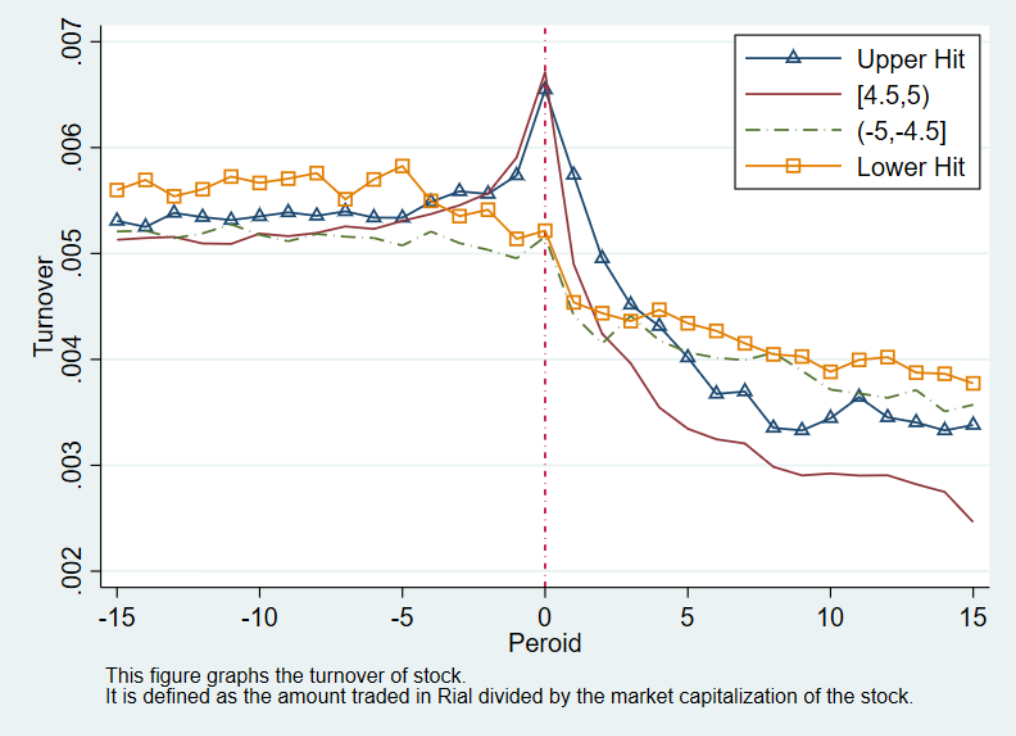


Figure 31

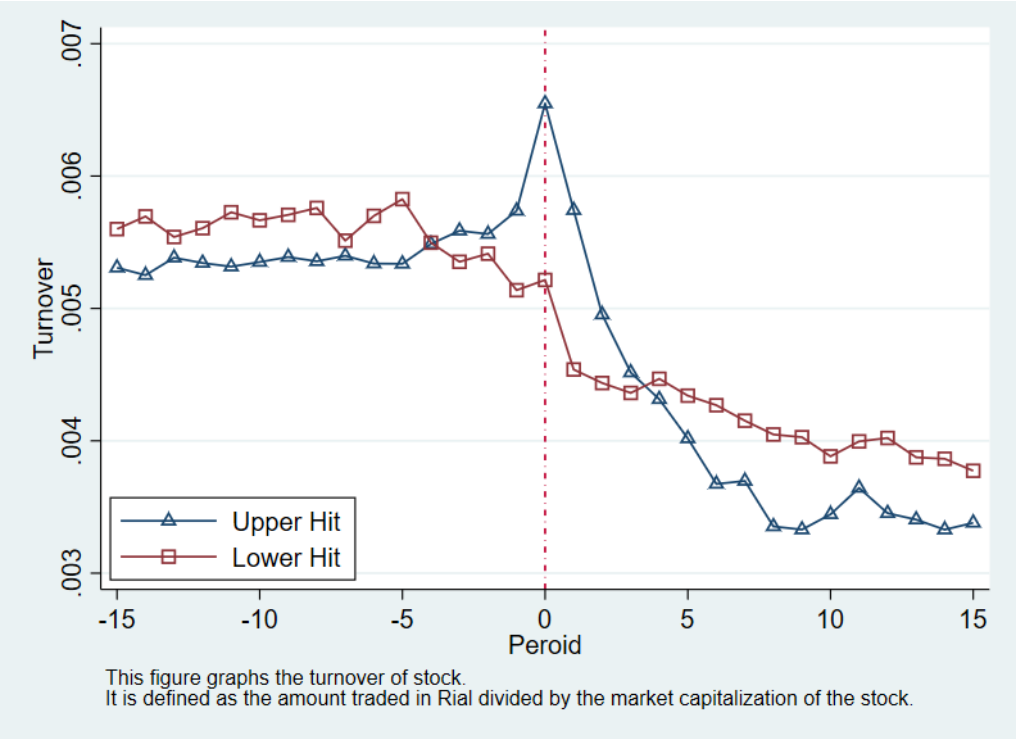


Figure 32

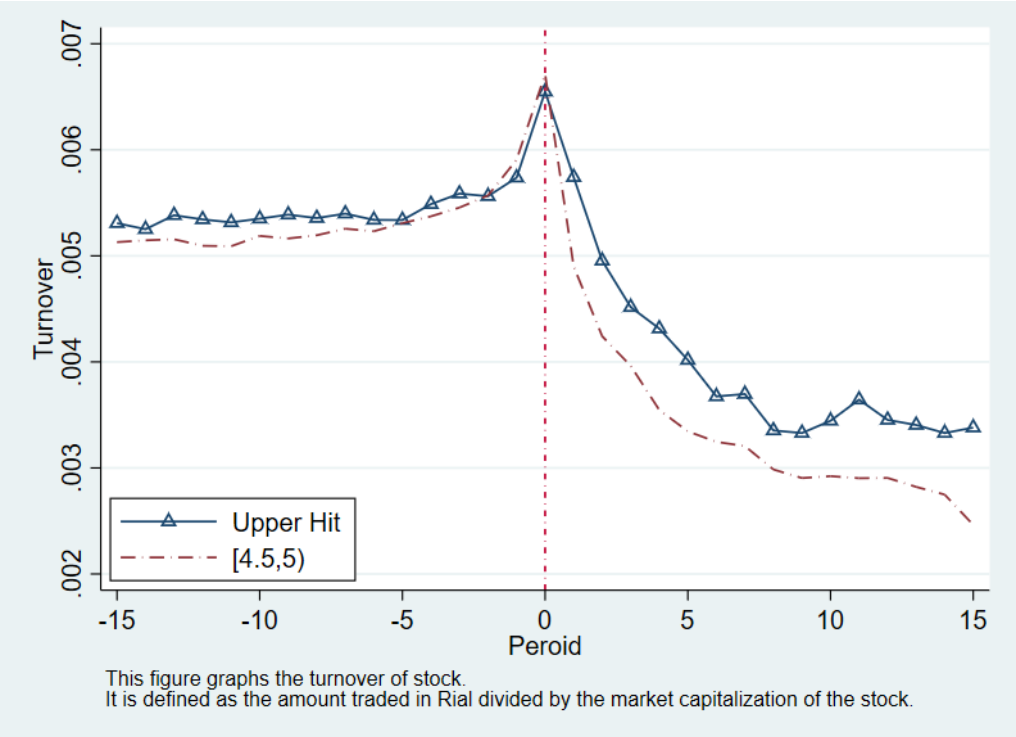


Figure 33

