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Institutional Holding Periods

Bidisha Chakrabarty
Saint Louis University

Pamela C. Moulton Ph.D.
Cornell Universtiy, pm388@cornell.edu

Charles Trzcinka
Indiana University, Bloomington

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Bidisha Chakrabarty, Pamela C. Moulton, and Charles Trzcinka

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School of Hotel Administration

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Bidisha Chakrabarty

Pamela C. Moulton

Charles Trzcinka*

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* Chakrabarty is at Saint Louis University (chakrab@slu.edu), Moulton is at Cornell University (pmoulton@cornell.edu), and Trzcinka is at Indiana University, Bloomington (ctrzcink@indiana.edu). We thank Amber Anand, Warren Bailey, Robert Battalio, Jeff Harris, Craig Holden, Bob Jennings, Peter Lerner, Qing Ma, Maureen O'Hara, Anna Obizhaeva, Gideon Saar, Sophie Shive, Konstantin Tyurin, Russ Wermers, and seminar participants at Cornell University, Indiana University, Syracuse University, and University of Notre Dame for helpful comments. We also thank Andy Puckett and John Hallinger for advice on the data, Jeff Bacidore for insights into institutional trading, Yifei Mao for research assistance, and Ancerno Ltd. and Thomson Reuters for providing data.

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Abstract

We find wide dispersion in trade holding periods for institutional money managers and pension funds, using a large database of fund-level transactions. All of the institutional funds execute round-trip trades lasting over a year; 96% of them also execute trades lasting less than one month, although short-duration trades have negative returns on average. We find only limited evidence that institutions choose trade holding periods based on portfolio optimization and no evidence that short-duration institutional trades are driven by the disposition effect. Our results are consistent with the agency problem that arises when clients cannot distinguish when a manager is "actively doing nothing" versus "simply doing nothing" as well as managers having overconfidence in their own short-term trading ability.

1. Introduction

This paper is an empirical investigation of how long institutions hold equities. Many theories and empirical studies in the finance literature are related to institutional holding periods, though none to our knowledge address the question of how institutions choose how long to hold a trade. In corporate finance, empirical studies routinely use the percentage of common stock held by institutions as a proxy for the sophistication of the investors holding the security, typically finding that companies held by "long term" institutions are better priced. Empirical studies find that stocks held by institutions are better governed (Chung and Zhang, 2011), more efficiently priced (Boehmer and Kelley, 2009), and have lower agency costs (Wang and Nanda, 2011) than stocks held by retail investors. In contrast, the literature on delegated portfolio management offers substantial evidence that institutions do not make decisions based on information or portfolio optimization. Mutual funds appear to select stocks based on familiarity (Coval and Moskowitz, 1999), sell stocks based on the disposition effect (Frazzini, 2005), engage in transactions solely for the purpose of presenting a more favorable list of stocks ("window dressing") (Sias and Starks, 1997), and earn risk-adjusted returns lower than simple passive strategies (Gruber, 1996).[1] For pension funds, the available evidence paints a similar picture (Lakonishok, Shleifer, Thaler, and Vishny, 1991). Yet there has been little examination of the actual trading patterns of institutions as a window into whether their behavior indicates that they are informed optimizers.

The purpose of this paper is to examine the trade holding periods (durations) of institutions that buy and sell common stock.[2] We believe that the pattern of trade durations will inform the disparate views of institutions and may help to resolve some of the controversy over whether they behave as rational optimizers or exhibit agency problems and behavioral biases. If institutional trading is largely determined by portfolio managers acting as rational optimizers, we expect to see more short-duration trades when

[1] A recent exception to the generally negative assessment of fund managers is provided by Berk and van Binsbergen (2012), who find evidence that mutual fund manager skill exists and is persistent.

