

Investor Behavior

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Some things financial economists consider when thinking about markets

- Principal-agent relationships
 - Current mortgage crisis
 - Contract design
- Asymmetric information
 - Akerlof's lemons
- Regulation
 - Shleifer et. al. on shareholder rights
- People's behavior depends upon anticipated behavior of others
 - Grossman-Stiglitz
- Non-normal distributions, including extreme

Behavioral Finance

- Considers that human decision making often deviates from traditional economic models of rational decision making and that these deviations can have material importance for markets, corporations, and welfare.
 - Errors of probability
 - Overconfidence
 - Availability heuristic, representativeness heuristic (K & T)
 - Non-expected utility preferences
 - Prospect theory (Kahneman and Tversky, 1979)
 - Bounded rationality
 - lack of rational expectations, incorrect beliefs about underlying probability distributions

Some mistakes economists make

- Fail to recognize the distinction between a normative and a descriptive model.
 - rational decision making
 - corporate finance
- Apply theories in policy and in business without fully considering whether the theory's critical underlying assumptions fit the real world application.
 - miscalibrated market models
 - California energy deregulation

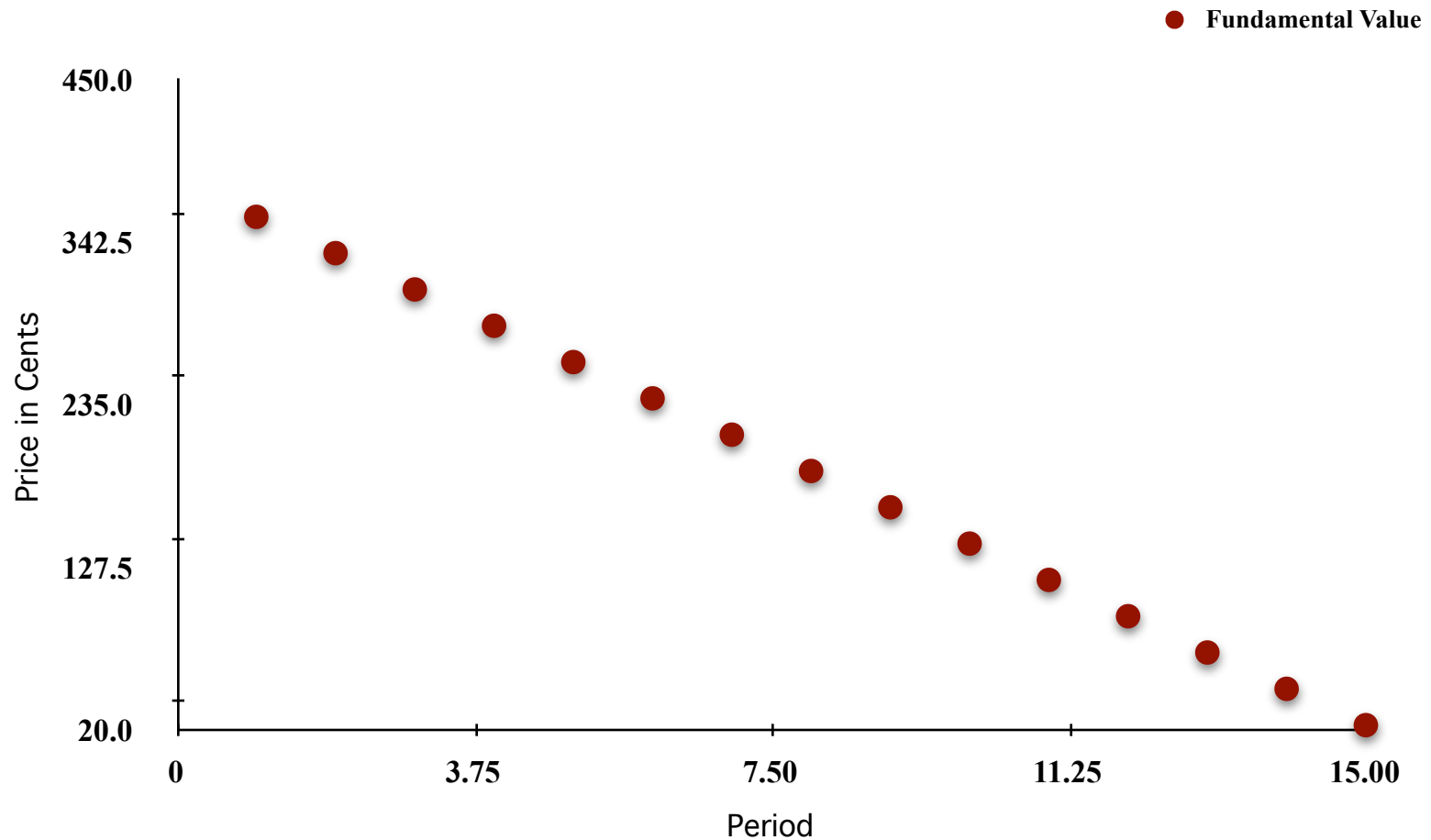
Equilibrium

- Exogenous shocks
- Supply and demand
 - Vernon Smith's early experiments
- Endogenous changes to demand
 - Vernon Smith, David Porter, and co-authors' work on bubbles
 - Representativeness heuristics
 - Rational response to anticipated actions of others

Overview of the Experimental Environment

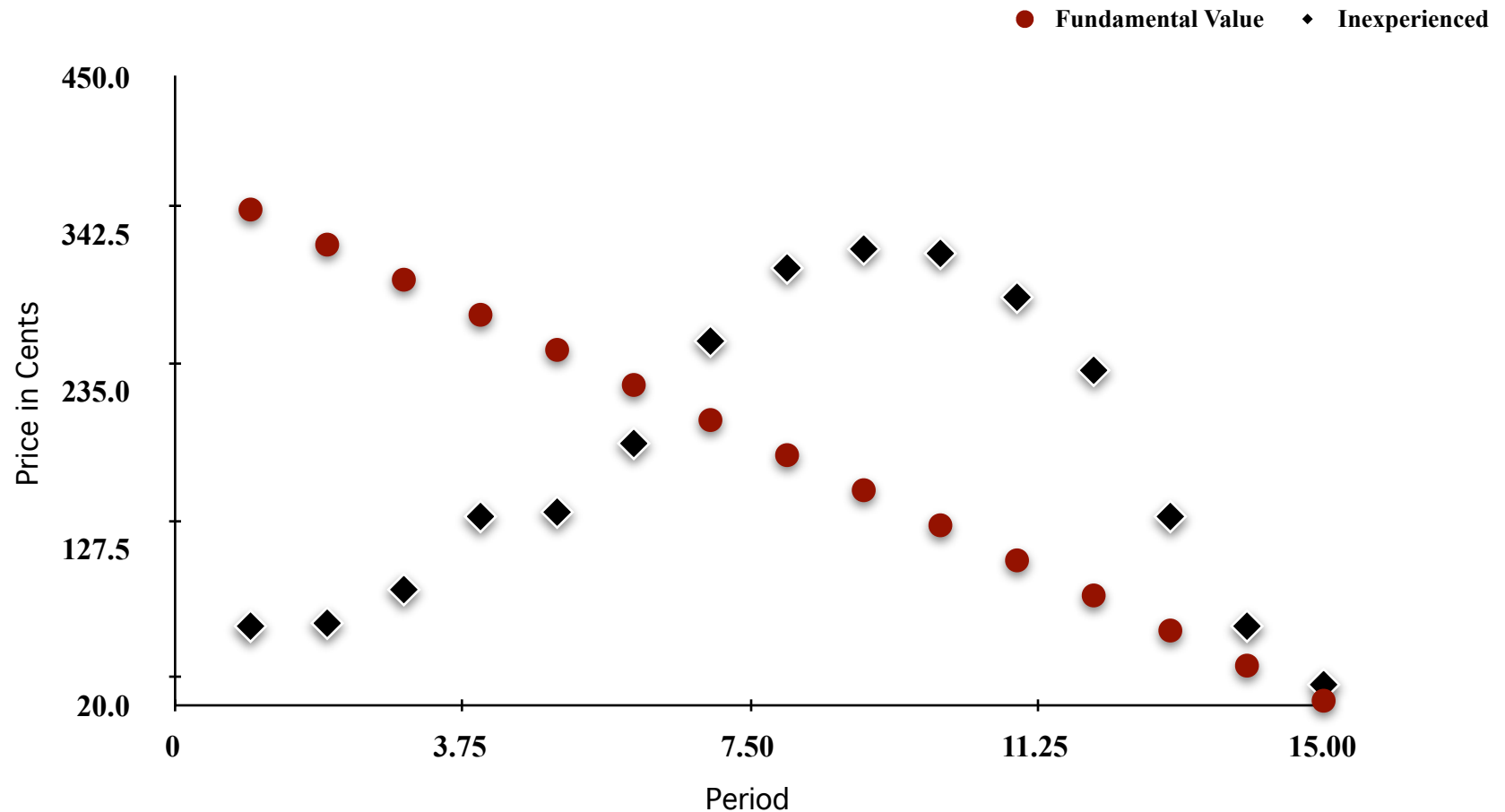
- The basic experimental setup has the following features
 - 15 period asset
 - Dividend uncertainty
 - $\{0,8,28,60\}$
 - Initial cash and shares
 - Double auction or call market trading mechanism
 - Trader experience

