Attention Spillover in Asset Pricing

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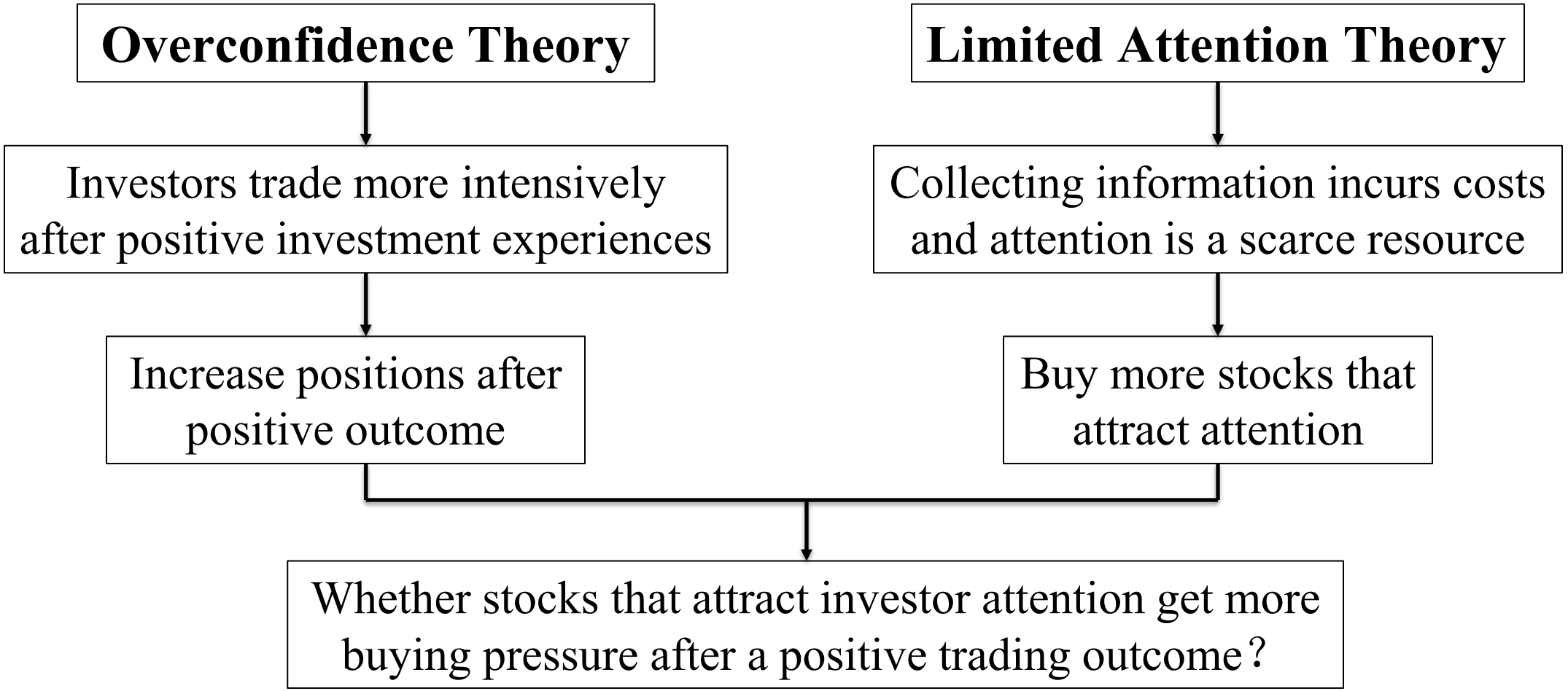
Present by Li Ziming

Motivation

- Overconfidence and limited attention are widely used to explain market.
  - Prior studies examine overconfidence and limited attention **separately**.
  - Abstract from potential **interactions** among them.
- These two behavioral biases difficult to identify when considered alone.
  - Variables boost overconfidence (past experienced return) or attract and reflect investor attention (news headlines, extreme return, trading volume) are associated with **fundamental information**.
  - Our setting provides clean identification because order of listing code is exogenous.

Research questions



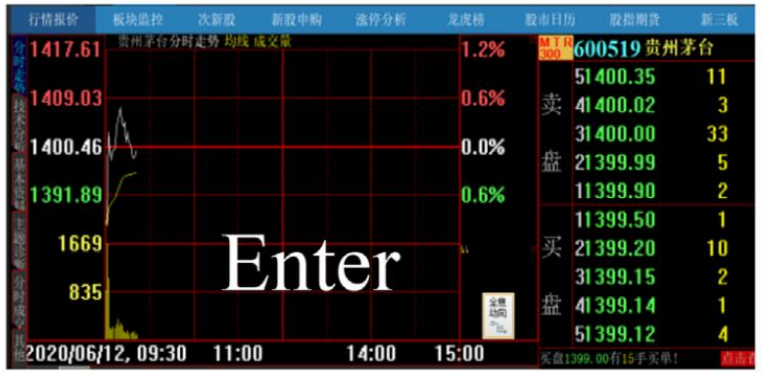
Contribution

- Contribute to literature on limited attention and overconfidence.
  - Prior literature: investigate pricing implication of two biases focus on one at a time.
  - Extend: focus on interaction, find only attention spillover and positive feedback trading **work together** can produce return predictability.
- Contribute to literature that study return predictability of limited attention.
  - Prior literature**:** PEAD (post earnings announcement draft) and lead-lag return mostly through **underreaction to information** (Cohen and Frazzini, 2008).
  - Extend: attention spillover effect implies **continued overreaction**, especially when coupled with positive feedback trading.