[2] Throughout this paper we use the terms "trade holding period" and "trade duration" interchangeably to describe the amount of time from entry to exit in a round-trip trade. See Section 3.1 for a description of the identification of round-trip trades.

market volatility is higher, fund flow volatility is higher, and trading costs are lower. Furthermore, we expect informed traders to choose the holding period that maximizes the advantage of their information. If institutional trading is also affected by agency problems and behavioral biases, we expect to see the desire to demonstrate activity leading to short-duration trades with low returns, the disposition effect leading to higher realized returns in short-duration trades relative to longer-duration trades, or, alternatively, overconfidence leading to short-duration trades that have low returns.[3]

Using a proprietary database of the daily U.S. equity transactions of over 4000 institutional money managers and pension funds, we match stock purchases and sales within each fund to identify the holding periods and returns of over 120 million round-trip trades between 1999 and 2009. For our trade duration analysis we focus on the subset of funds present in the database for at least five years: 1186 funds responsible for over 105 million round-trip trades, with a total volume of over 292 billion shares. We find a surprising incidence of short-duration trades: over 96% of the institutional funds execute round-trip trades lasting less than one month, and in aggregate over seven percent of the volume occurs in trades that are held for less than one month (23% occurs in trades that are held for less than three months). The prevalence of short-duration trades appears surprising in light of the typically low annual turnover rates for mutual funds and pension funds.

Our empirical results provide limited support for the idea that institutions make trading decisions based on portfolio optimization. For example, we find some evidence of shorter holding periods during times of higher market volatility, when the cost of being at a suboptimal portfolio allocation may be greater. But institutions appear to hold their trades longer when fund flow volatility is higher and hold illiquid stocks for shorter periods, all else equal, contrary to the rational optimizer predictions. We find little support for the disposition effect as a driver of short-duration trades. While some short-duration trades have high returns, short-duration trades have negative returns on average and many funds engage in unprofitable short-duration trades that do not appear consistent with simply "cutting one's losses." Short-duration trades are not more common following higher returns, suggesting that short-duration trading not

[3] We develop these predictions in Section 2.

driven by attribution-based overconfidence, although it may be due to overconfidence more generally or managers' desire to show they are active. We find evidence of persistent skill and/or information in funds' short-duration trade returns; we also find that some funds are persistently unskilled and/or uninformed. The picture that emerges suggests that the narrative of institutions as informed, sophisticated portfolio optimizers is at best a limited description.

The remainder of the paper is organized as follows. In section 2 we first build a simple model of institutional trading that forms the basis for our hypotheses and then consider deviations from the rational optimizing framework. Section 3 describes our data and sample and details our methodology for identifying round-trip trades. Section 4 presents our core analysis of trade holding periods, and section 5 extends our analysis into holding period returns and return persistence in short-duration trades. Section 6 discusses robustness checks, and section 7 concludes. Two appendices detail the matching of transaction data to CRSP and the implementation of double-clustered standard errors used throughout the paper.

2. Why do institutions trade?

To frame our analysis of institutional trade holding periods, it is useful to begin with a more fundamental question: Why do institutions trade? In the following subsection, we build a model of institutional trading that relates a fund manager's costs and benefits of trading to the holding period of the fund's trades. We then consider several additional factors that influence trade duration and outline testable hypotheses.

2.1 A baseline model

Trading is commonly thought of as related to information, investor flows, transaction costs, and optimization. To study the interplay between optimization and transaction costs, we model as a baseline an institution with no informational advantages and no inflows, outflows, agency problems, or behavioral biases. We assume the institution exists because it provides efficient portfolios at a lower transaction cost than that available to the clients who give it money. It is clear that the means, variances, and covariances defining the efficient set will change over time and that the portfolio manager must periodically change the weights to keep the portfolio efficient, but how often will the portfolio manager rebalance? Shortening the time interval between portfolio revisions reduces the chance of a suboptimal portfolio allocation but also increases the cost of trading. If the moments of the distribution are known with perfect certainty then the revision time is simply whenever the cost of inefficiency is greater than the transaction cost of revision. But since these moments must be estimated and are best known only ex-post, the revision time is random. If trade durations are random variables, can we still describe our stylized institution as optimizing trade holding periods by minimizing costs?