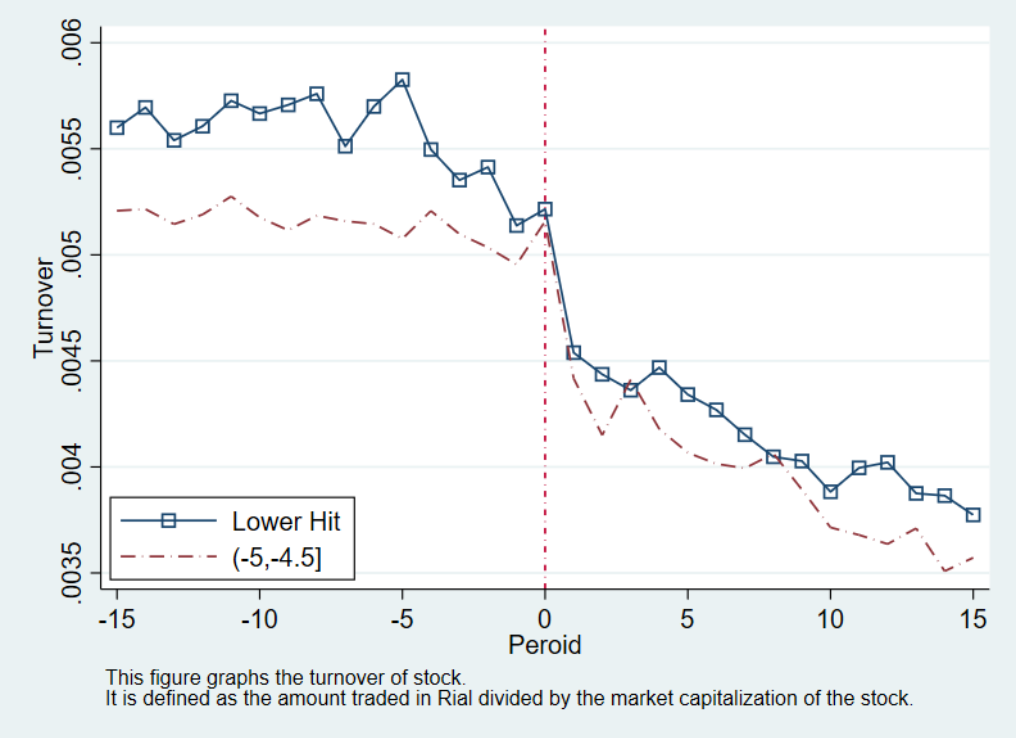


Figure 34

5.2 Relative Turnover

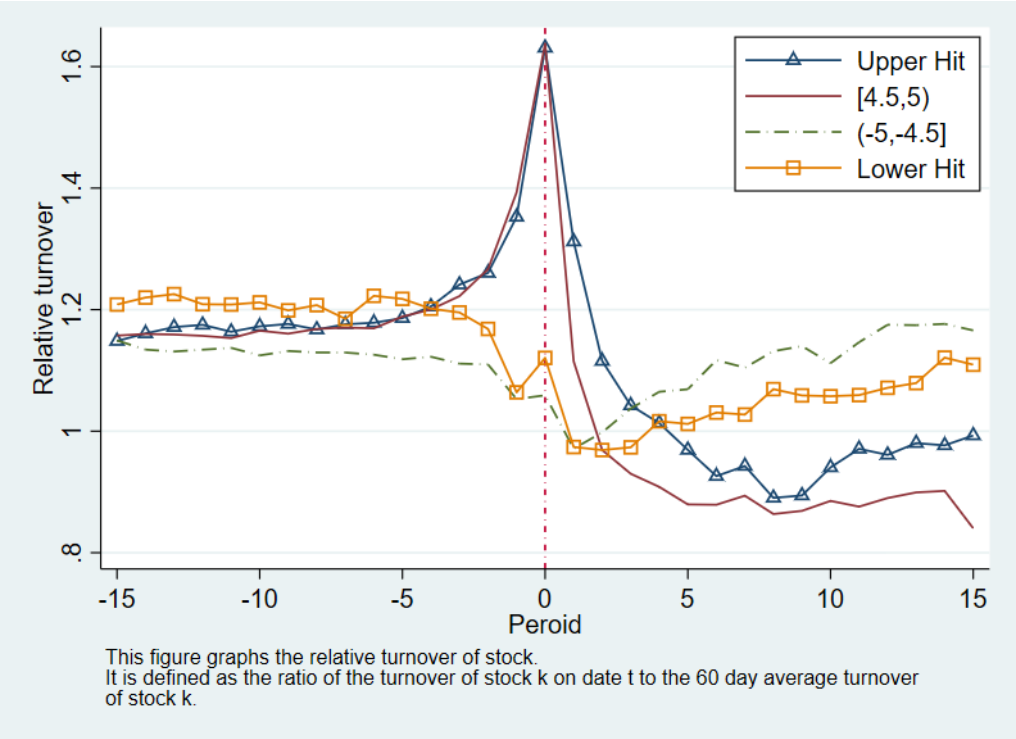


Figure 35

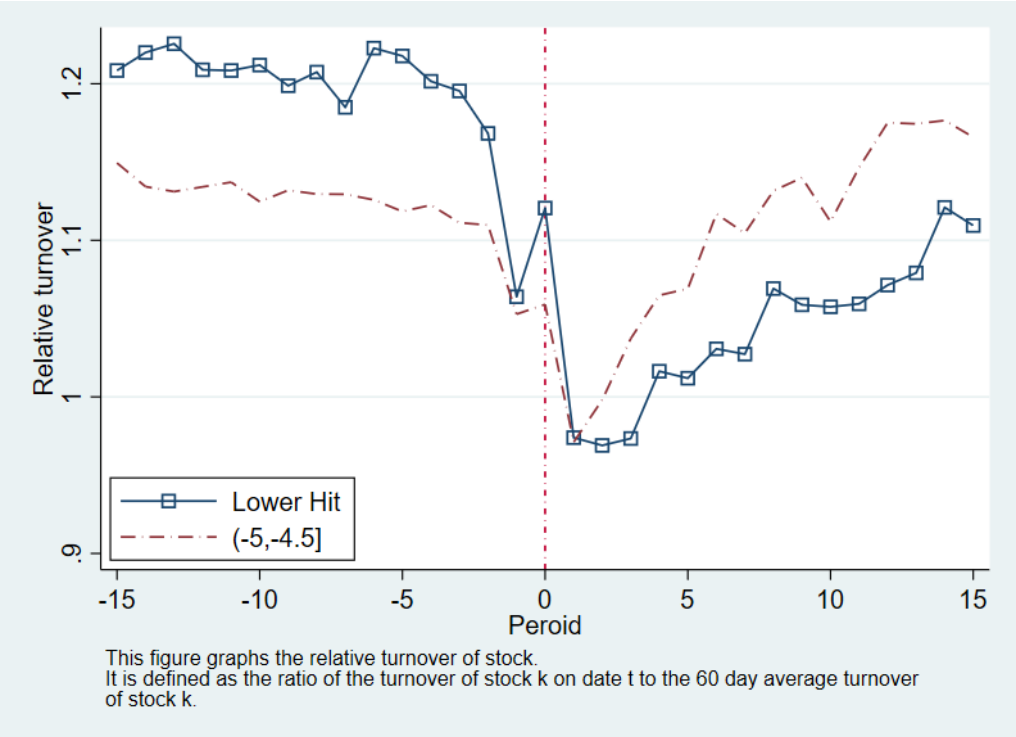


Figure 36