Display feature of trading platforms

Panel A. Input "GZMT"

Panel B. Press "Enter"



Panel C. Press "Page-Up"

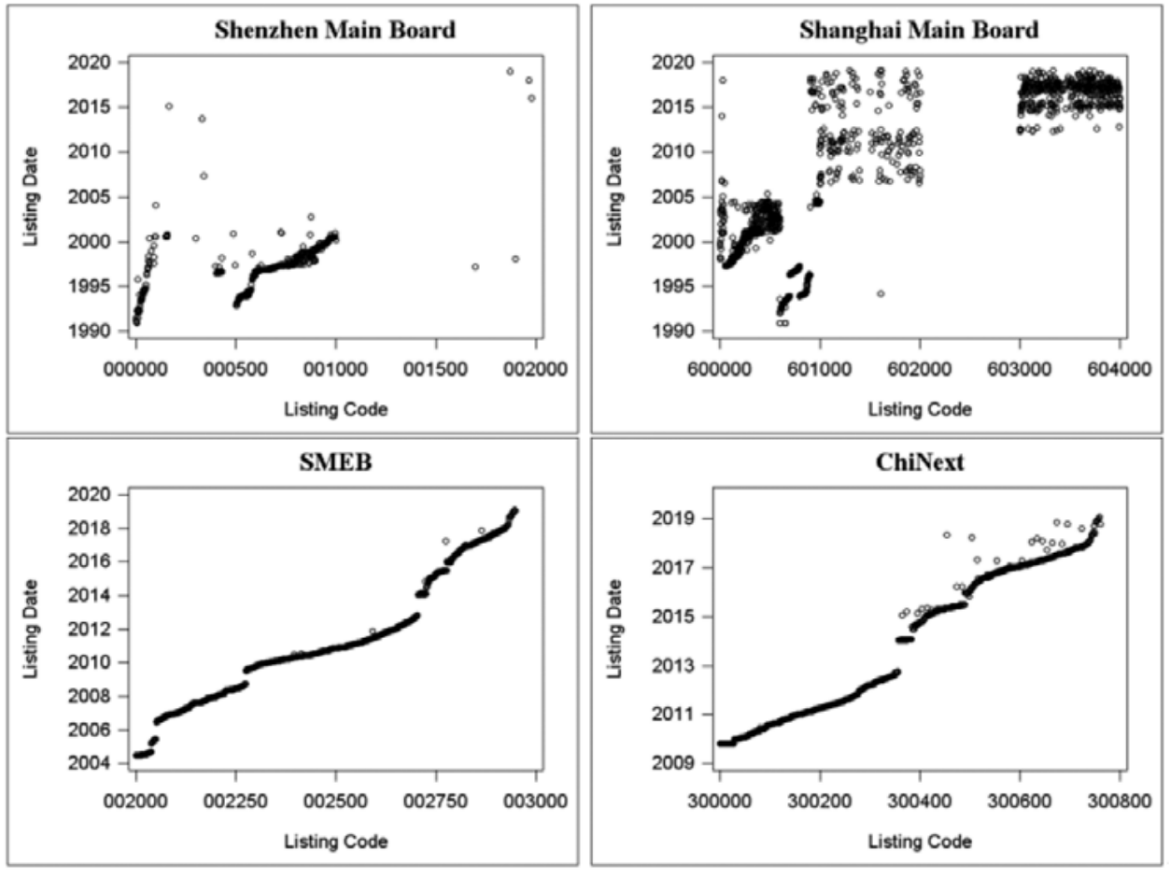
Panel D. Press "Page-Down"

Panel E. Press "Enter"