Fundamental Value Line



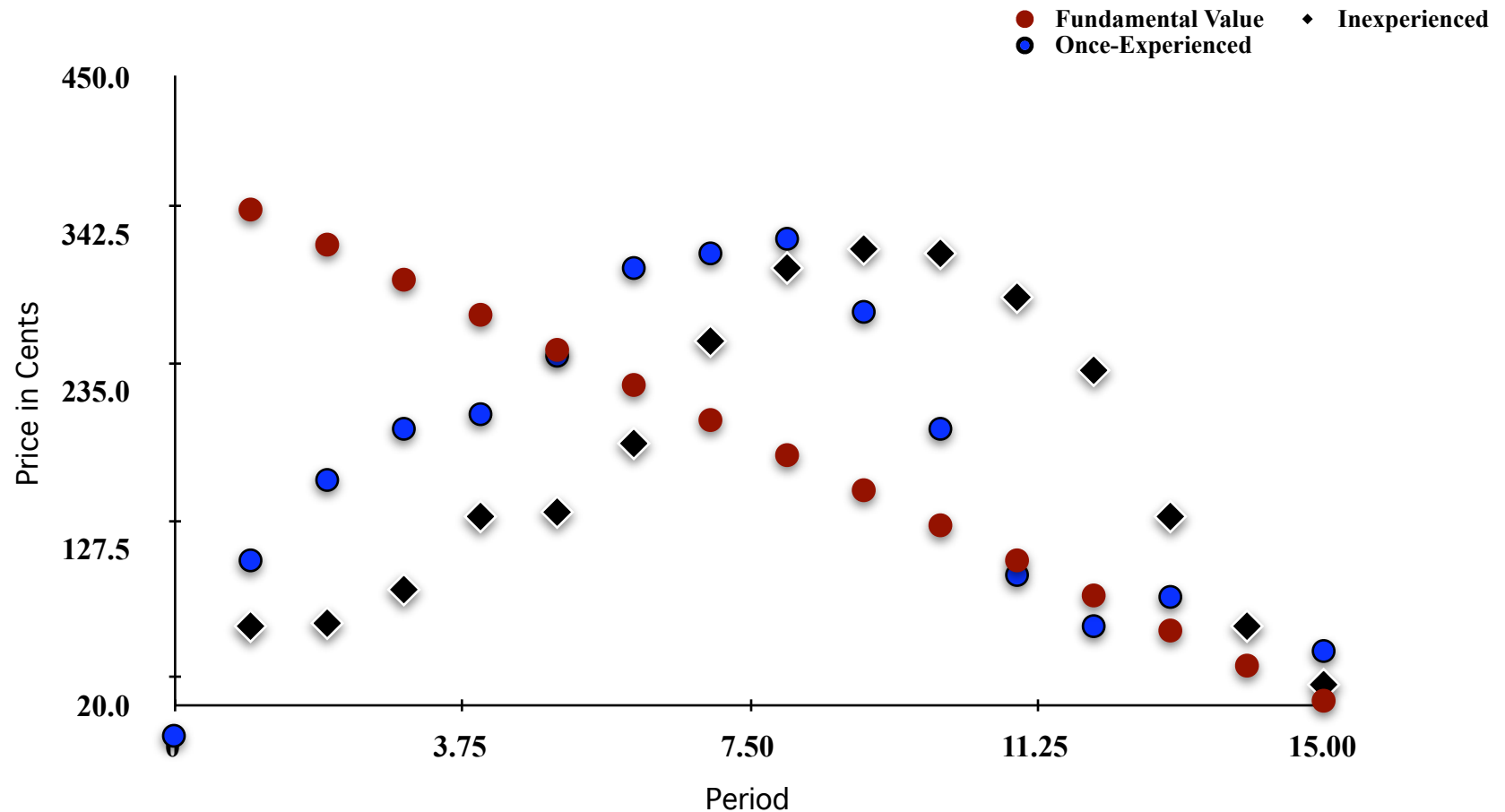
Courtesy of David Porter

Inexperienced Traders' Time Series



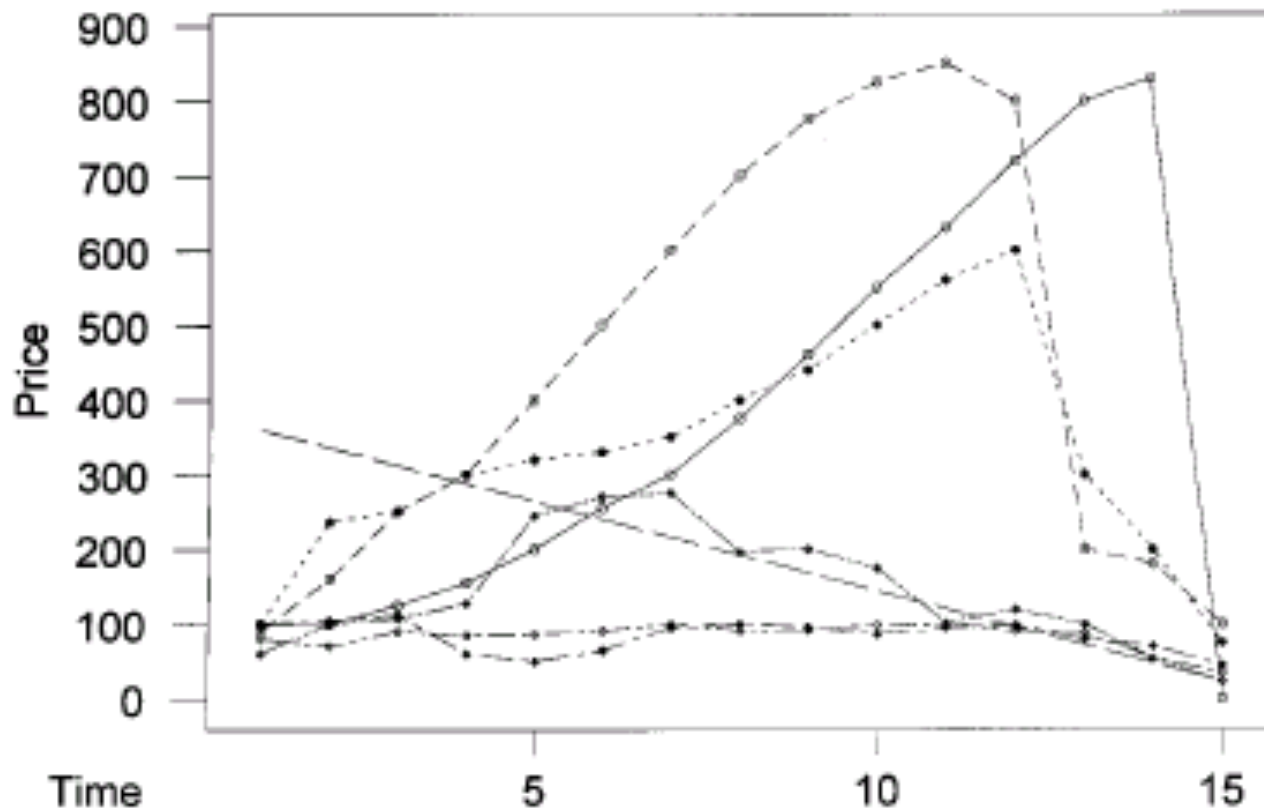
Courtesy of David Porter

Inexperienced Traders' Time Series



Courtesy of David Porter

FIGURE 1
Price Evolution Under Conditions Maximizing and Minimizing Bubbles



Note: The price evolution is shown for six experiments, along with the straight line representing the fundamental value (which declines from \$3.60 to \$0.24). In the three experiments, marked by circles, in which prices soar far above the fundamental value, there is an excess of cash, the dividends are distributed at the end of each period (adding more cash) and there is a closed book so that traders do not know the entire bid–ask book. In the experiments marked by diamonds, the opposite conditions prevail, and prices remain low and there is no bubble.

Bubbles in Experimental Markets

- Inexperienced traders
- Closed bid-ask book, i.e., lack of transparency
- Low initial price can increase bubble by increasing momentum.
- Prices are rising with fewer traders buying shortly before the crash.
- *“Even the traders who had not planned to implement a momentum strategy are forced to recognize it as an important factor in determining the temporal evolution of prices.”* (CPS, p. 81)
- Common static environment is a necessary condition for convergence to Fundamental Value
 - new, sufficiently different asset —————> new bubble

- Which is a more common cause of death in the United States, tornadoes or lightning?

Lightning safety tips

NEW YORK: The biggest misconception people have about getting struck by lightning, one of the world's leading experts on lightning strike injuries says, is that it won't happen to them.

In fact, people are thousands of times more likely to be struck by lightning than to win the lottery, said Dr Mary Ann Cooper of the University of Illinois at Chicago. Anyone who lives to the age of 80 has a one in 5,000 chance of being hit at least once.

Availability Heuristic

The rule of thumb by which people judge the probability of an event by the ease with which occurrences can be brought to mind.

Availability Bias

- IPO in March 1986

2,795,000 Shares

MICROSOFT
Microsoft Corporation
Common Stock

Of the 2,795,000 shares of Common Stock offered hereby, 2,000,000 shares are being sold by the Company and 795,000 shares are being sold by the Selling Stockholders. See "Principal and Selling Stockholders." The Company will not receive any of the proceeds from the sale of shares by the Selling Stockholders.

Prior to this offering, there has been no public market for the Common Stock of the Company. For the factors which were considered in determining the initial public offering price, see "Underwriting."

See "Certain Factors" for a discussion of certain factors which should be considered by prospective purchasers of the Common Stock offered hereby.

THESE SECURITIES HAVE NOT BEEN APPROVED OR DISAPPROVED BY THE SECURITIES AND EXCHANGE COMMISSION NOR HAS THE COMMISSION PASSED UPON THE ACCURACY OR ADEQUACY OF THIS PROSPECTUS. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

	Initial Public Offering Price	Underwriting Discount (1)	Proceeds to Company (2)	Proceeds to Selling Stockholders (2)
Per Share	\$21.00	\$1.31	\$19.69	\$19.69
Total (3)	\$58,695,000	\$3,661,450	\$39,380,000	\$15,653,550

(1) The Company and the Selling Stockholders have agreed to indemnify the Underwriters against certain liabilities, including liabilities under the Securities Act of 1933.

(2) Before deducting expenses of the offering estimated at \$541,000, of which \$452,000 will be paid by the Company and \$89,000 by the Selling Stockholders.

(3) The Company has granted to the Underwriters an option to purchase up to an additional 300,000 shares at the initial public offering price, less the underwriting discount, solely to cover over-allotments. If such option is exercised in full, the total Initial Public Offering Price, Underwriting Discount and Proceeds to Company will be \$64,995,000, \$4,054,450 and \$45,287,000, respectively.

The shares are offered severally by the Underwriters, as specified herein, subject to receipt and acceptance by them and subject to their right to reject any order in whole or in part. It is expected that the certificates for the shares will be ready for delivery at the offices of Goldman, Sachs & Co., New York, New York on or about March 20, 1986.

Goldman, Sachs & Co.

Alex. Brown & Sons
Incorporated

The date of this Prospectus is March 13, 1986.

- Paris Business Forms
- IFEX
- Beauty Control
Cosmetics
- Tops Market
- First Family Group
- Rubicon
- American Claims
Exchange

Market Efficiency

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“A market in which prices always ‘fully reflect’ available information is called ‘efficient.’