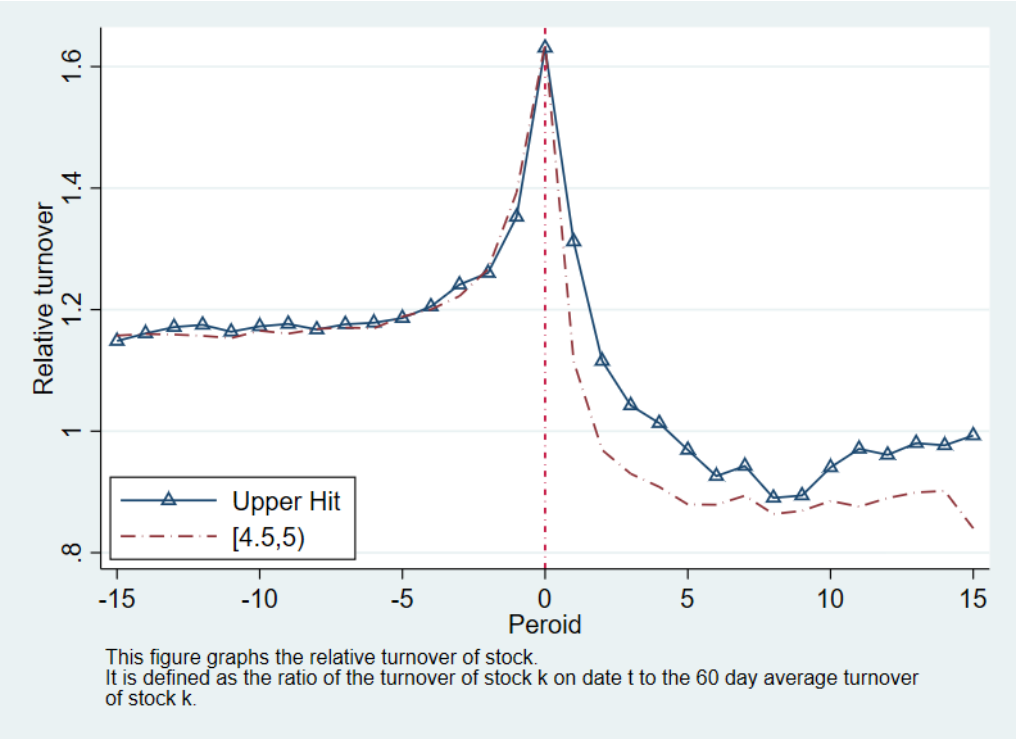


Figure 37

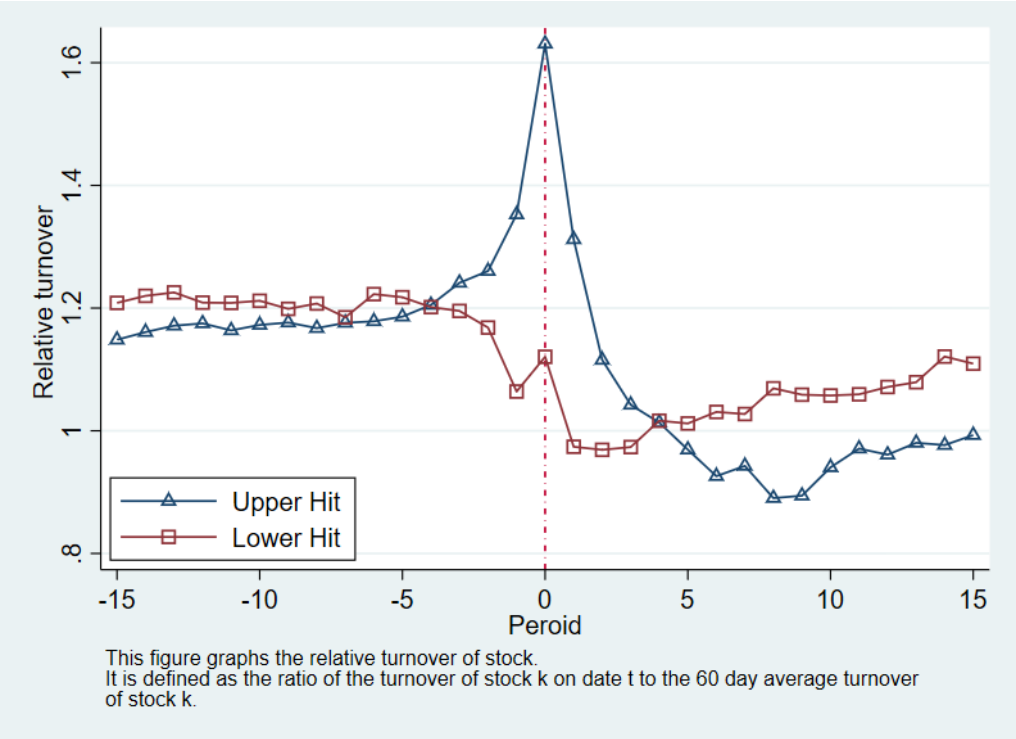
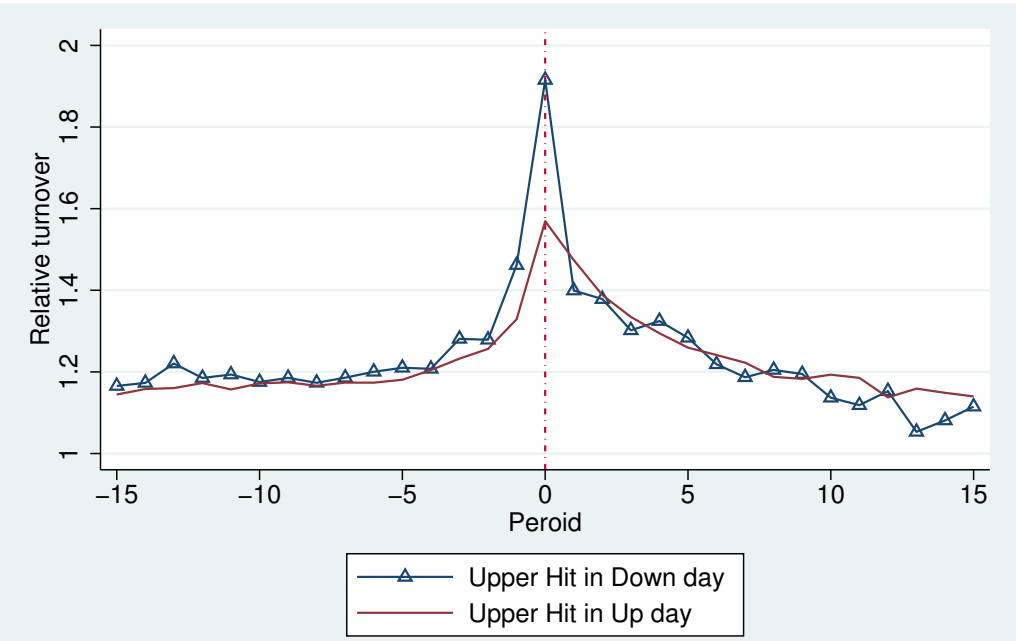
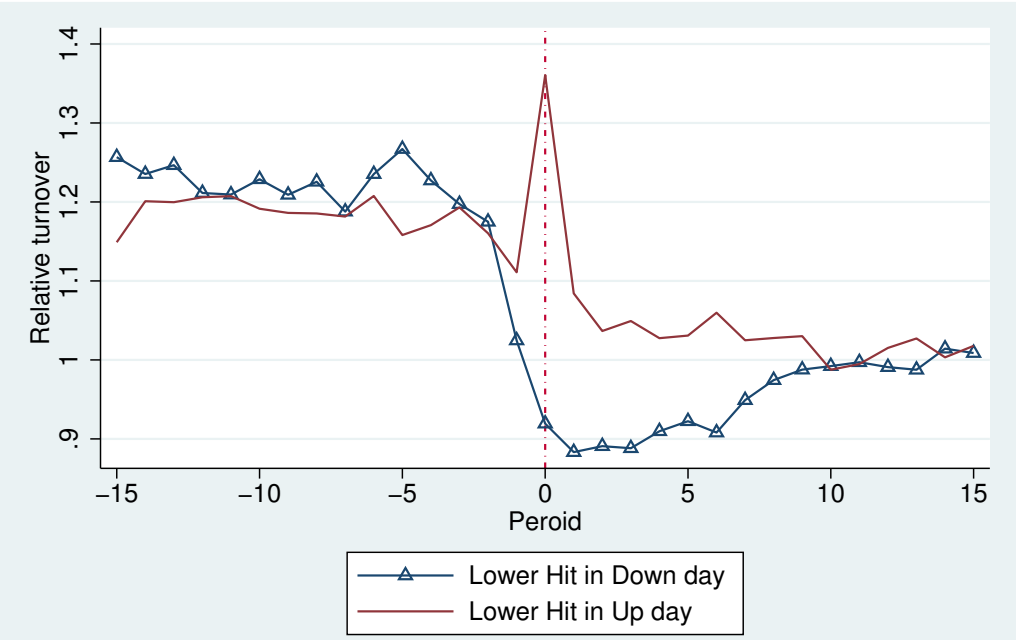