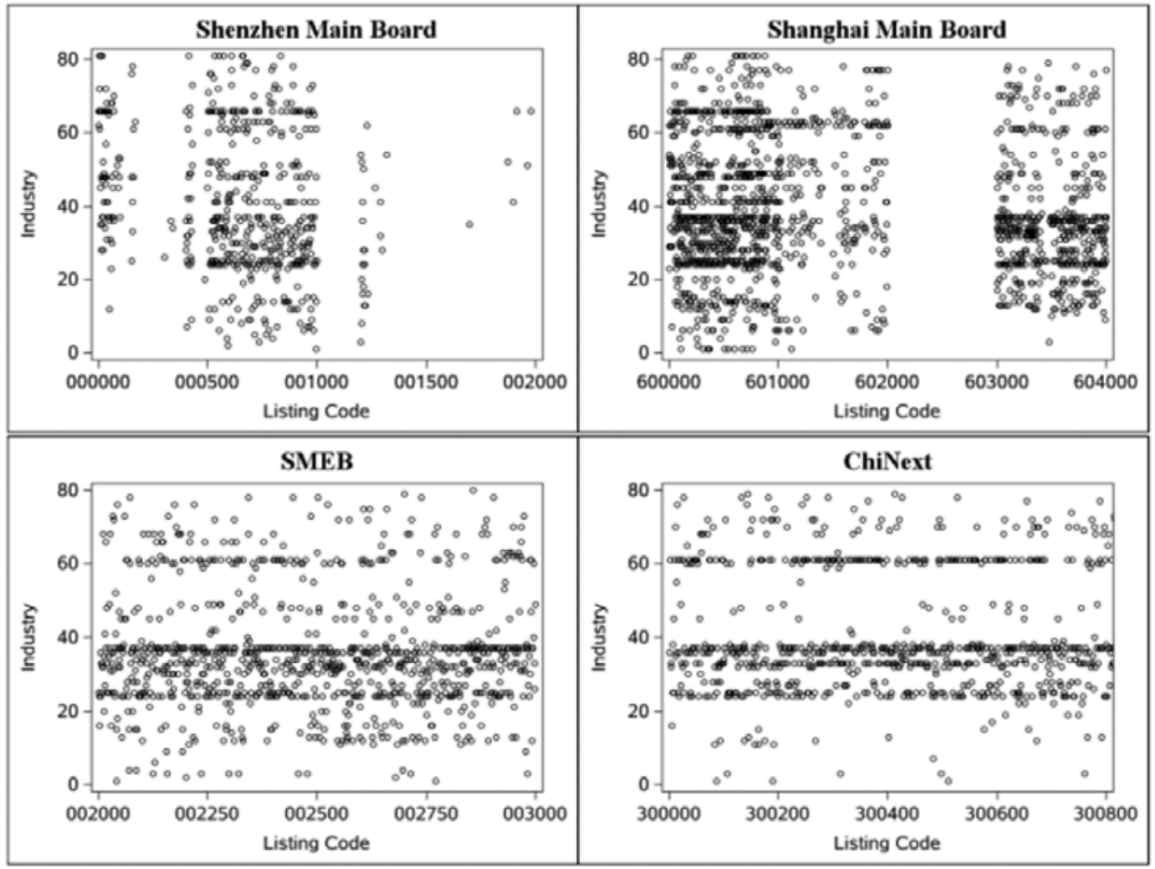
Panel F. Input "60051"