Eugene Fama, *Journal of Finance*, 1970

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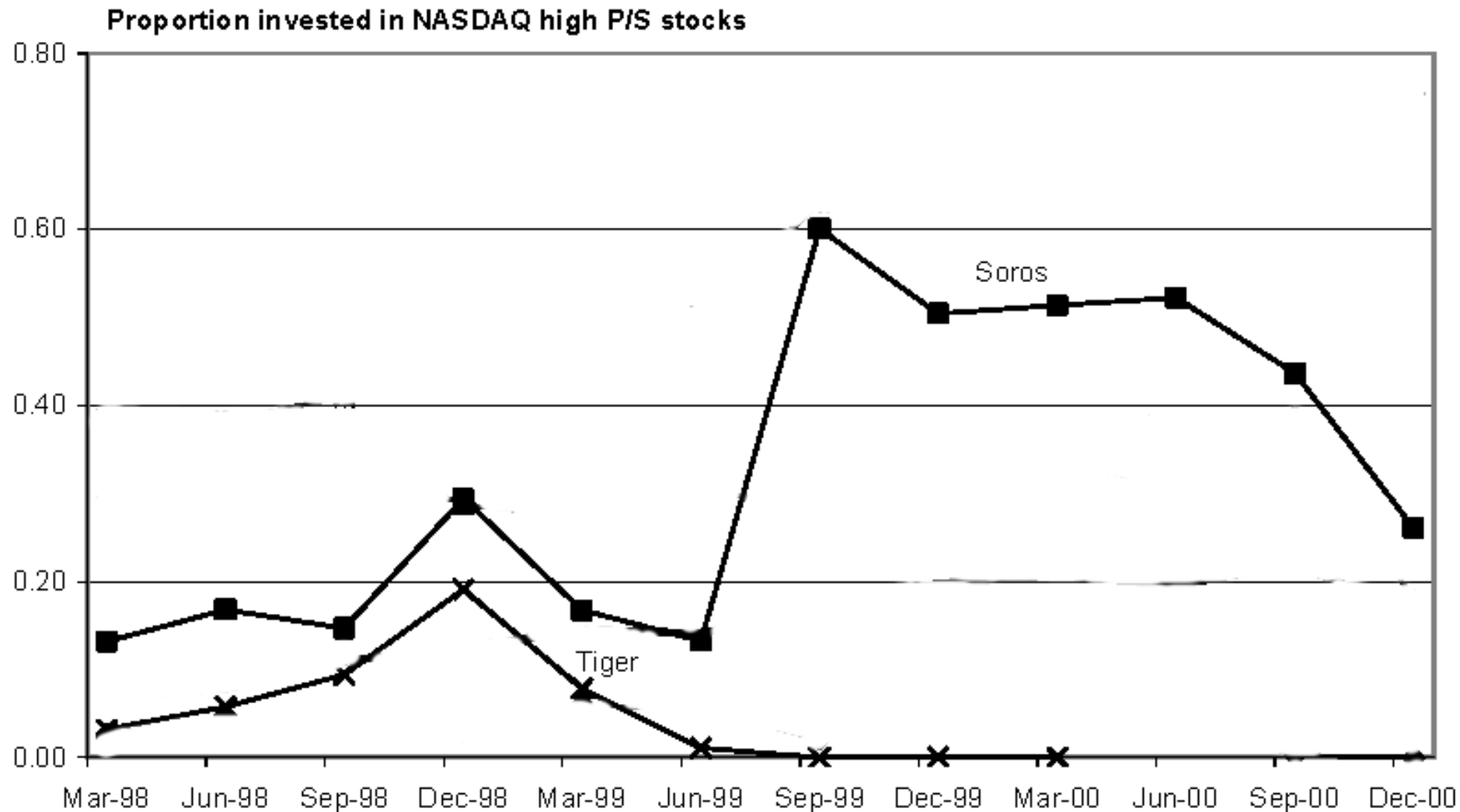
"I'd be a bum in the street with a tin cup if the markets were efficient."

Warren Buffet, *Fortune*, 1995

Do Behavioral Biases Affect Market Prices?

1. Informed traders are constrained by risk aversion and the limits of arbitrage.
2. Trading decisions of individual investors are biased.
 - Overconfidence, avoiding regret, limited attention, chasing trends
3. Purchases & sales of individual investors are correlated.
4. Buy-sell imbalance of individual investors drives prices away from fundamental value.
5. Over time, informed trades push prices back towards fundamental value.

1. Informed traders are constrained by risk aversion and the limits of arbitrage.



Adapted from Brunnermeier & Nagel, 2002

2. Trading decisions of individual investors are biased.

- Overconfidence → Trade too much.
- Desire to reduce regret → Cling to losers.
- Limited attention → Buy attention grabbing stocks.
- Confusion about probability → Chase performance.

When All Traders Are Above Average (i.e., overconfident) Odean, 1998, *Journal of Finance*

- Trade more.
- Earn less.
- Underdiversify.
- Increase market volatility.

Do Investors Trade Too Much?

Odean, 1999, *American Economic Review*

Average Returns Following Purchases and Sales

	4 Months Later	1 Year Later	2 Years Later
Stocks Bought Minus Stocks Sold	-1.45	-3.22	-3.57

Excluding Non-Speculative Trades

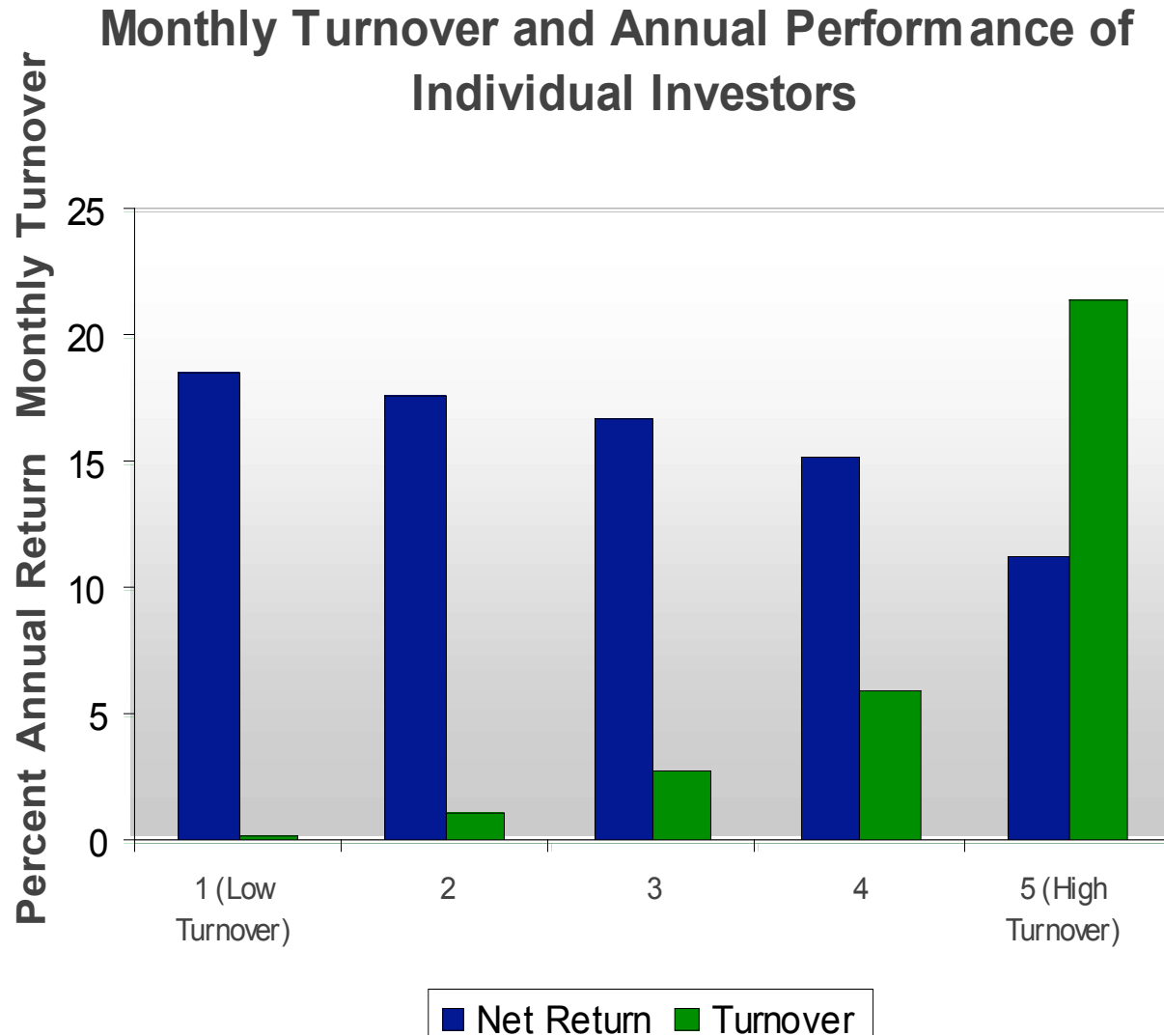
Odean, 1999, *American Economic Review*

Average Returns Following Speculative Purchases and Sales

	4 Months Later	1 Year Later	2 Years Later
Stocks Bought Minus Stocks Sold	-2.46	-5.07	-8.61

Trading is Hazardous to Your Wealth

Barber and Odean, 2000, *Journal of Finance*



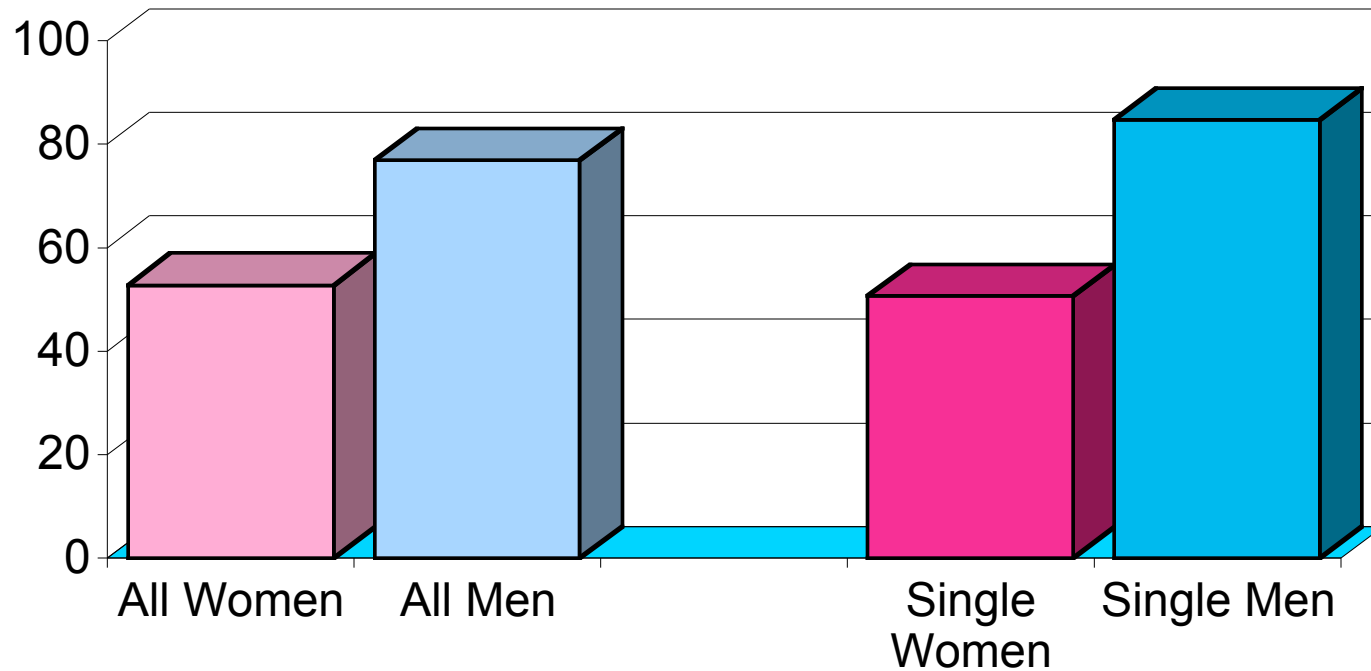
Who gains ...

"Overall, men claim more ability than do women, but this difference emerges most strongly on ... masculine task[s]."