Figure 38



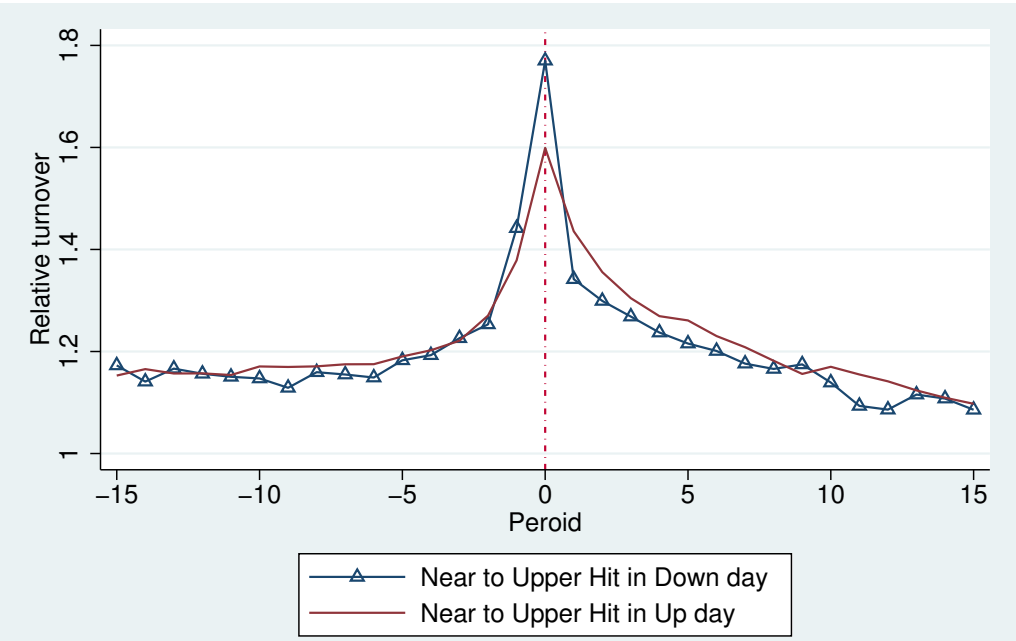
This figure graphs the relative turnover of stock.
It is defined as the ratio of the turnover of stock k on date t to the 60 day average turnover of stock k.

Figure 39



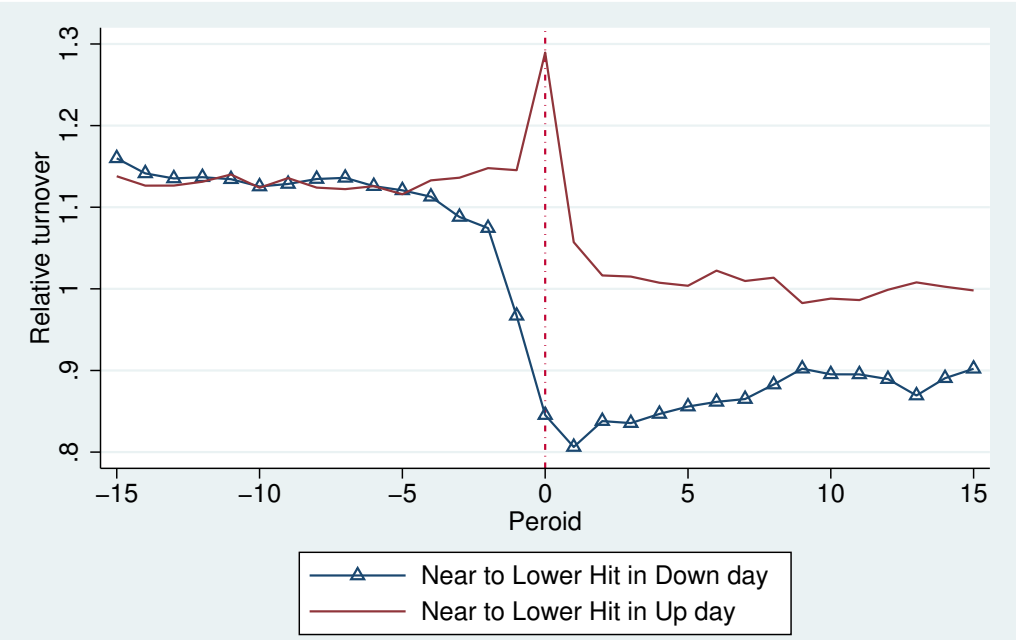
This figure graphs the relative turnover of stock.
It is defined as the ratio of the turnover of stock k on date t to the 60 day average turnover of stock k.