Quasi-random assignment of listing codes

Panel A. Listing code and listing date

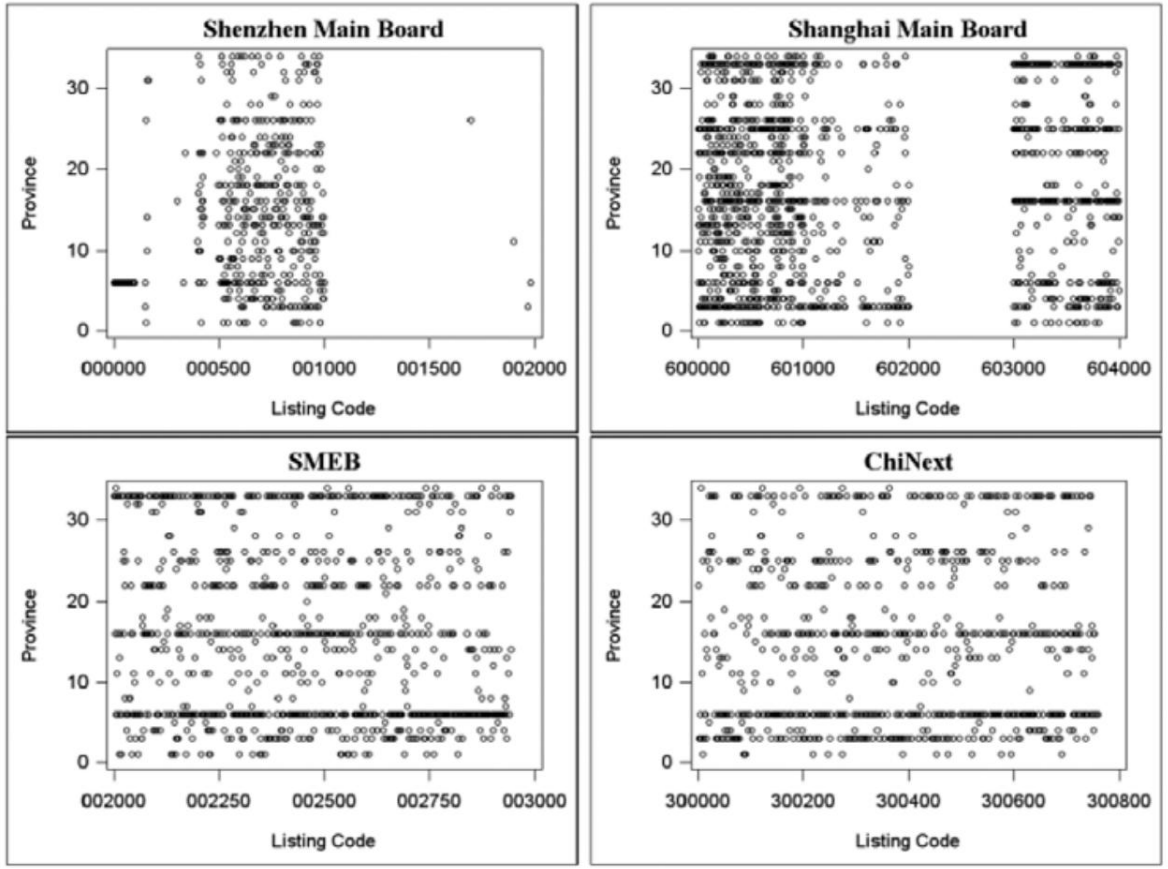


Panel B. Listing code and industry

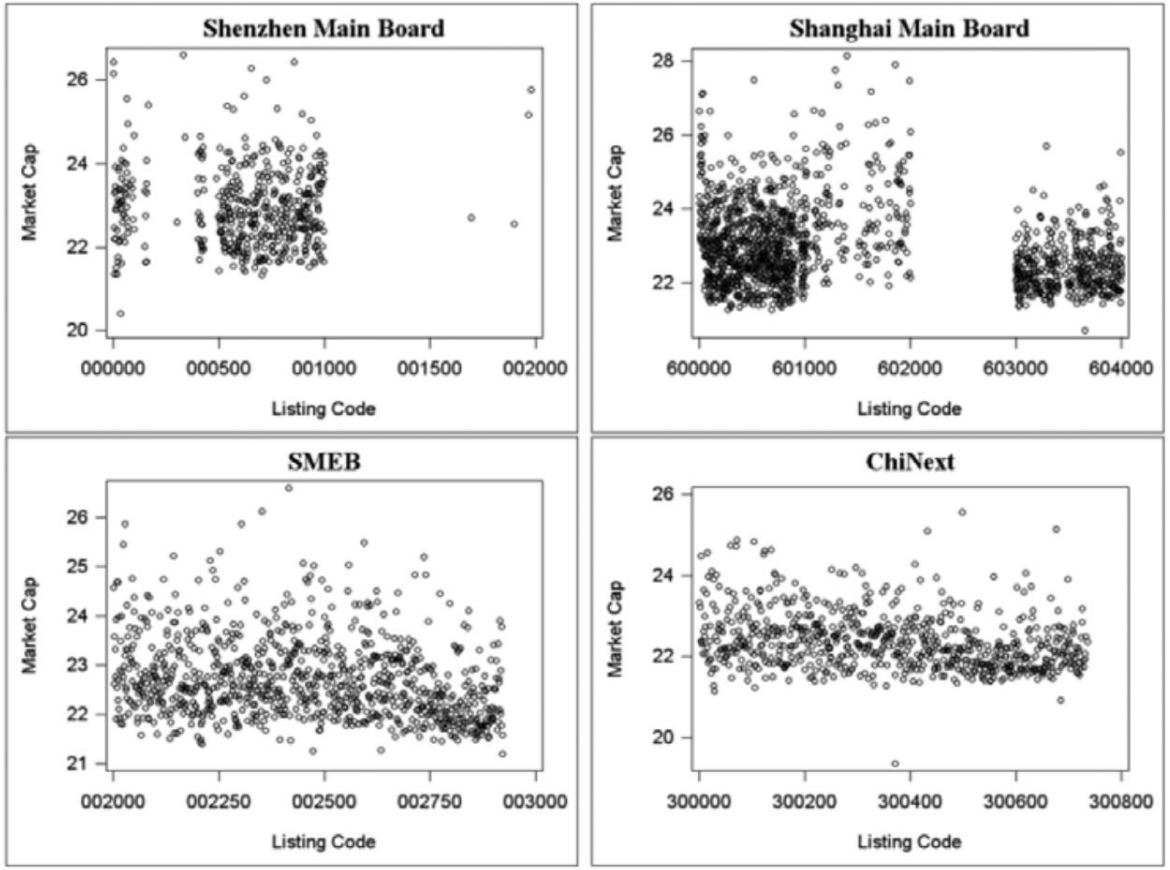


Quasi-random assignment of listing codes

Panel C. Listing code and the province of registration



Panel D. Listing code and market capitalization

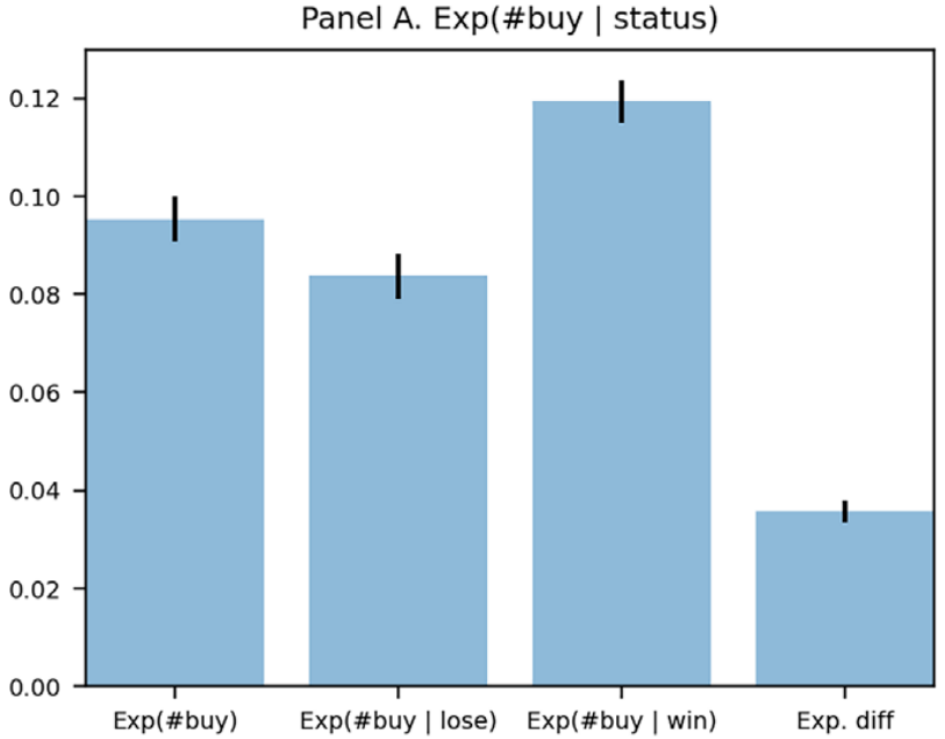


Data

- Brokerage account data
  - Daily trading and holding records from a retail brokerage firm in China.
  - 401,014 investors from Jan. 2009 to Sept. 2012.
- Stock market data
  - A-shares listed on SSE and SZSE from January 2002 to December 2019.
  - Exclude stocks lower than 2 RMB, traded less than 10 days over past four weeks, listed less than two years, and ST.