Deaux and Ferris (1977)

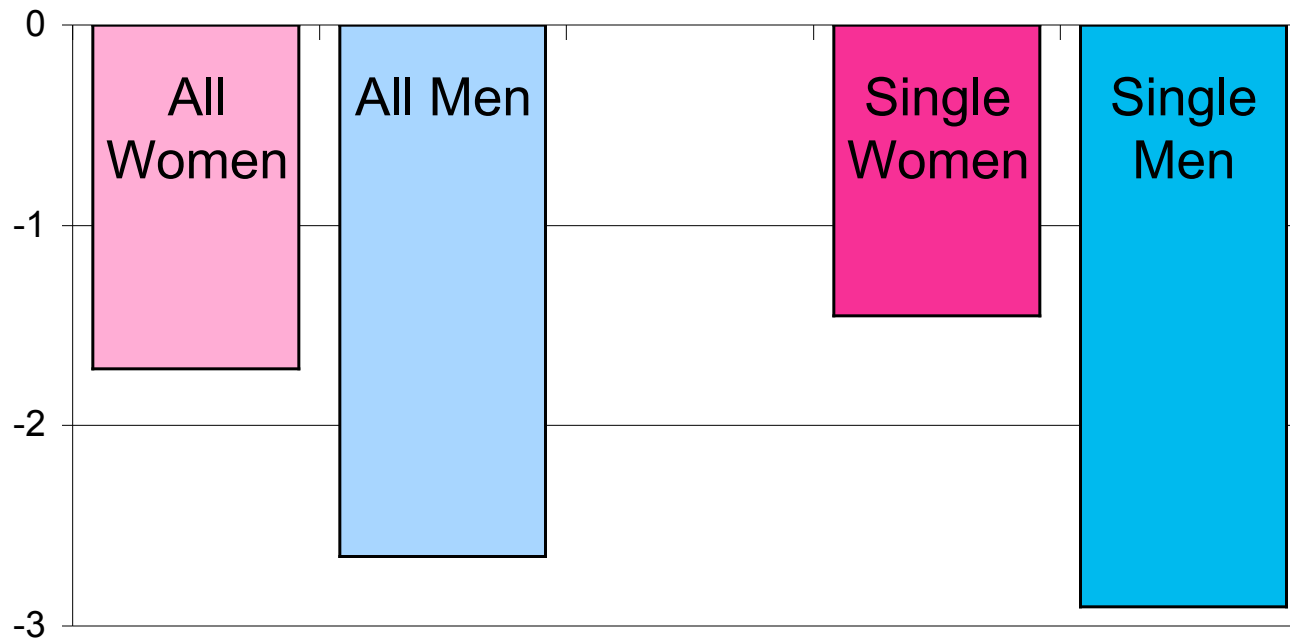
Boys will be Boys

Barber and Odean, 2001, *Quarterly Journal of Economics*,



“Own Benchmark” Annual Net Returns

Barber and Odean, 2001, *Quarterly Journal of Economics*



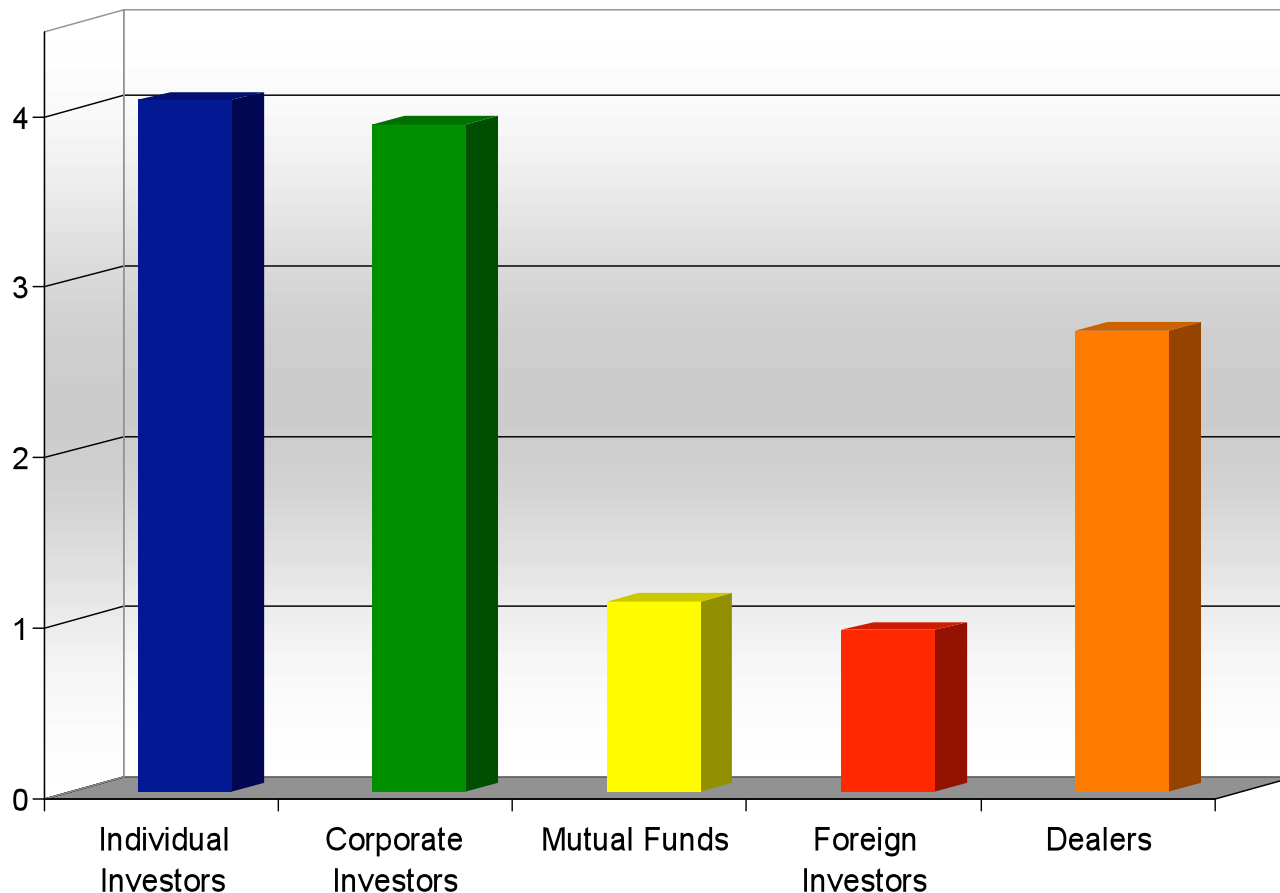
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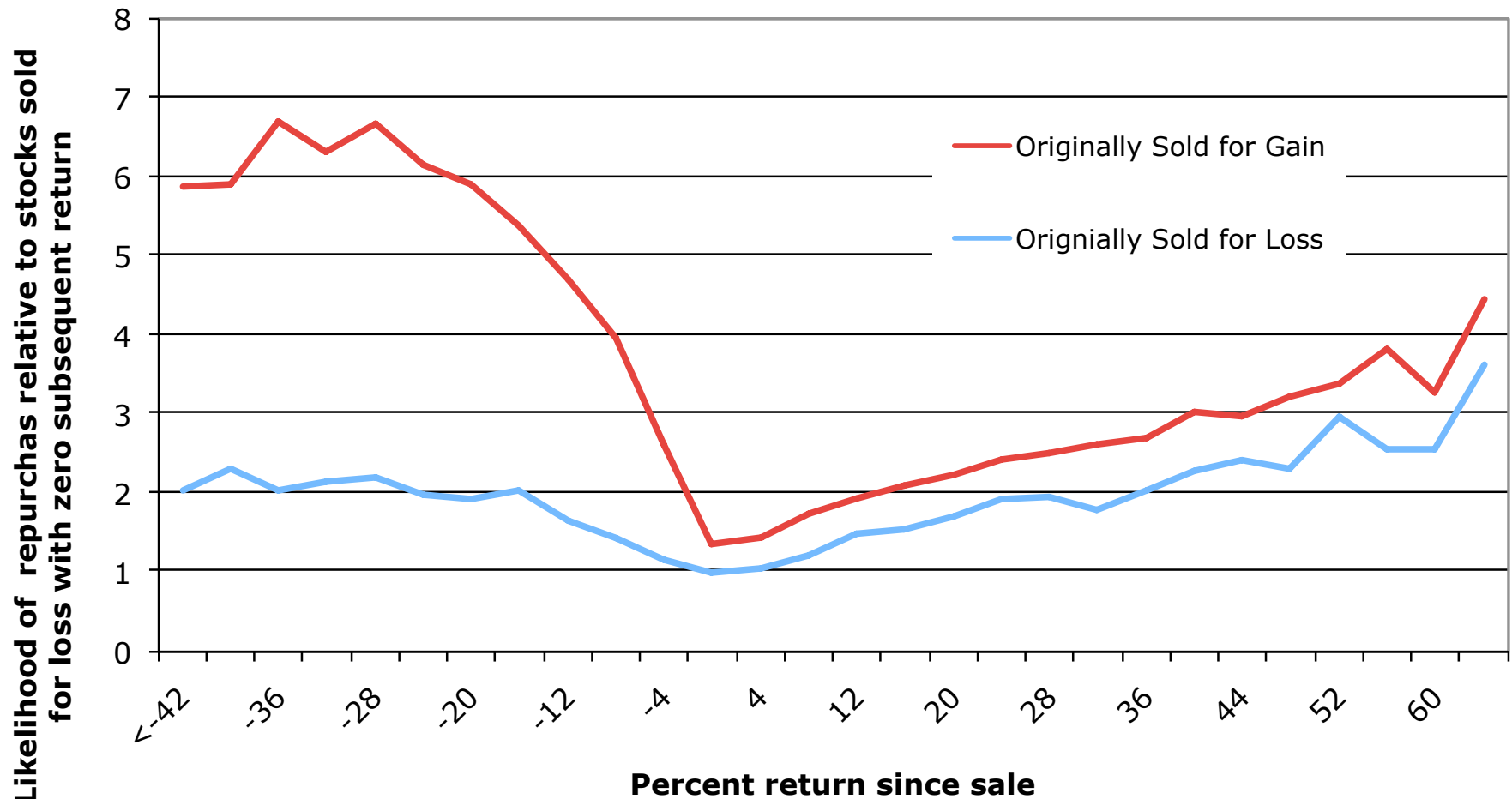
Disposition Effect in Taiwan

Barber, Lee, Liu, Odean, 2007, *European Financial Management*

**Proportion of Gains Realized / Proportion of
Losses Realized**



Relative Rate at which Investors Repurchase Stocks Previously Sold



Source: Odean, Strahilevitz, & Barber, 2008.

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All that Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors

Barber and Odean, 2008, *Review of Financial Studies*

All that Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors

Barber and Odean, 2008, *Review of Financial Studies*

- Thousands of stocks.
- Bounded rationality and processing ability.
- Limit search to stocks that catch attention.
- Investors buy stocks that catch their attention.

When do stocks attract **ATTENTION**?