The answer is yes, if we are willing to further assume that the institution is long-lived and costs are stationary. To see this, denote the time between the $(i\text{-}1)^{st}$ and the i^{th} revision as X_i. Let $F(x) = \Pr(X_i \leq x)$ and assume that the random revision times $X_1, X_2, ..$ are independent and identically distributed. This assumption of a stationary distribution of revision times clearly will not be the case in practice, but this baseline assumption lets us focus on revisions as a function of a random transaction cost and the random cost of suboptimality.

The X_i generate a renewal process that is defined by counting the number of revisions in a specified time period. The total time for *n* revisions is the sum $S_n = X_1 + \cdots + X_n$. Associated with the sum is a counting process that simply counts the number of revisions between two points in time. Let N(t) = the number of revisions between time 0 and time t, where N(0)=0. The revisions will generate a cost, Y_i, composed of both a suboptimality cost and a transactions cost of re-aligning the weights. Ex-ante, the Y_i are random for the same reason that X_i are random: means, variances, and covariances are known only with historical data. The pairs, (X_i, Y_i) are random variables, and we will assume that each series is i.i.d. The portfolio manager's problem of choosing the optimal number of revisions over a horizon (0, τ] is one of minimizing costs. Since there are N(τ) revisions, he wishes to minimize the expected costs of N(τ) revisions or:

$$A(\tau) = \mathrm{E}(\sum_{i=1}^{N(\tau)} Y_i)$$

A standard result for the function A(τ) (see Karlin and Taylor, 1998, p. 432) is:

$$\lim_{\tau\to\infty}\frac{A(\tau)}{\tau} = \frac{E(Y_1)}{E(X_1)} \qquad (1)$$

For large τ, the long-run cumulative cost per unit of time is approximately the expected cost of the first revision divided by the time to the first revision.

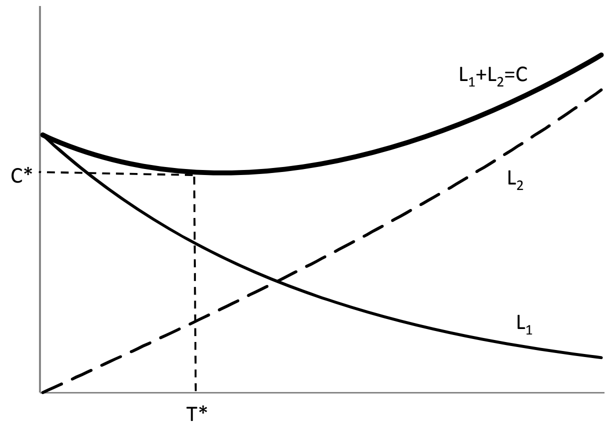
Putting more structure on the numerator of equation (1) gives a clearer picture of the determinants of trade holding periods in the baseline case. Suppose that the transaction cost is a constant, c_1, and the cost of suboptimality, c_2, is a function of time, $c_2=c_2(T)$, where the decreased return and/or increased risk from not revising the portfolio grows over time, or $c_2'(T) \geq 0$. Intuitively the percentage of time that the portfolio is suboptimal is the probability that X_i is less than or equal to T, or F(T), while the fraction of time that the portfolio will not be suboptimal is 1-F(T). We can write:

$$Y_i = \begin{cases} c_1 \, with\ probability\ 1 - F(T) \\ c_2 \ with\ probability\ F(T) \end{cases}$$