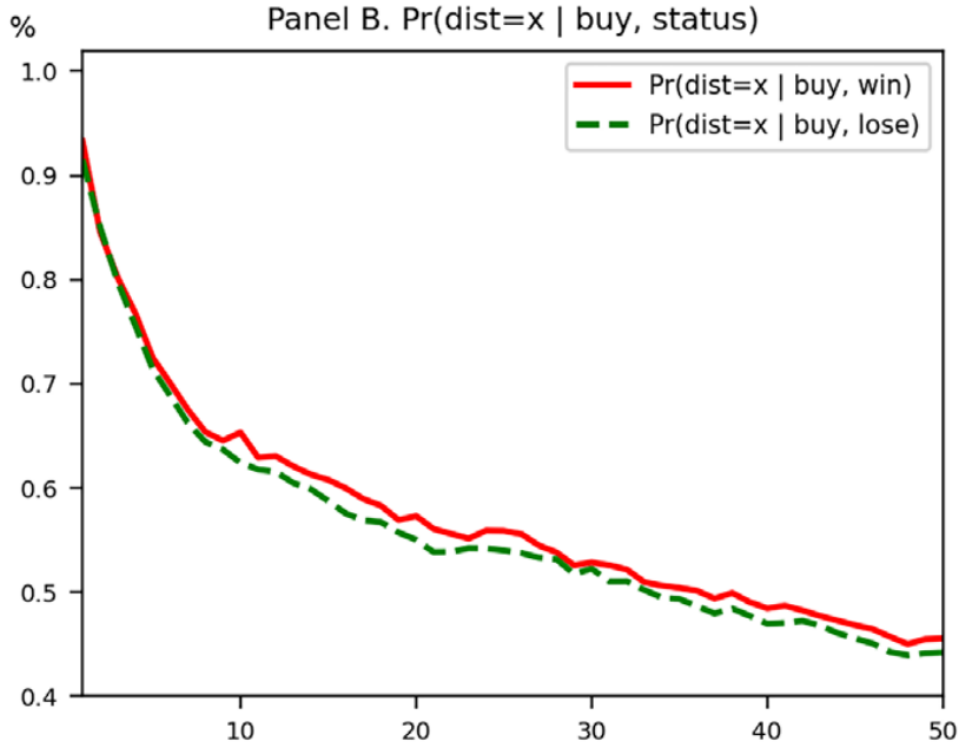
Positive feedback trading effect

- Expected number of purchases
  - $Exp(\#buy|win) = \#stocks\ purchased\ during\ days\ with\ a\ winning\ position$
  - $Exp(\#buy|lose) = \#\ stocks\ purchased\ during\ days\ with\ a\ losing\ position$
  - Counted at level of $investor \times day \times currently\ held\ stock$