- Abnormal Trading Volume

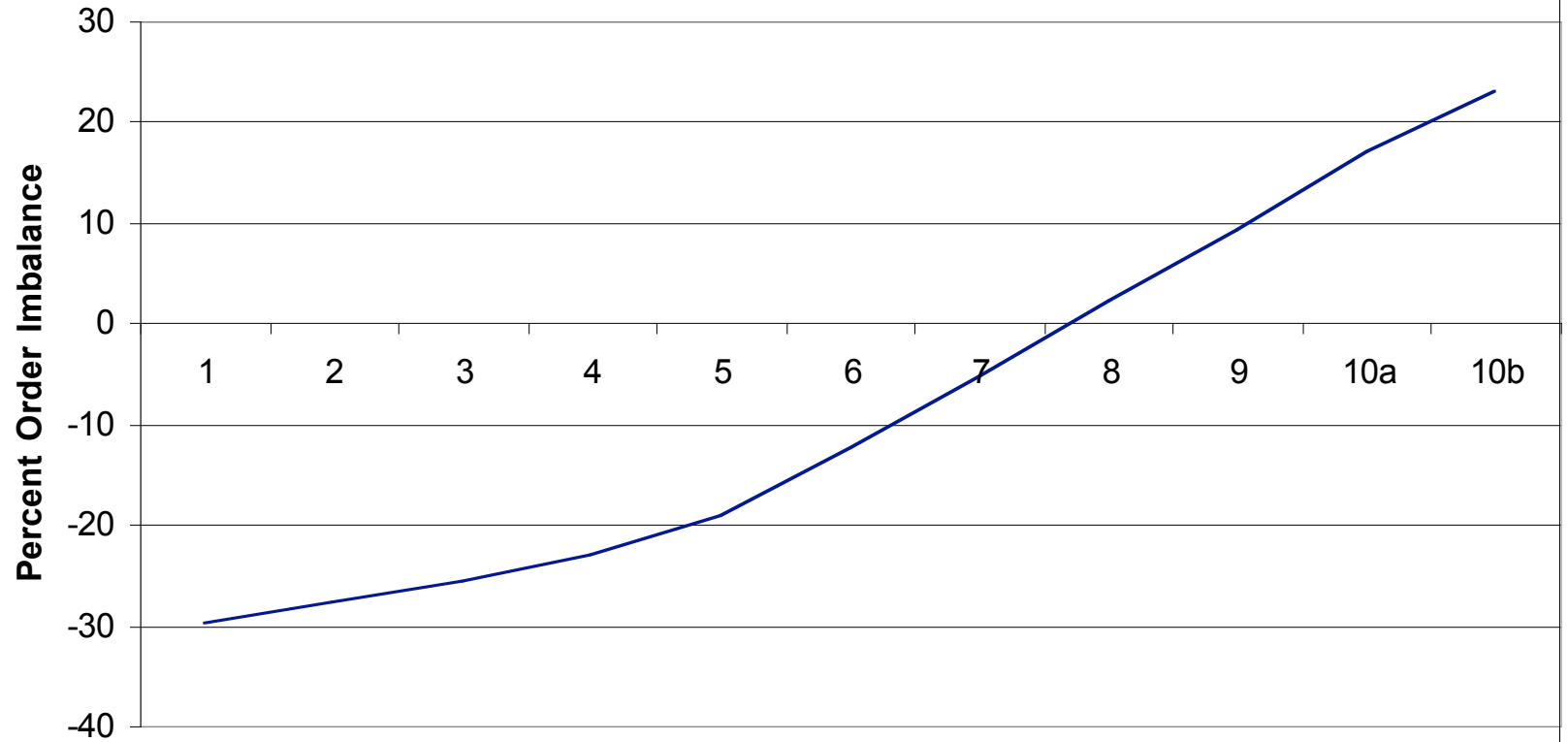
When do stocks attract **ATTENTION**?

- Abnormal Trading Volume
- Extreme price moves

When do stocks attract **ATTENTION**?