Figure 40



This figure graphs the relative turnover of stock.
It is defined as the ratio of the turnover of stock k on date t to the 60 day average turnover of stock k.

Figure 41



This figure graphs the relative turnover of stock.
It is defined as the ratio of the turnover of stock k on date t to the 60 day average turnover of stock k.

Figure 42

	(1)	(2)	(3)
	lnvolume	Turn	RelTurn
upperHit	2.179***	0.00636***	1.107***
	(44.82)	(20.34)	(49.38)
[4.5,5)	0.724***	0.00286***	0.599***
	(37.13)	(14.50)	(35.42)
[4,4.5)	0.402***	0.000999***	0.161***
	(24.09)	(8.14)	(12.51)
[2,4)	0.878***	0.00215***	0.288***
	(31.82)	(16.60)	(24.34)
(-2,2)	-0.0289	0.00210***	0.0713***
	(-1.05)	(11.53)	(4.03)
(-4,-2]	0.519***	0.00205***	0.144***
	(28.90)	(16.42)	(10.31)
(-4.5,-4]	0.305***	0.00111***	0.0821***
	(16.63)	(4.00)	(6.54)
(-5,-4.5]	0.376***	0.00124***	0.145***
	(13.39)	(4.88)	(11.01)
lowerHit	1.429***	0.00480***	0.514***
	(37.04)	(17.73)	(26.49)
Up Market	0.268***	0.000737***	0.122***
	(26.43)	(6.88)	(18.54)
Constant	12.32***	-0.00120***	0.394***
	(280.83)	(-4.05)	(19.25)
Observations	305297	305298	305298
R^2	0.225	0.028	0.068

t statistics in parentheses

This table reports fixed effect estimates of volume, turnover and relative turnover.

The independent variables are dummies that control for events . We calculate standard errors by using fixed effect on stock level