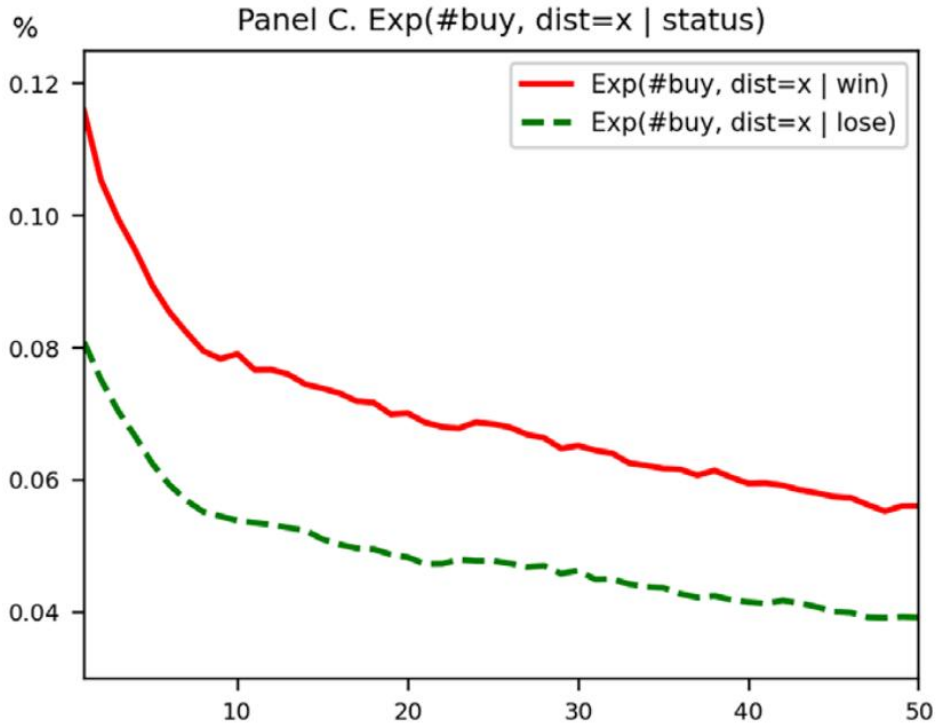
Attention spillover effect

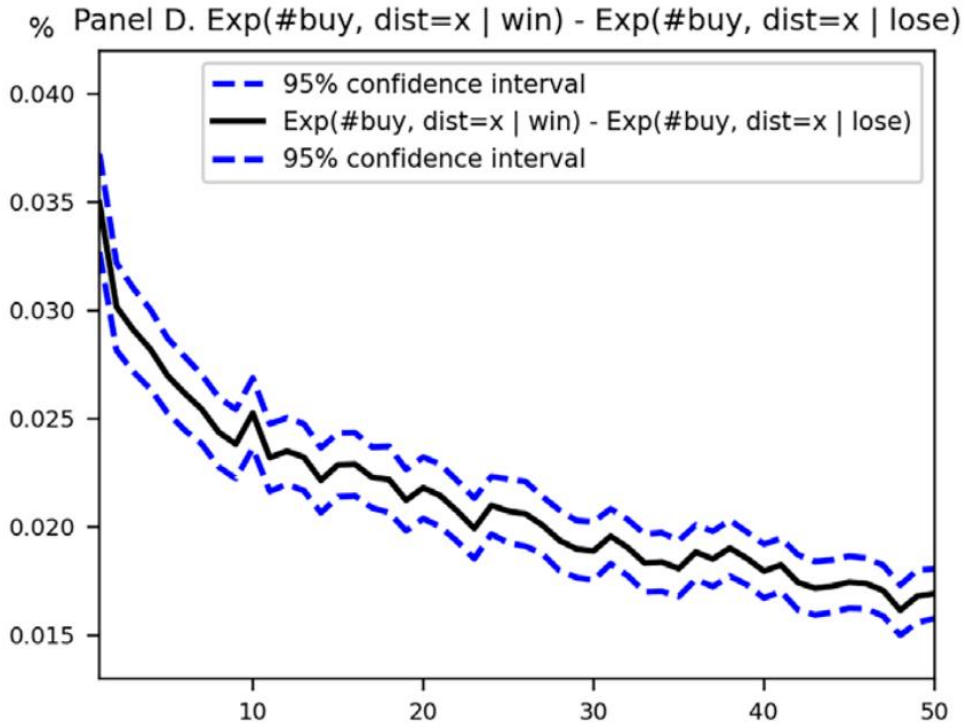
- Probability of buying new stock with distance of x
  - Distance x indicate difference in display rank between two stocks fall in $[5(x-1), 5x]$
  - $Prob(dist = x|buy, status) = \frac{\#\ a\ newly\ purchased\ stock\ with\ distance = x}{\#\ newly\ purchased\ stocks\ with\ any\ distance}$



Overall effect

- Expected number of stocks bought at a particular distance
  - Distance x indicate difference in display rank between two stocks fall in $[5(x-1), 5x]$
  - $Exp\ (\#buy, dist = x|win) = Exp(\#buy|win) \times Prob(dist = x|buy, win)$
  - $Exp\ (\#buy, dist = x|lose) = \exp(\#buy|lose) \times Prob\ (dist = x|buy, lose)$





Test trading patterns in panel regression

- $\mathbf{1}_{(x,x+5]} = \alpha_{(x,x+5]} + \beta_{(x,x+5]}\mathbf{1}_{win} + \epsilon$
  - $\mathbf{1}_{(x,x+5]}$ dummy variable: whether investor buys any stocks whose distance to the currently held stock between x and $x + 5$.
  - Randomly select 50,000 investors to form sample.

$Y =$	$1_{(0,5]}$	$1_{(5,10]}$	$1_{(10,15]}$	$1_{(15,20]}$	$1_{(20,25]}$	$1_{(25,30]}$	$1_{(30,35]}$	$1_{(35,40]}$	$1_{(40,45]}$	$1_{(45,50]}$
1_{win}	0.029	0.023	0.022	0.018	0.019	0.015	0.013	0.013	0.013	0.013
	[15.19]	[14.06]	[15.00]	[13.16]	[14.83]	[12.16]	[10.80]	[10.63]	[10.81]	[10.18]
Intercept	0.068	0.064	0.060	0.058	0.054	0.054	0.052	0.050	0.050	0.049
	[123.86]	[138.86]	[156.15]	[157.29]	[157.40]	[165.17]	[161.39]	[159.57]	[155.40]	[138.18]
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003
No. of Obs.	85m	85m	85m	85m	85m	85m	85m	85m	85m	85m

Experienced vs. observed extreme returns

- $\mathbf{1}_{(x,x+5]} = \alpha_{(x,x+5]} + \beta^{hold}_{(x,x+5]}\mathbf{1}_{hold} + \beta^{hit}_{(x,x+5]}\mathbf{1}_{hit} + \beta^{inter}_{(x,x+5]}\mathbf{1}_{hold} \times \mathbf{1}_{hit} + \epsilon$
  - Hitting daily price limit is a salient event can attract investor attention.
  - Include full list of stocks **hit upper daily price limit** and same number of stocks with **extremely high returns** that do not reach limit.