- Abnormal Trading Volume
- Extreme price moves
- News

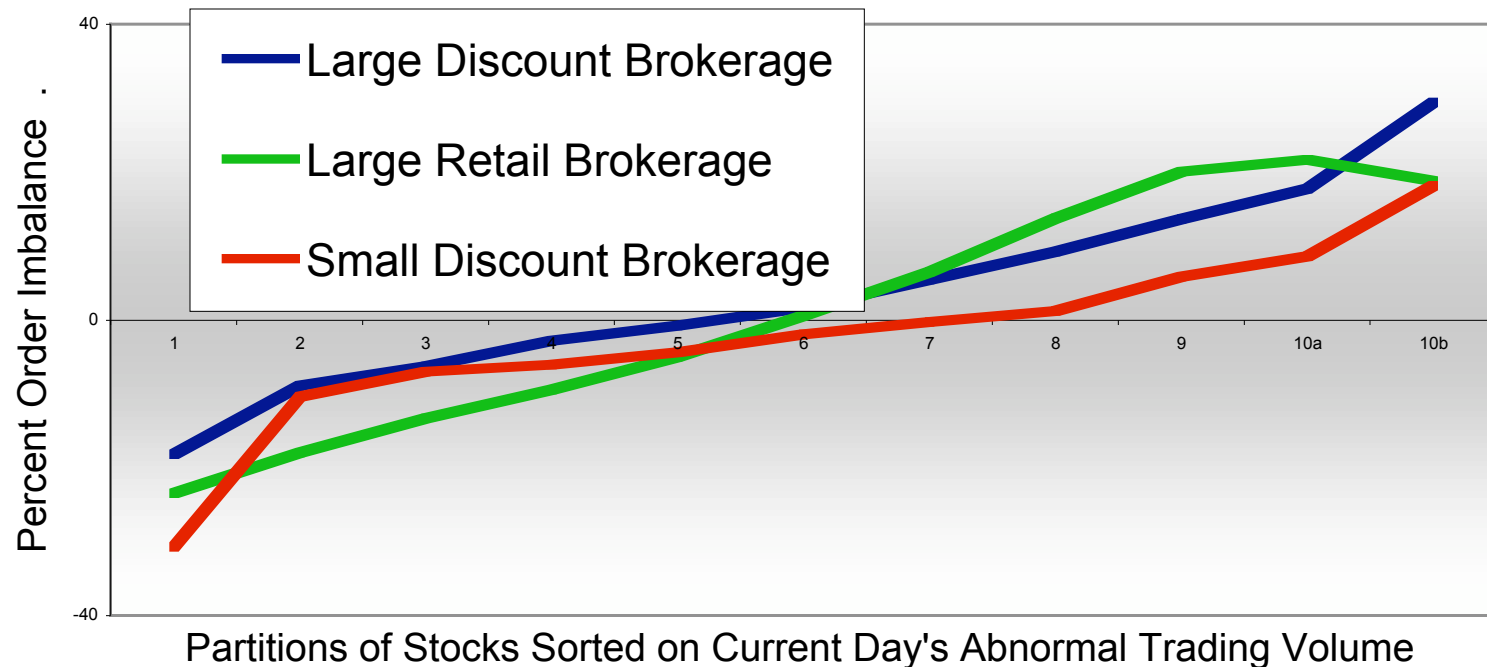
Simulation Volume Sort



Partitions Sorted on Same Period Trading Volume

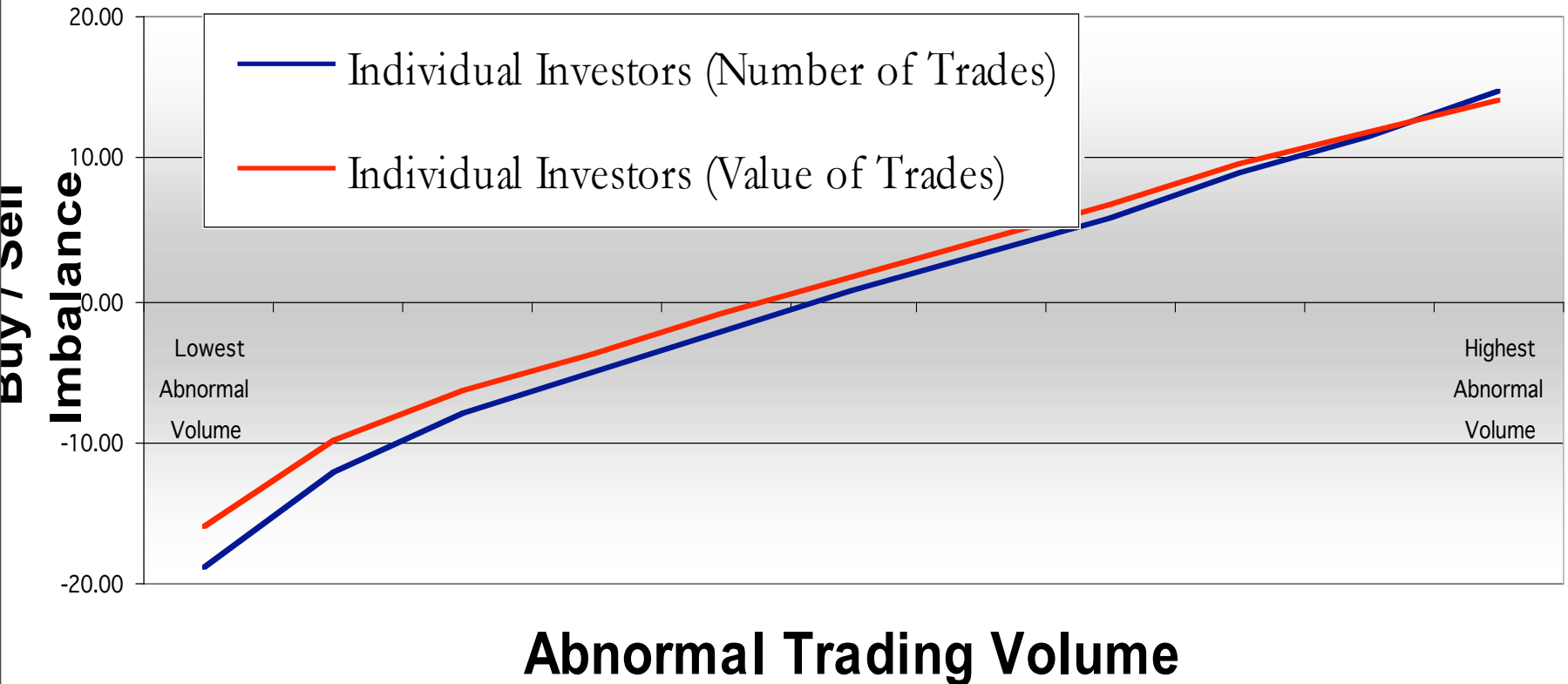
Abnormal Volume Sort Individuals

Imbalance by # trades

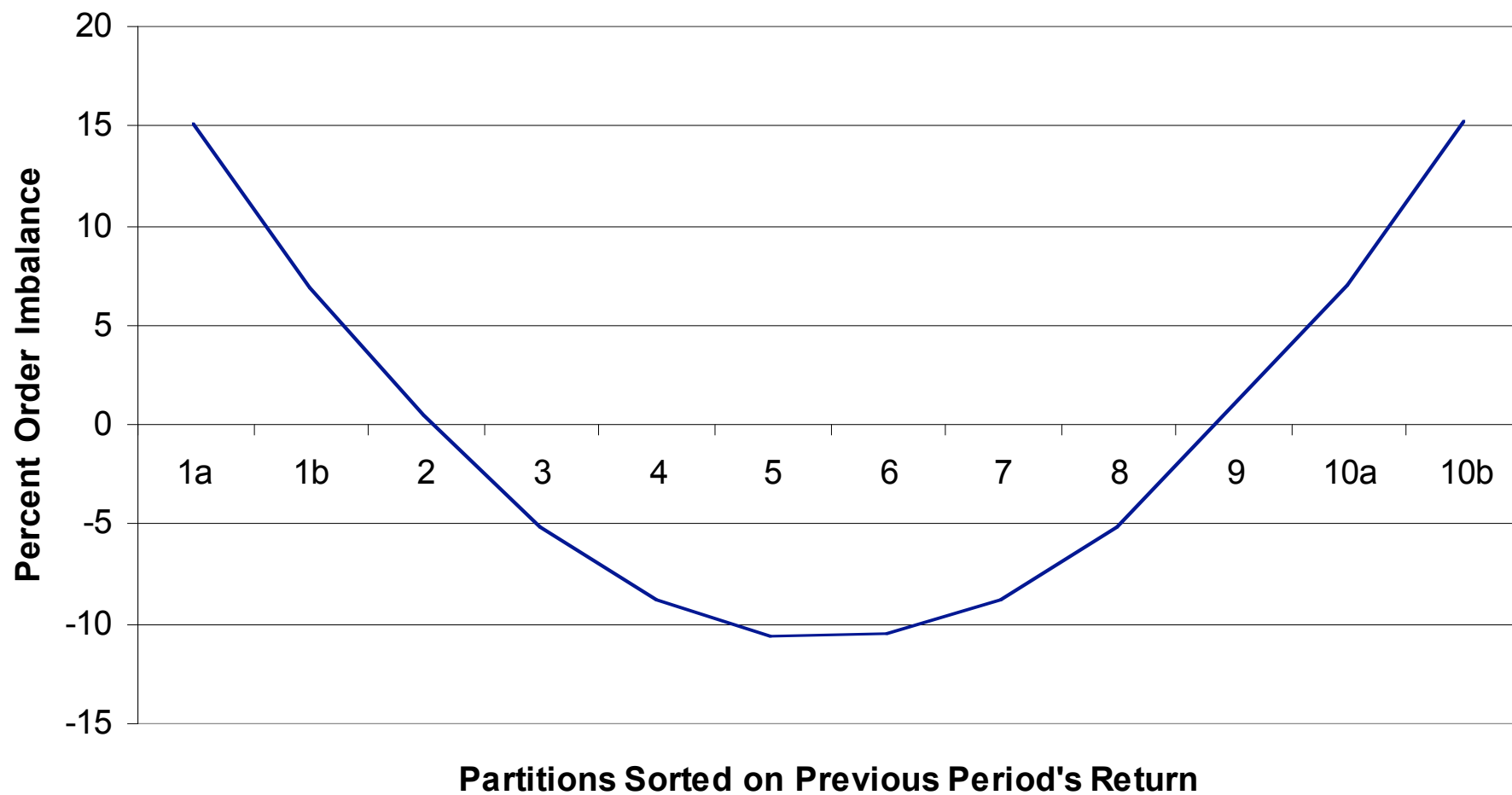


Order Imbalance: Volume Sorts

TAQ & ISSM Data: 1983-2000

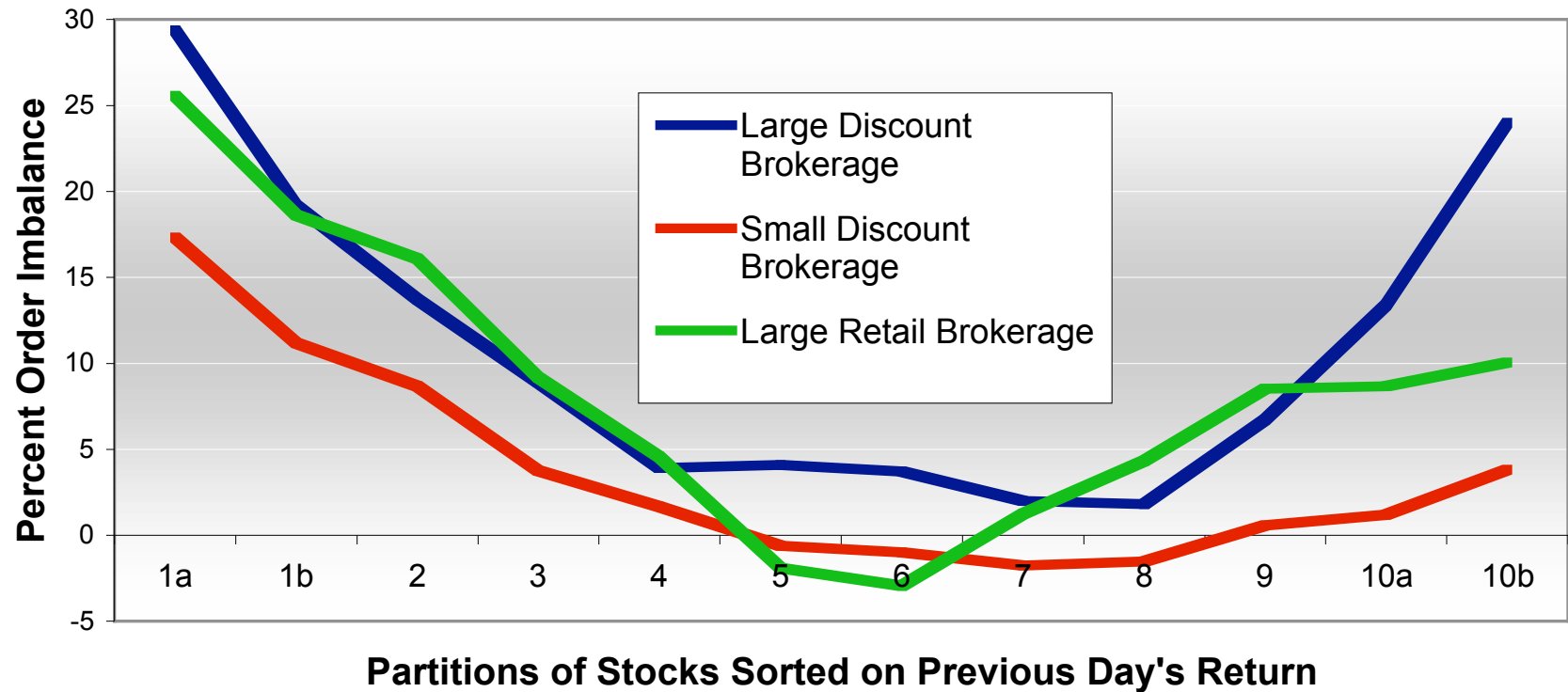


Simulation Return Sort



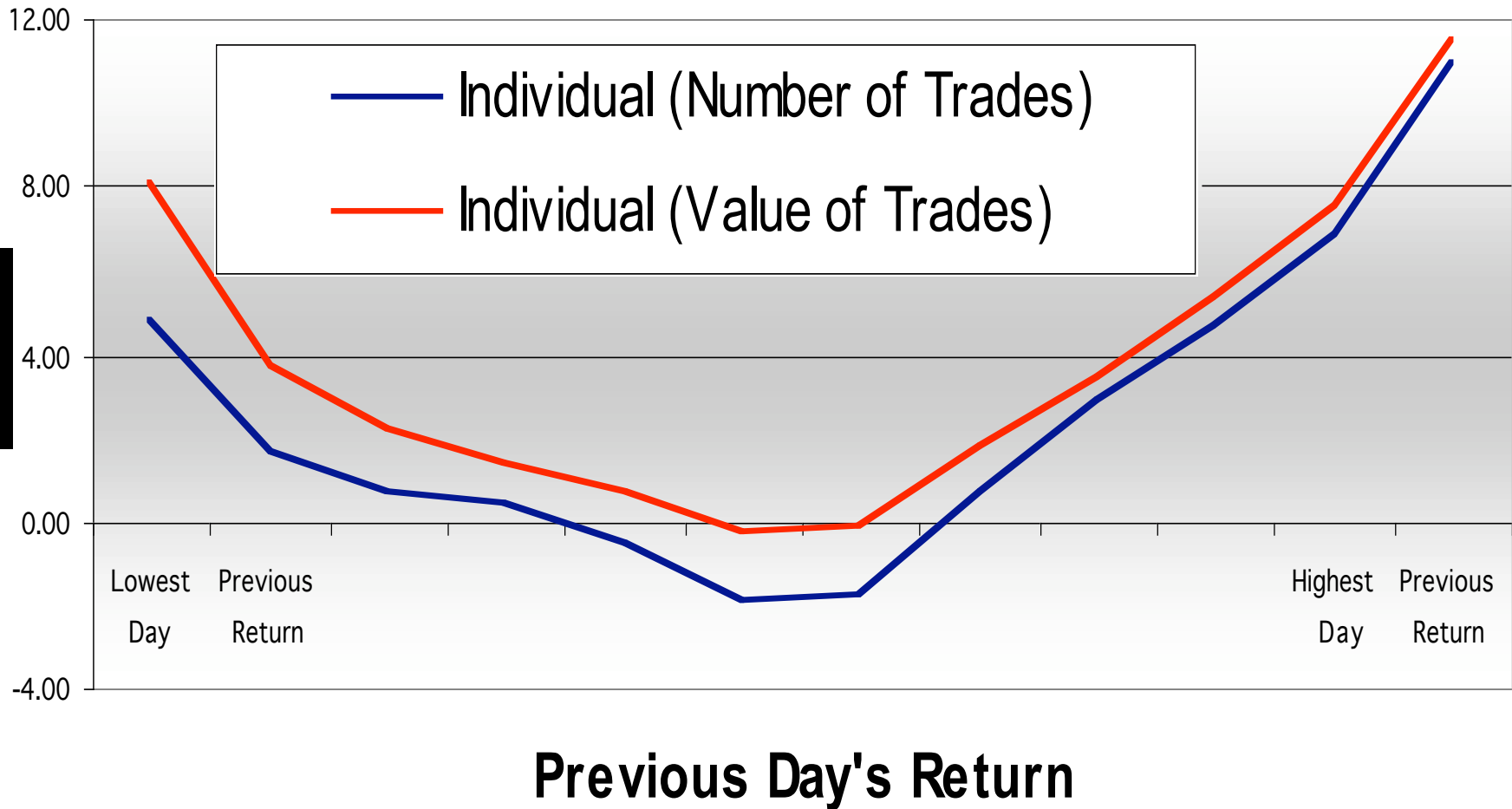
Return Sort Individuals

Imbalance by # trades



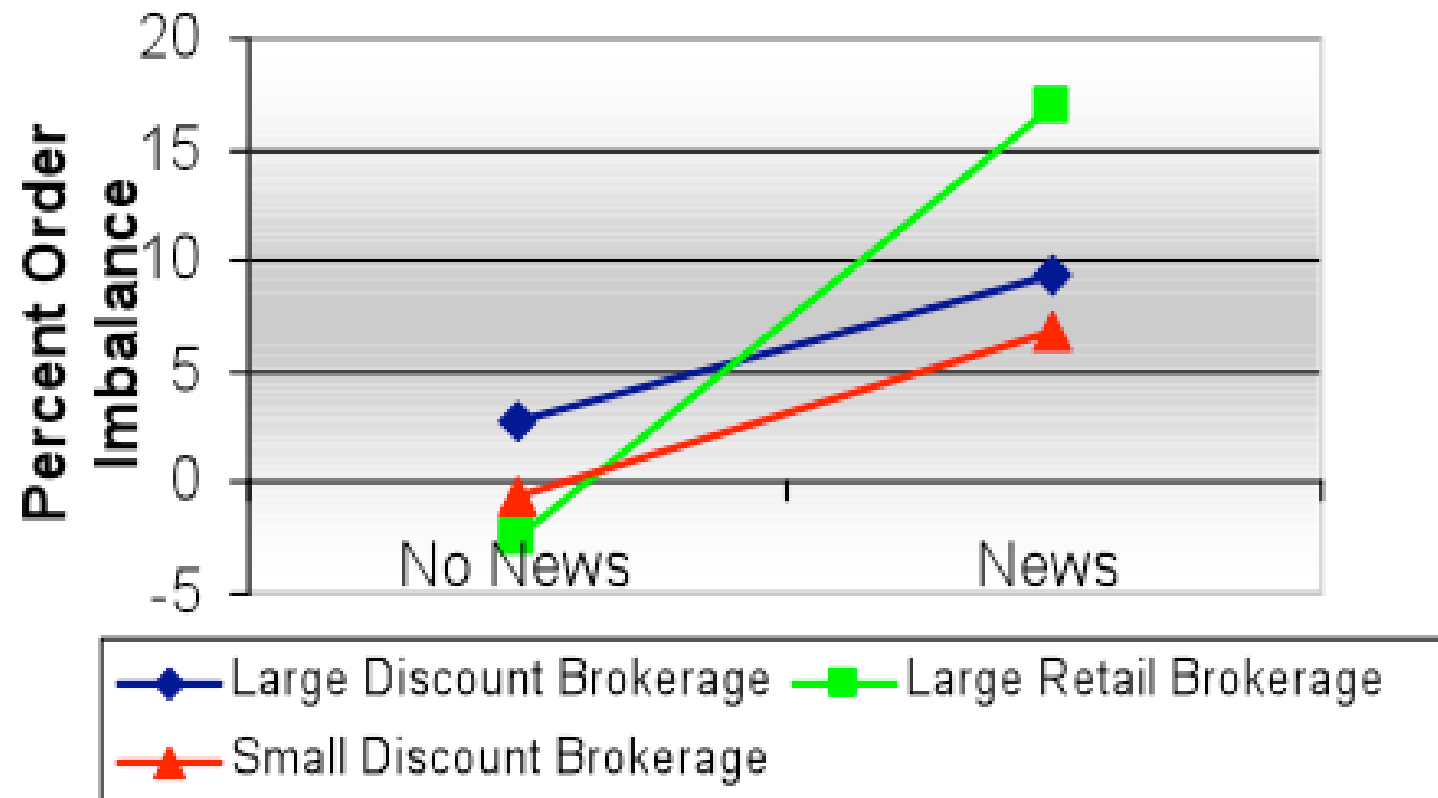
Order Imbalance: Return Sorts

TAQ & ISSM Data: 1983-2000



No News vs. News

Order imbalance by number of trades

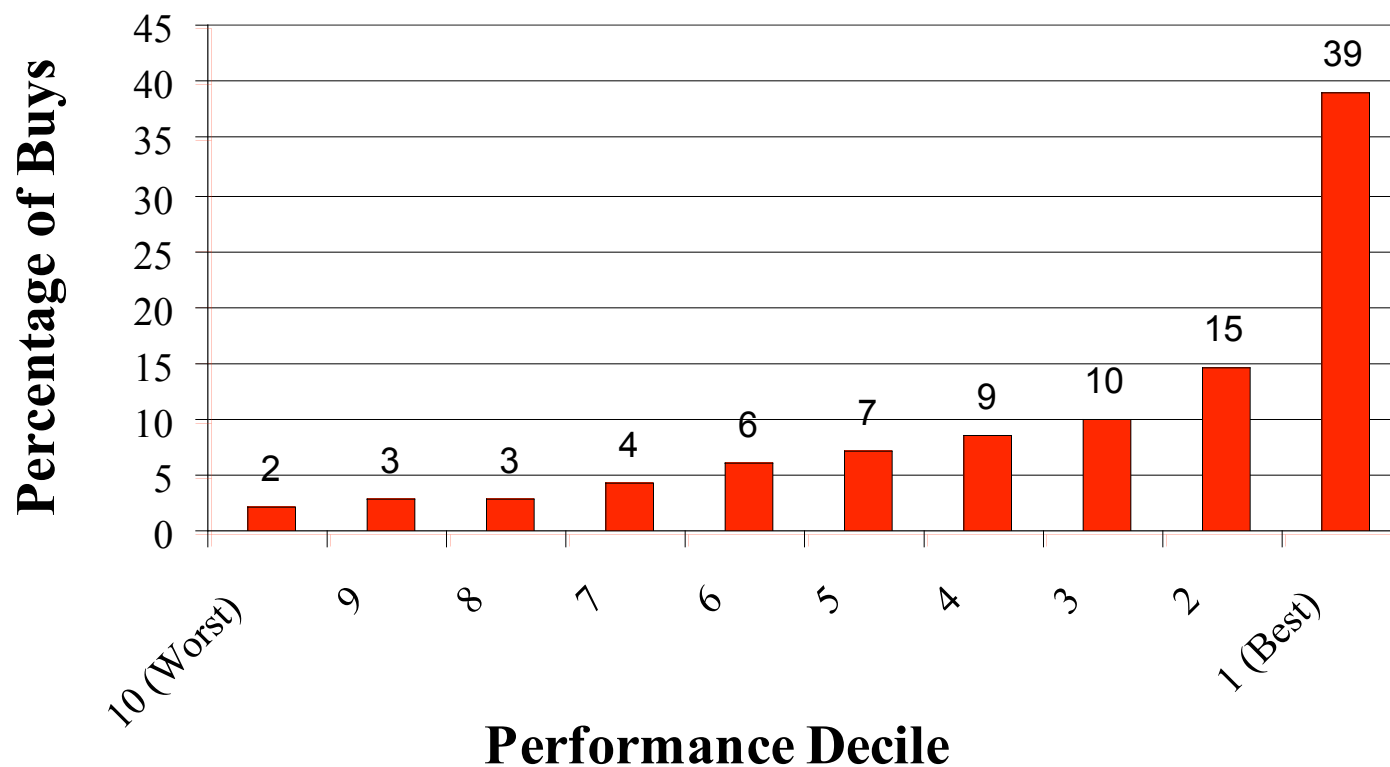


from Barber and Odean, 2006, forthcoming *Review of Financial Studies*

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Mutual Funds: Money Pours into *Last Year's Winners*



Winner's Curse

- Number of participants
- Degree of uncertainty

Instructions

Please write down a number between 0 and 100 (inclusive) such that your guess will be as close as possible to $\frac{2}{3}$ of the average guess. For example, suppose five people enter and their guesses are 50, 40, 30, 20, and 10. Then the average guess would be 30, two thirds of which is 20, so the person guessing 20 would win.

Institutional investors biases?

- Overconfidence
 - risk and leverage
- Self-attribution bias
- Representativeness heuristic,
 - e.g., extrapolating recent past
- Disposition effect

Do Behavioral Biases Affect Market Prices?

1. Informed traders are constrained by risk aversion and the limits of arbitrage.
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Correlation of % Buys in Month t with % Buys in Month $t+L$

Horizon (L):	Group 1 with Group 1	Group 2 with Group 2	Group 1 with Group 2
0	100.0%	100.0%	75.1%
1	56.7	58.6	55.8
2	45.8	46.4	45.5
3	39.8	40.8	41.1
4	36.5	34.9	36.5

Large Retail Brokerage

Barber, Odean, Zhu, 2008, "Systematic Noise", forthcoming *Journal of Financial Markets*

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Do Retail Trades Move Markets?

Barber, Odean, & Zhu, forthcoming *Review of Financial Studies*

- Higher percentage of individual investor buy orders this week
 - more buy orders next week
 - higher returns next week
 - lower returns next month