Appendix A Extra Return from Market

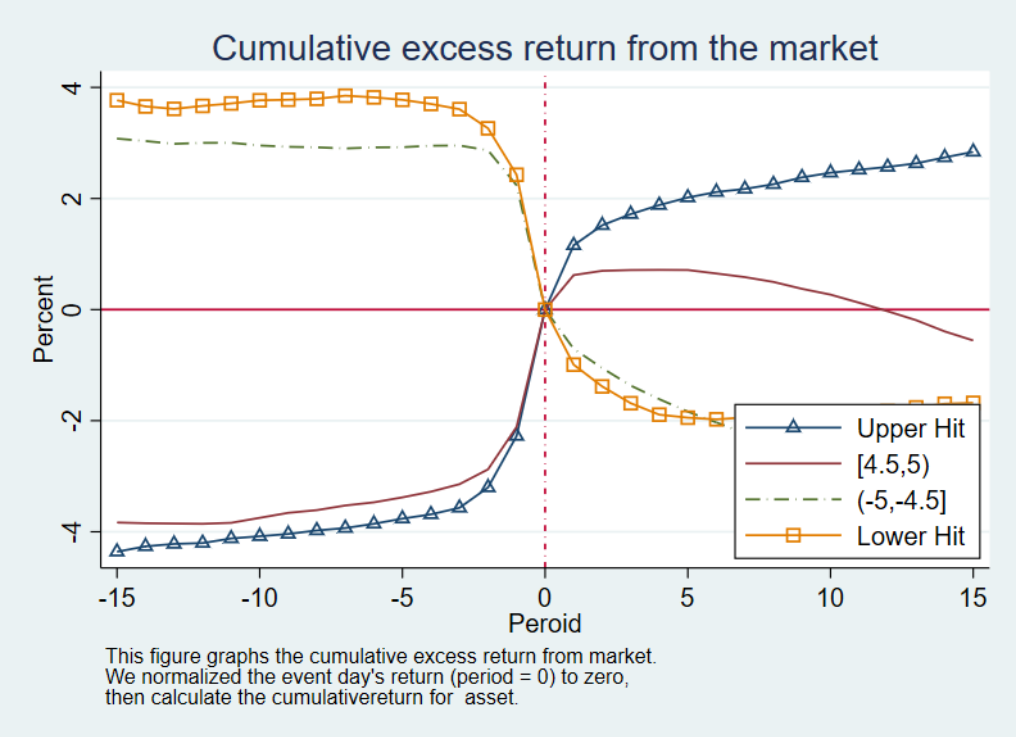


Figure 43

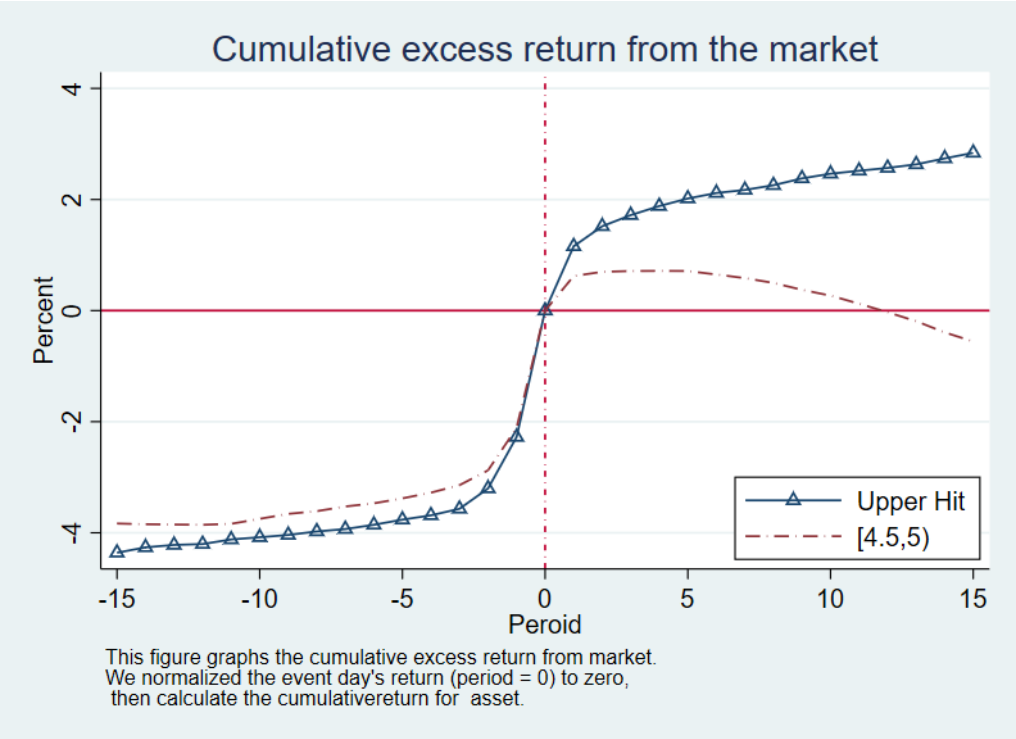


Figure 44

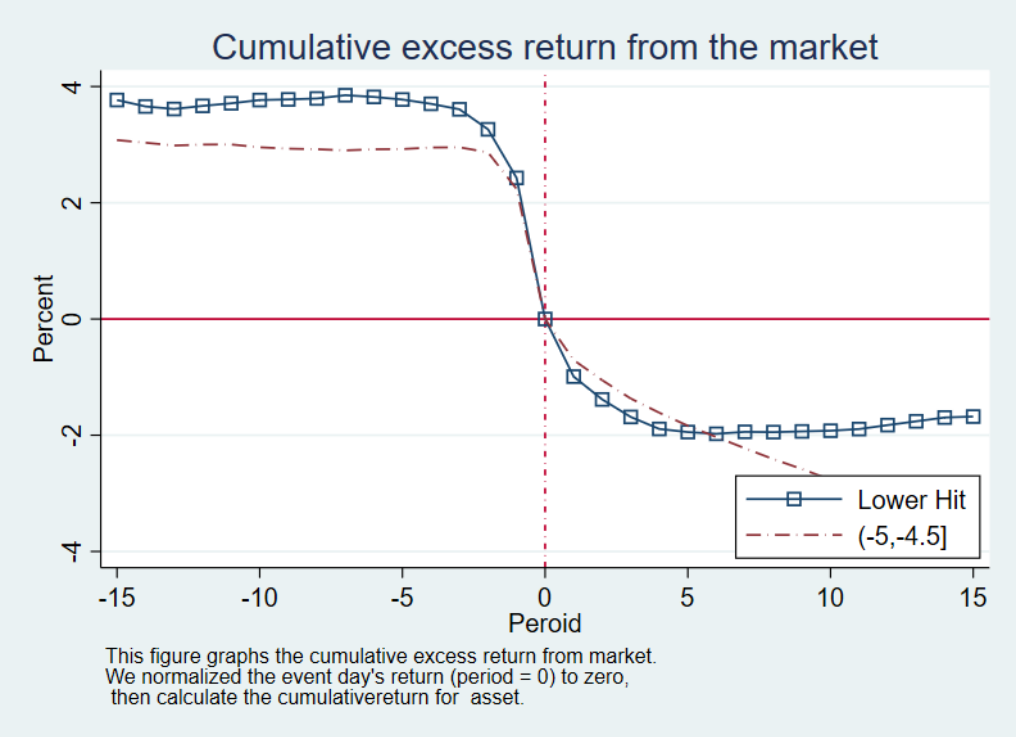


Figure 45

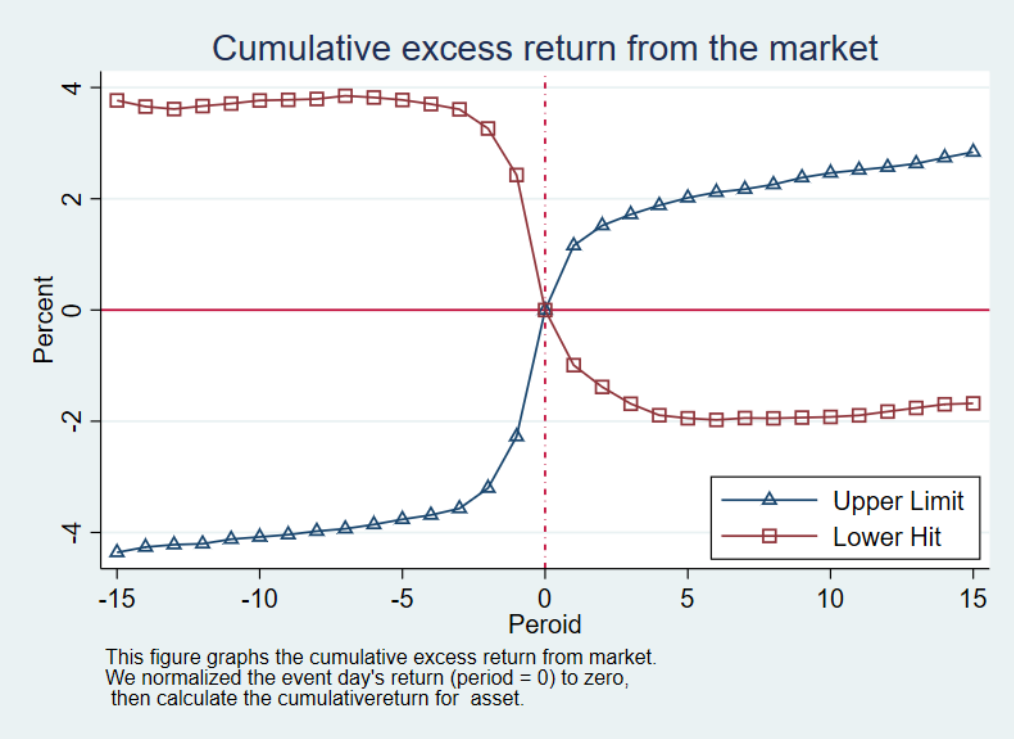

Cumulative excess return from the market
Percent
4
2
0
-2
-4
-15
-10
-5
0
5
10
15
Peroid
Upper Limit
Lower Hit
This figure graphs the cumulative excess return from market.
We normalized the event day's return (period = 0) to zero,
then calculate the cumulativereturn for asset.

Figure 46

	(1)	(2)	(3)	(4)	(5)	(6)
	ERet_1	ERet_2	E[2,5]	E[5,50]	E[50,100]	E[100,300]
upperHit	1.306***	1.680***	0.357***	-3.365**	-7.211***	-47.00***
	(42.20)	(25.72)	(3.64)	(-2.82)	(-3.52)	(-3.39)
[4.5,5)	0.991***	1.220***	0.0828	-5.042***	-7.035***	-8.743
	(29.90)	(21.42)	(1.05)	(-8.09)	(-6.33)	(-1.50)
[4,4.5)	-0.153***	-0.317***	-0.209**	-0.437	-0.295	9.666
	(-5.34)	(-6.41)	(-2.97)	(-0.94)	(-0.34)	(1.87)
[2,4)	-0.0536**	0.0377	0.277***	1.157**	0.275	-1.784
	(-2.62)	(0.99)	(4.93)	(3.20)	(0.42)	(-0.46)
(-2,2)	-0.193***	-0.186***	-0.0201	-1.766***	-3.092***	-12.93**
	(-7.74)	(-3.83)	(-0.28)	(-3.39)	(-3.72)	(-3.01)
(-4,-2]	-0.476***	-0.559***	-0.192***	-0.444	-1.701**	-5.690
	(-22.14)	(-14.27)	(-3.39)	(-1.19)	(-2.67)	(-1.55)
(-4.5,-4]	-0.113***	-0.149**	-0.200**	-0.645	-0.407	2.539
	(-3.48)	(-3.12)	(-3.08)	(-1.40)	(-0.56)	(0.64)
(-5,-4.5]	-0.403***	-0.704***	-0.535***	-3.536***	-3.721***	4.567
	(-12.44)	(-14.04)	(-7.86)	(-6.21)	(-4.09)	(0.96)
lowerHit	-1.308***	-1.843***	-0.961***	-5.154***	-5.280**	-14.60*
	(-40.29)	(-29.04)	(-10.65)	(-5.30)	(-2.74)	(-2.01)
Up Market	-0.549***	-0.734***	-0.285***	-2.642***	-3.661***	-19.54***
	(-40.29)	(-32.18)	(-9.23)	(-10.91)	(-9.33)	(-10.41)
Constant	0.503***	0.770***	0.764***	3.683**	7.500***	45.71***
	(17.56)	(13.28)	(8.27)	(2.90)	(3.63)	(3.61)
Observations	304849	304400	303053	282856	260512	174360
R^2	0.048	0.033	0.005	0.007	0.004	0.013