$Y =$	$1_{(0,5]}$	$1_{(5,10]}$	$1_{(10,15]}$	$1_{(15,20]}$	$1_{(20,25]}$	$1_{(25,30]}$	$1_{(30,35]}$	$1_{(35,40]}$	$1_{(40,45]}$	$1_{(45,50]}$
1_{hold}	0.032	0.018	0.013	0.013	0.004	0.003	0.007	0.006	0.003	0.014
	[5.67]	[3.55]	[2.72]	[2.73]	[0.78]	[0.73]	[1.55]	[1.44]	[0.79]	[1.91]
1_{hit}	0.003	0.002	0.001	0.003	0.001	0.002	0.003	0.002	0.002	0.001
	[1.68]	[1.26]	[0.67]	[1.86]	[0.99]	[1.58]	[1.83]	[1.21]	[1.46]	[0.77]
$1_{hold} \times 1_{hit}$	0.008	0.012	0.011	0.005	0.014	0.005	0.017	0.006	0.011	0.004
	[1.02]	[1.48]	[1.47]	[0.78]	[2.04]	[0.83]	[2.44]	[0.87]	[1.70]	[0.56]
Intercept	0.089	0.088	0.088	0.086	0.087	0.086	0.083	0.085	0.085	0.085
	[205.79]	[233.68]	[193.21]	[194.84]	[205.02]	[209.01]	[160.03]	[231.07]	[268.87]	[197.31]
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Stock FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
No. of Obs.	47m	47m	47m	47m	47m	47m	47m	47m	47m	47m

Return predictability

- $LOCAL$
  - Value-weighted average return over past two weeks of 10 stocks with listing code closest to focal stock (five above and five below).
  - Measure performance of neighboring stocks.
- $RLOCAL$
  - Residual of cross-sectional regression of $LOCAL$ on focal stock's own return.
  - Address **reflection problem** (focal stock's extreme return attracts attention to its neighboring stocks and captured in $LOCAL$).

- One-way sorts
  - Sort stocks into five portfolios based on $RLOCAL$ at the end of each week.
  - Track returns over the next week for five portfolios.
  - Risk-adjusted benchmarks: age-adjusted, industry-adjusted, 18 DGTW character-adjusted, alphas of Chinese four-factor, alphas of Fama-French five-factor

	P1	P2	P3	P4	P5	P5-P1	Age-adj Ret	Ind-adj Ret	DGTW Ret	CH4 Alpha	FF5 Alpha
EW	8.120	10.942	12.401	13.274	16.140	8.020	7.229	5.625	4.146	8.929	7.979
	[0.88]	[1.18]	[1.34]	[1.41]	[1.71]	[5.45]	[5.51]	[5.45]	[3.94]	[5.51]	[5.45]
VW	3.311	6.557	8.715	8.628	11.822	8.511	7.427	2.995	3.827	11.825	7.862
	[0.40]	[0.80]	[1.06]	[1.00]	[1.43]	[2.67]	[3.26]	[2.65]	[2.09]	[3.23]	[2.53]
CVW	5.471	8.293	9.265	10.050	12.367	6.896	6.304	4.278	3.173	7.697	6.933
	[0.61]	[0.92]	[1.03]	[1.10]	[1.36]	[4.59]	[4.64]	[4.39]	[2.84]	[4.54]	[4.61]

- Double sorts

	LogME		Beta		LogBM		$Ret_{-12m,-2m}$		$Ret_{-36m,-13m}$		ILLIQ
	EW	VW	EW	VW	EW	VW	EW	VW	EW	VW	EW
P5-P1	6.312	5.908	7.877	6.806	6.871	5.649	7.878	7.915	7.148	7.146	6.007
	[4.96]	[4.30]	[5.54]	[2.89]	[5.35]	[2.26]	[5.61]	[3.16]	[5.11]	[2.88]	[4.58]
Age-adj Ret	5.698	5.506	7.080	6.244	6.181	5.046	7.221	7.328	6.515	6.307	5.422
	[4.95]	[4.62]	[5.51]	[3.37]	[5.24]	[2.60]	[5.74]	[3.85]	[4.99]	[3.24]	[4.55]
Ind-adj Ret	4.516	3.861	5.557	2.852	5.169	2.735	5.598	3.962	5.310	3.289	4.193
	[4.59]	[3.97]	[5.38]	[2.61]	[5.36]	[2.33]	[5.67]	[3.89]	[5.29]	[2.94]	[4.36]
DGTW Ret	4.241	4.220	4.379	3.183	4.074	2.246	4.183	3.703	3.916	3.780	3.730
	[3.83]	[3.63]	[4.14]	[2.13]	[4.02]	[1.35]	[4.11]	[2.56]	[3.83]	[2.39]	[3.50]
CH4 Alpha	6.857	6.728	8.739	8.032	7.478	7.864	8.512	9.762	7.825	8.703	6.839
	[4.78]	[4.25]	[5.52]	[3.05]	[5.35]	[2.86]	[5.72]	[3.48]	[5.21]	[3.08]	[4.63]
FF5 Alpha	6.328	5.882	7.791	6.422	6.814	4.901	7.743	7.193	6.976	6.202	5.956
	[5.05]	[4.33]	[5.42]	[2.73]	[5.37]	[1.99]	[5.68]	[3.08]	[5.26]	[2.60]	[4.53]