- Higher percentage of individual investor buy orders this year
 - lower returns next year
 - in the subsequent year high idiosyncratic risk stocks bought by individuals underperform those sold by 13 percentage points.

Mean Monthly Percentage Abnormal Returns for Portfolios formed on the basis of Annual Proportion of Buyer-Initiated Trades: 1984 to 2001

Proportion Buyer- Initiated Quintile	Equally-Weighted					
	Return			t-statistic		
	Small Trades	Large Trades	Diff.	Small Trades	Large Trades	Diff.
	Market-Adjusted Returns (%)					
1 (Sold)	0.211	-0.255	0.466	0.99	-1.04	3.84
2	0.293	-0.131	0.424	1.22	-0.56	4.13
3	0.116	-0.017	0.133	0.44	-0.08	1.09
4	-0.082	0.017	-0.099	-0.33	0.11	-0.77
5 (Bought)	-0.233	-0.064	-0.169	-1.30	-0.39	-1.71
B-S (5-1)	-0.444	0.191	-0.635	-2.99	1.72	-3.42
	Four-Factor Alphas (%)					
1 (Sold)	0.409	-0.017	0.426	2.98	-0.12	5.27
2	0.572	0.189	0.383	3.85	1.71	4.15
3	0.477	0.303	0.174	3.27	3.67	1.46
4	0.213	0.145	0.068	1.79	2.15	0.70
5 (Bought)	-0.160	0.075	-0.235	-1.50	0.79	-2.53
B-S (5-1)	-0.569	0.093	-0.662	-4.67	1.03	-5.02

Barber, Odean, Zhu, 2008, "Do Retail Trades Move Markets?", forthcoming, *Review of Financial Studies*

Monthly Percentage Abnormal Returns for Portfolios formed from Five-by-Five Partition on Proportion Buyer-Initiated Trades based on Small Trades (columns) and Large Trades (Rows) Equally-Weighted Portfolios

Large Trade Proportion Buyer- Initiated Quintile	Four-Factor Alphas (%)							t-statistics						
	Small Trade Proportion Buyer-Initiated Quintile							Small Trade Proportion Buyer-Initiated Quintile						
	1 (Sold)	2	3	4	5 (Bought)	All Large Trade s	Small Trade B-S (5-1)	1 (Sold)	2	3	4	5 (Bought)	All Larg e Trad es	Small Trade B-S (5-1)
1 (Sold)	-0.151	0.254	0.070	-0.077	-0.281	-0.029	-0.130	-0.92	1.29	0.34	-0.37	-1.70	-0.19	-0.74
2	0.259	0.165	0.366	0.223	-0.149	0.176	-0.408	1.66	1.14	2.11	1.48	-1.08	1.60	-2.44
3	0.369	0.338	0.538	0.229	-0.126	0.273	-0.495	2.45	2.74	3.94	1.87	-1.03	3.36	-2.70
4	0.222	0.444	0.103	0.122	-0.154	0.129	-0.376	1.78	3.55	0.88	1.13	-1.26	1.85	-2.57
5 (Bought)	0.212	0.409	0.229	-0.037	-0.413	0.059	-0.625	1.60	2.48	1.59	-0.27	-3.35	0.61	-3.92
All Small Trade	0.175	0.333	0.285	0.094	-0.261	n.a.	-0.435	1.52	2.76	2.37	0.96	-2.58	n.a.	-3.90
Large Trade B-S (5-1)	0.363	0.154	0.159	0.040	-0.132	0.088	n.a.	0.96	0.88	0.21	-0.82	0.98	-0.37	n.a.