t statistics in parentheses

This table reports fixed effect estimates of extra return from market.

The independent variables are dummies that control for events . We calculate standard errors by using fixed effect on stock level

Appendix B Return

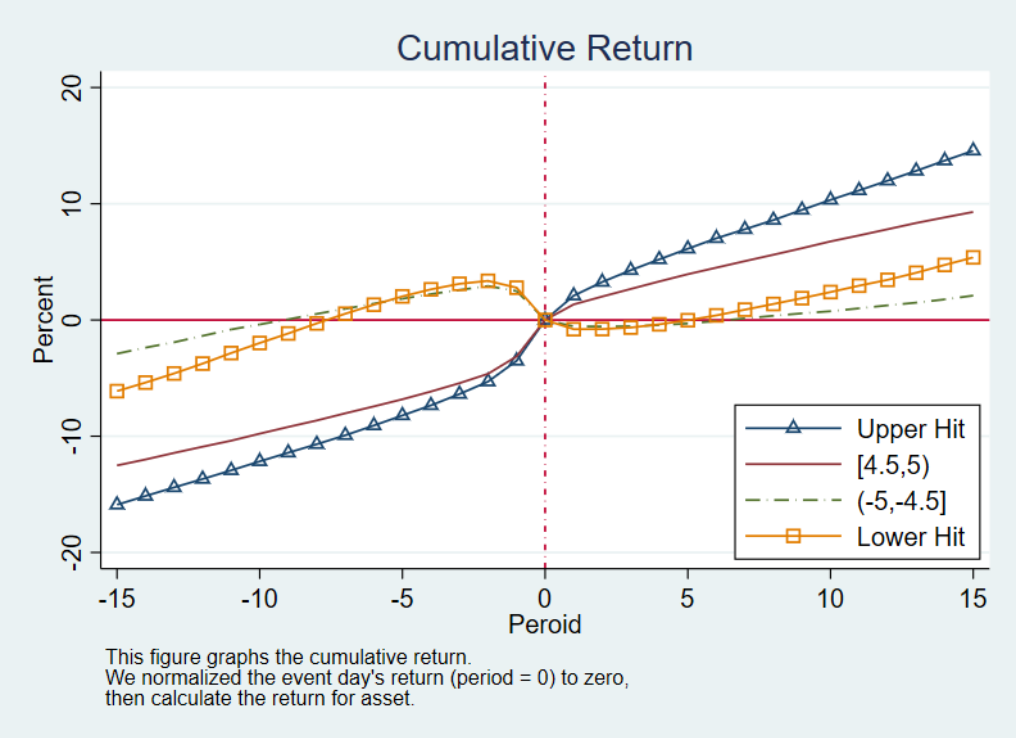


Figure 47

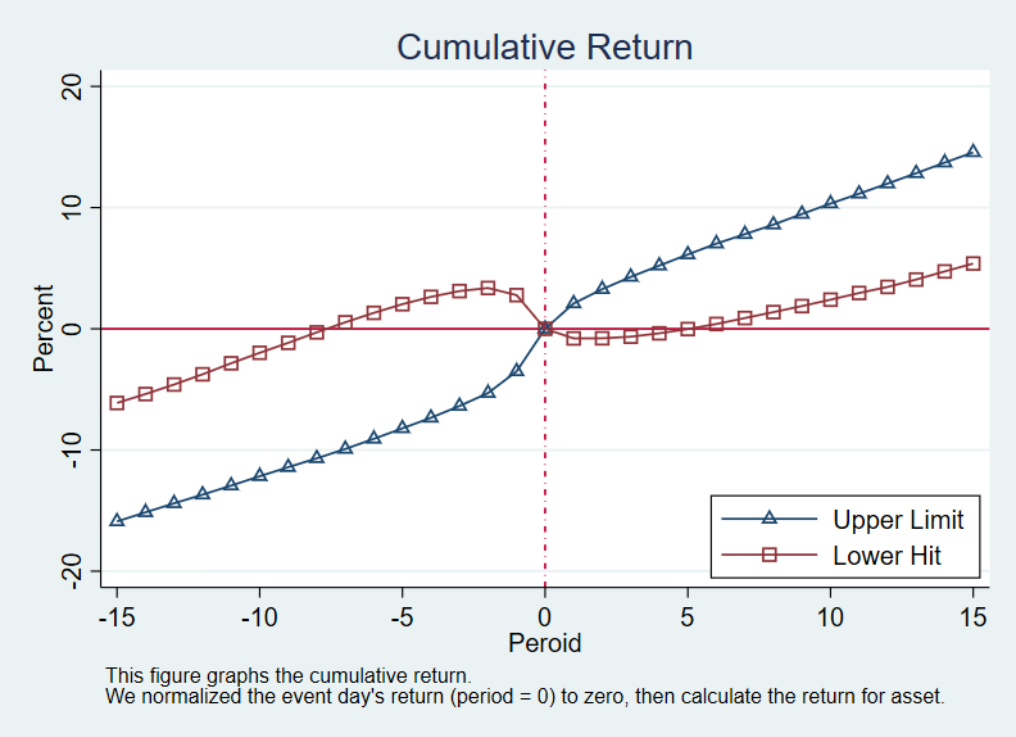


Figure 48

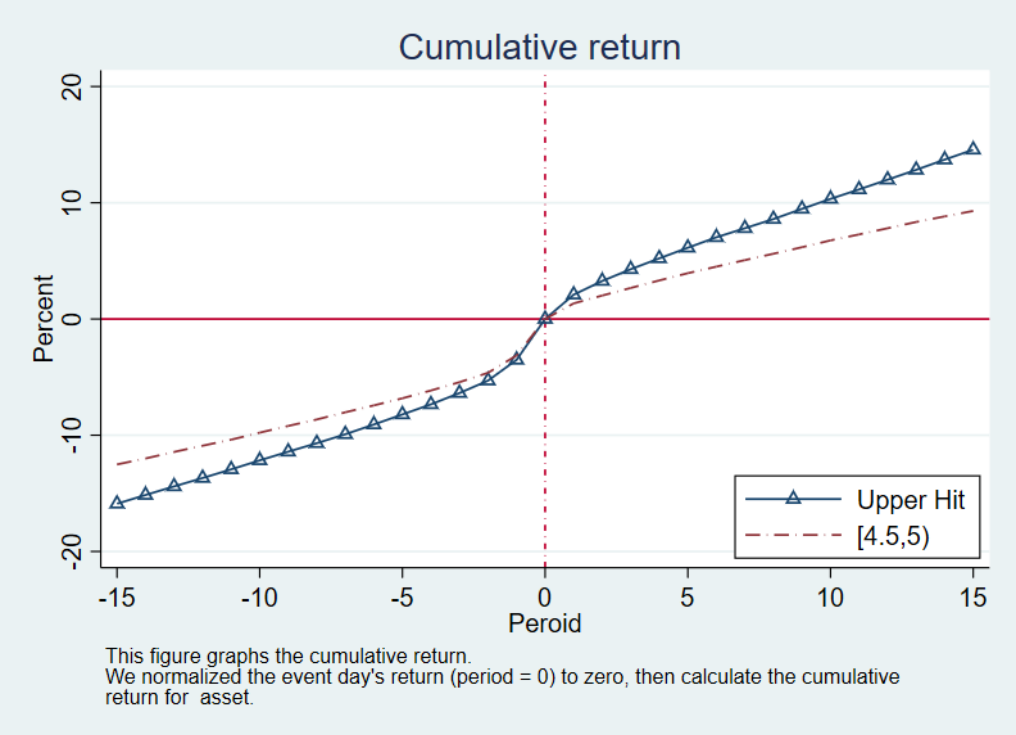


Figure 49

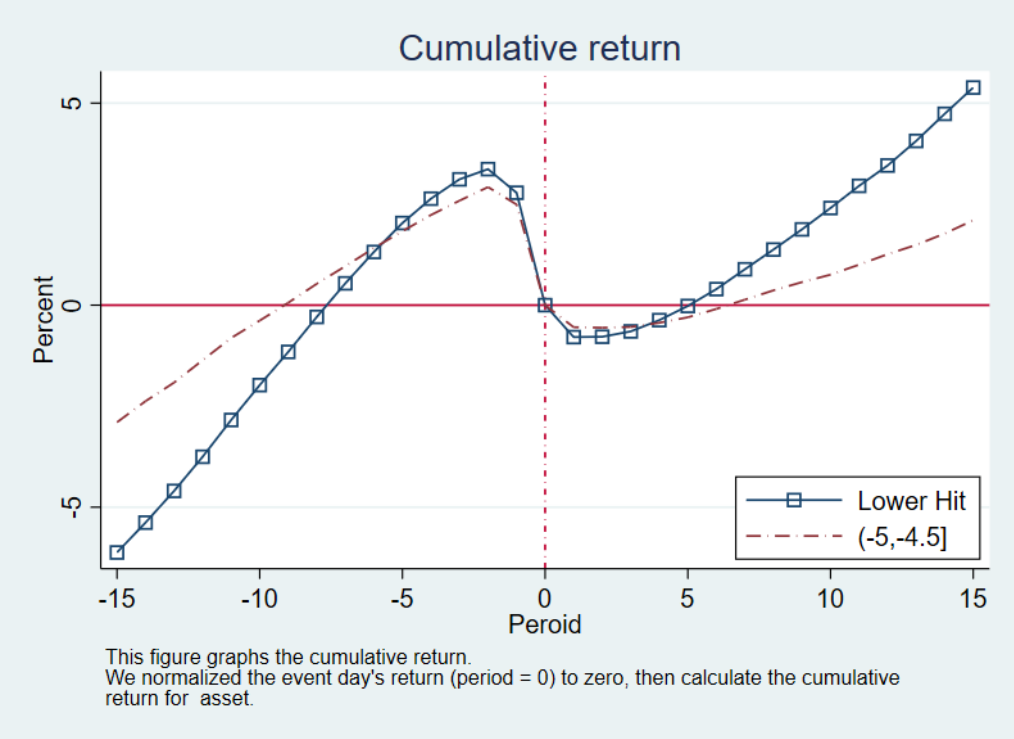

Cumulative return
Percent
5
0
-5
-15
-10
-5
0
5
10
15
Peroid
Lower Hit
(-5,-4.5]
This figure graphs the cumulative return.
We normalized the event day's return (period = 0) to zero, then calculate the cumulative return for asset.

Figure 50

	(1)	(2)	(3)	(4)	(5)	(6)
	Ret_1	Ret_2	[2,5]	[5,50]	[50,100]	[100,300]
upperHit	1.856***	2.732***	1.714***	20.44***	8.055***	117.4***
	(60.81)	(41.73)	(17.21)	(17.28)	(3.38)	(7.71)
[4.5,5)	1.269***	1.703***	0.696***	0.223	1.873	-10.31
	(38.33)	(30.29)	(8.50)	(0.32)	(1.54)	(-1.51)
[4,4.5)	-0.0932**	-0.196***	-0.0282	2.060***	3.051**	30.31***
	(-3.13)	(-3.97)	(-0.39)	(3.88)	(3.24)	(5.07)
[2,4)	-0.0102	0.141***	0.532***	5.174***	8.859***	43.64***