	ILLIQ		Turnover		IVOL		Max		Skew		Board
	VW	EW	VW	EW	VW	EW	VW	EW	VW	EW	VW
P5-P1	5.660	7.481	7.516	8.031	8.477	7.459	8.270	7.681	8.733	4.810	3.727
	[3.79]	[5.67]	[3.42]	[5.53]	[3.30]	[5.30]	[3.18]	[5.50]	[3.56]	[5.08]	[2.24]
Age-adj Ret	4.954	6.767	6.775	7.165	7.331	6.683	7.319	7.021	7.756	5.363	4.357
	[3.89]	[5.53]	[3.76]	[5.51]	[3.73]	[5.28]	[3.70]	[5.52]	[4.13]	[5.10]	[2.99]
Ind-adj Ret	3.438	5.400	3.570	5.739	3.594	5.110	3.076	5.525	3.628	3.704	1.288
	[3.70]	[5.58]	[3.17]	[5.51]	[3.01]	[5.10]	[2.53]	[5.49]	[3.43]	[4.41]	[1.08]
DGTW Ret	3.003	4.307	3.639	4.195	3.583	3.874	3.741	4.018	3.633	3.615	2.180
	[2.62]	[4.16]	[2.44]	[3.84]	[2.29]	[3.68]	[2.23]	[3.93]	[2.51]	[2.45]	[1.15]
CH4 Alpha	6.216	7.953	8.084	8.958	10.286	8.384	10.337	8.629	10.205	3.004	1.420
	[3.65]	[5.82]	[3.27]	[5.72]	[3.56]	[5.49]	[3.54]	[5.70]	[3.81]	[3.03]	[0.78]
FF5 Alpha	5.508	7.411	6.695	7.891	8.197	7.344	7.931	7.664	7.912	4.879	3.025
	[3.63]	[5.79]	[3.30]	[5.57]	[3.26]	[5.34]	[3.05]	[5.53]	[3.40]	[5.04]	[1.78]

- Fama-MacBeth regressions

	[1]	[2]	[3]	[4]	[5]	[6]
LOCAL	0.823	0.667	0.801	0.422	0.611	0.380
	[3.90]	[3.55]	[3.71]	[2.30]	[3.43]	[2.23]
Ret_{-2w}		−2.889		−2.587		−2.939
		[-10.04]		[-8.50]		[-10.05]
LogME		−0.055		−0.052		−0.058
		[−1.55]		[−1.37]		[−1.61]
Beta		0.052		0.061		0.059
		[1.22]		[1.13]		[1.39]
LogBM		0.036		0.019		0.033
		[1.51]		[0.66]		[1.40]
$Ret_{-12m,-2m}$		0.149		0.167		0.145
		[1.95]		[2.05]		[1.89]
$Ret_{-36m,-13m}$		−0.023		−0.027		−0.025
		[−0.72]		[−0.84]		[−0.86]
ILLIQ		4.194		4.015		3.991
		[5.59]		[5.21]		[5.36]
Turnover		-8.183		-7.924		-8.613
		[−5.90]		[−5.65]		[-6.34]
IVOL		-26.228		-25.993		-25.513
		[-13.35]		[-12.80]		[-12.87]
Max		5.259		5.893		5.118
		[7.18]		[6.10]		[7.03]
Skew		−0.002		0.005		−0.000
		[−0.04]		[0.12]		[−0.01]
Ind FE	Yes	Yes	No	No	Yes	Yes
Age FE	No	No	Yes	Yes	Yes	Yes
Avg. weekly obs.	1,616	1,566	1,616	1,566	1,616	1,566
Adj-R^2	0.071	0.141	0.012	0.100	0.076	0.145
#. of weeks	864	864	864	864	864	864

Tests on key mechanisms

- Return predictability of $LOCAL$ originates from interaction of two channels
  - **Positive feedback channel**: increase positions after positive outcome.
  - **Attention spillover channel**: pay more attention to stocks adjacent to winning stocks.
- **Placebo tests** that turn off each of channels one at a time
  - Shut down attention spillover channel: replace past return of immediate adjacent stocks with distant stocks (skip 100 closest and use next 10 stocks).
  - Shut down positive feedback channel: replace return of neighboring stocks with turnover and return volatility.

- FM regressions on placebo tests
  - Neither attention spillover nor positive feedback trading alone is sufficient to produce return predictability.

	Panel A: Placebo–Gap100				Panel B: Placebo–Turnover				Panel C: Placebo–TVOL			
Placebo	0.068	0.057	0.051	0.051	0.108	0.031	0.036	0.005	3.572	2.456	2.599	1.865
	[0.39]	[0.33]	[0.31]	[0.31]	[1.05]	[0.31]	[0.39]	[0.06]	[2.19]	[1.57]	[1.96]	[1.47]
LOCAL		0.585		0.353		0.584		0.376		0.570		0.397
		[3.36]		[2.10]		[3.32]		[2.18]		[3.24]		[2.28]
Controls	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Ind FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg. weekly obs.	1,616	1,616	1,566	1,566	1,616	1,616	1,566	1,566	1,593	1,593	1,545	1,545
Adj.R^2	0.076	0.077	0.145	0.145	0.077	0.077	0.145	0.145	0.077	0.077	0.145	0.146
# of weeks	864	864	864	864	864	864	864	864	864	864	864	864

New ideas

- Heterogeneity between institutions and retail investors?
- Heterogeneity between main board, Sci-Tech innovation board and ChiNext (Investor access restrictions)?