Monthly Percentage Abnormal Returns by Idiosyncratic Risk Partitions for Value-Weighted Portfolios formed on the basis of Annual Proportion Buyer-Initiated Trades using Small and Large Trades: 1984 to 2001

Proportion Buyer- Initiated Quintile	Four-Factor Alpha (%)			t-statistic		
	Small Trades	Large Trades	Diff.	Small Trades	Large Trades	Diff.
Panel A: High Idiosyncratic Risk						
1 (Sold)	0.511	-0.139	0.650	1.44	-0.59	1.60
2	0.477	-0.008	0.485	1.57	-0.03	1.64
3	-0.085	0.170	-0.254	-0.32	0.58	-0.93
4	-0.018	-0.047	0.029	-0.07	-0.15	0.14
5 (Bought)	-0.584	0.139	-0.723	-2.08	0.41	-2.05
B-S (5-1)	-1.095	0.278	-1.373	-2.64	0.74	-2.63
Panel B: Medium Idiosyncratic Risk						
1 (Sold)	0.560	0.125	0.435	2.57	0.37	1.66
2	0.049	0.188	-0.138	0.26	0.89	-0.54
3	0.356	0.583	-0.227	1.64	2.49	-0.97
4	0.068	0.153	-0.086	0.47	-0.02	-0.52
5 (Bought)	0.180	0.152	0.028	1.06	0.24	0.16
B-S (5-1)	-0.381	0.027	-0.407	-1.44	-0.22	-1.06
Panel C: Low Idiosyncratic Risk						
1 (Sold)	0.304	0.051	0.253	1.66	0.88	1.19
2	-0.025	0.126	-0.151	-0.21	1.11	-1.02
3	0.031	0.333	-0.303	0.24	3.57	-2.20
4	-0.028	-0.002	-0.026	-0.27	0.88	-0.24
5 (Bought)	0.014	0.020	-0.006	0.13	0.90	-0.06
B-S (5-1)	-0.291	-0.031	-0.260	-1.56	0.12	-1.18

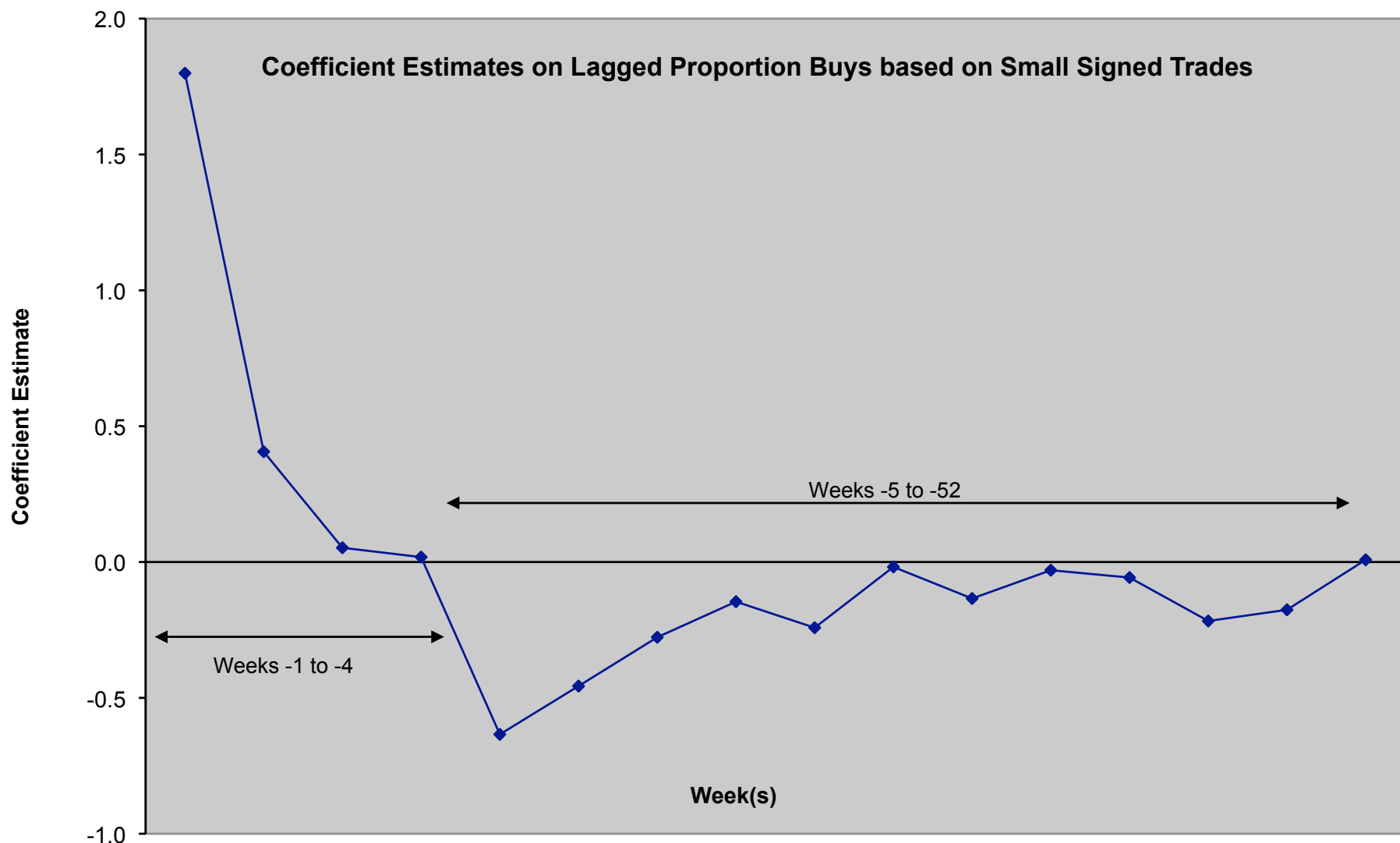
Monthly Percentage Abnormal Returns by Small Trade Turnover for Value-Weighted Portfolios formed on the basis of Proportion Buyer-Initiated Trades using Small and Large Trades

Proportion Buy Quintile	Four-Factor Alpha (%)			t-statistic		
	Small Trades	Large Trades	Diff.	Small Trades	Large Trades	Diff.
High Small Trade Turnover						
1 (Sold)	1.197	0.130	1.067	3.45	0.44	3.09
2	0.895	0.192	0.703	3.01	0.86	2.56
3	0.147	0.595	-0.448	0.65	1.87	-1.52
4	0.649	0.657	-0.008	2.09	2.20	-0.03
5 (Bought)	0.075	0.323	-0.248	0.24	1.16	-0.76
B-S (5-1)	-1.123	0.193	-1.316	-2.58	0.62	-2.51
Mid Small Trade Turnover						
1 (Sold)	0.500	-0.082	0.581	3.24	-0.73	3.23
2	0.441	-0.004	0.446	2.91	-0.04	2.65
3	0.327	0.404	-0.077	1.91	2.50	-0.45
4	0.134	0.153	-0.019	0.93	1.00	-0.15
5 (Bought)	0.020	0.164	-0.144	0.13	1.01	-0.88
B-S (5-1)	-0.480	0.245	-0.725	-2.50	1.31	-2.87
Low Small Trade Turnover						
1 (Sold)	0.267	-0.040	0.307	1.83	-0.33	1.79
2	-0.149	0.258	-0.406	-1.45	1.68	-2.12
3	-0.049	0.388	-0.437	-0.42	3.06	-3.17
4	-0.118	-0.025	-0.092	-1.51	-0.36	-0.85
5 (Bought)	0.059	0.024	0.035	0.68	0.28	0.31
B-S (5-1)	-0.208	0.064	-0.272	-1.28	0.44	-1.25

**Monthly Percentage Four-Factor Abnormal Returns for Value-Weighted Portfolios
formed on the basis of Weekly Proportion Buyer-Initiated Trades using
Small and Large Trades: February 1983 to December 2000**

	Monthly Four-Factor Alpha (%)			t-statistic		
	Panel A: Contemporaneous Returns					
Proportion Buyer-Initiated Quintile	Small Trades	Large Trades	Diff.	Small Trades	Large Trades	Diff.
1 (Sold)	-2.398	-7.398	5.000	-9.79	-38.96	28.26
2	-1.205	-5.718	4.513	-6.57	-29.36	27.03
3	-0.422	-1.091	0.668	-3.37	-11.73	4.46
4	0.413	4.111	-3.698	4.20	31.91	-25.73
5 (Bought)	1.786	8.062	-6.277	10.92	35.87	-27.95
B-S (5-1)	4.184	15.460	-11.277	11.99	39.37	-37.91
	Panel B: Subsequent Returns					
Proportion Buyer-Initiated Quintile	Small Trades	Large Trades	Diff.	Small Trades	Large Trades	Diff.
1 (Sold)	-0.637	0.421	-1.057	-5.16	3.57	-6.34
2	-0.160	0.797	-0.958	-1.87	8.06	-7.35
3	0.161	0.276	-0.115	1.70	3.53	-0.88
4	0.427	-0.219	0.646	4.81	-2.79	5.61
5 (Bought)	0.733	-0.362	1.095	5.22	-3.96	7.37
B-S (5-1)	1.370	-0.782	2.152	6.55	-5.54	8.26

Coefficient Estimates on Lagged Proportion Buys based on Small Signed Trades



Coef. Est.	1.799	0.406	0.052	0.018	-0.634	-0.457	-0.277	-0.146	-0.242	-0.018	-0.134	-0.030	-0.057	-0.217	-0.176	0.008
t-stat.	30.06	6.55	0.85	0.29	-6.47	-5.27	-3.16	-1.61	-2.72	-0.21	-1.51	-0.35	-0.67	-2.53	-2.12	0.10

Do Behavioral Biases Affect Market Prices?

1. Informed traders are constrained by risk aversion and the limits of arbitrage.
2. Individual investors are biased in interpretation of information &/or trade for non-informational reasons.
3. Purchases & sales of individual investors are correlated.
4. **Buy-sell imbalance of individual investors drives prices away from fundamental value.**
5. **Over time, informed trades push prices back towards fundamental value.**

A Beauty Contest

(Rosemary Nagel)

On the table at the front of the room is a jar of pennies. I am going to auction these pennies to the highest bidder. Each of you can submit a bid and the highest bidder will win the pennies in exchange for the amount of his or her bid. I know that a powerful pile of pennies is not a convenient instrument of procurement. So I have already taken the time to tediously count the pennies and I will happily exchange paper money and higher denomination coins for the equivalent value in pennies. (I would prefer to make this exchange so that I can auction these pennies again in a future class.) If you have not already done so, please examine the jar pennies. Pick it up. Formulate your estimate of its value. Then write your name and your bid on a 3 x 5 card.

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