	(-0.51)	(3.78)	(9.43)	(13.34)	(12.44)	(9.37)
(-2,2)	-0.230***	-0.170***	-0.0426	-2.881***	1.380	-13.45**
	(-9.33)	(-3.44)	(-0.57)	(-5.10)	(1.43)	(-2.63)
(-4,-2]	-0.491***	-0.562***	-0.122*	2.454***	6.004***	21.34***
	(-22.94)	(-13.72)	(-2.07)	(6.27)	(8.93)	(4.90)
(-4.5,-4]	-0.0236	0.00775	-0.0253	2.317***	1.121	15.28**
	(-0.78)	(0.16)	(-0.37)	(4.50)	(1.42)	(3.08)
(-5,-4.5]	-0.564***	-0.908***	-0.669***	-0.485	2.315*	-7.919
	(-18.13)	(-17.76)	(-9.23)	(-0.76)	(2.37)	(-1.49)
lowerHit	-1.333***	-1.781***	-0.609***	8.191***	13.20***	28.82**
	(-42.83)	(-28.01)	(-6.26)	(7.56)	(6.16)	(3.17)
Up Market	0.0615***	-0.00688	0.129***	0.831***	3.174***	-9.868***
	(5.09)	(-0.33)	(4.57)	(3.56)	(8.07)	(-4.80)
Constant	0.394***	0.892***	1.445***	26.24***	41.06***	313.2***
	(14.82)	(15.47)	(15.28)	(16.55)	(15.74)	(20.68)
Observations	304849	304400	303053	282856	260512	174360
R^2	0.082	0.060	0.014	0.032	0.017	0.019

t statistics in parentheses

This table reports fixed effect estimates of normal returns.

The independent variables are dummies that control for events . We calculate standard errors by using fixed effect on stock level