That is, if the portfolio becomes suboptimal before the portfolio manager trades, the cost is c_2, otherwise the cost is c_1 from trading. Therefore, $E(Y_1) = c_1[1\text{-}F(T)] + c_2F(T)$ and the expected long-run cost per unit of time using equation (1) is

$$L(T) = \frac{c_1[1-\mathrm{F(T)}] + c_2\mathrm{F(T)}}{E(X_1)} = L_1(T) + L_2(T) \qquad (2)$$

where $L_1(T)= c_1[1\text{-}F(T)]/E(X_1)$ and $L_2(T)=c_2F(T)/ E(X_1)$. Since c_2 and F(T) are monotonically increasing in T and $0 \leq F(T) \leq 1$, we have that $L_1'(T) \leq 0$ and $L_2'(T) \geq 0$. Noting that $L_1(0)= c_1$ and $L_2(0)=0$, we can illustrate the portfolio manager's problem graphically as follows:



The cost minimization yields an optimal trading time, T^*, which is a function of the transaction cost and the cost of suboptimality. A lower transaction cost would shift L_1 downward and shorten the optimal trading time. Faster changes in the efficient set would increase the cost of suboptimality, shifting L_2 upward and shortening the optimal trading time.[4] The baseline institution will therefore have a shorter trade holding period in markets with lower transaction costs and more estimation risk, which is clearly a function of the volatility of means, variances, and covariances.[5]

2.2 Information, investor flows, agency problems, and behavioral biases

In practice, trade durations (represented in the baseline model by the random revision times $X_1, X_2, ..$) are likely not independent and identically distributed. The time interval between revisions may be a function of information advantages, flows into and out of the portfolio, agency problems, and behavioral biases. Below we highlight how each of these issues may affect institutional trade duration.

Institutions with information advantages will trade when the expected profit is greater than the cost of trading. Whether institutions actually have information advantages was first examined by Jensen (1968), who argued there is little evidence that the mutual fund industry produces significant risk-adjusted

[4] Conversations with practitioners confirm that the baseline model developed here captures the intuition underlying the trading decisions of purely quantitative funds, which constantly weigh the trade-off between rebalancing needs and transaction costs, albeit with transaction costs modeled in a more sophisticated way.
[5] It is also plausible that the estimation risk of an efficient portfolio increases with the risk of the efficient portfolio. If transaction costs do not increase with the risk of the portfolio, then the optimal trade holding period will fall as the risk of the efficient portfolio increases and the return increases.

returns. Recent evidence has sharpened the debate. Using bootstrap methods, Kosowski, Timmerman, Wermers, and White (2006) conclude that there is statistically significant evidence of information advantages for some mutual funds, while Fama and French (2010) conclude the opposite. For managers of funds with institutional clients such as pension funds, Busse, Goyal, and Wahal (2010) conclude that there is only weak evidence of informational advantages. Looking specifically at intra-calendar-quarter trading skill, Puckett and Yan (2011) find that institutional round-trip trades that are reversed within a calendar quarter earn significant positive returns, suggesting that fund managers possess trading skill or benefit from short-lived information advantages. At a minimum, it appears that information advantages are rare enough that they are unlikely to explain the majority of trades.

Investor flows into and out of the portfolio are a second potential reason for trading (e.g., Coval and Stafford, 2007). An optimizing fund will quickly respond to investor flows since increasing cash obtained from inflows or holding cash for outflows increases the suboptimality cost for the fund.[6]

Agency problems constitute a third reason for institutional trading. For both mutual fund managers and managers of funds with institutional clients, such as pension funds, lack of transparency and the nature of the industry create a fertile environment for agency problems, initially identified by Lakonishok, Shleifer, and Vishny (1992). Fund managers may engage in window dressing, removing poor performers from a portfolio and/or purchasing stocks that have done well recently to present a more favorable impression of the fund's holdings. This tendency is particularly pronounced at the end of an evaluation period, such as the end of the calendar year, and has received considerable attention in the literature (e.g., Elton, Gruber, Blake, Krasny, and Ozelge, 2010; Lakonishok, Shleifer, Thaler, and Vishny, 1991; and Sias and Starks, 1997). Agency problems may also lead fund managers to trade merely to show that they are doing something. Dow and Gorton (1997) predict that when clients cannot distinguish between when a portfolio manager is "actively doing nothing" (not trading because he finds

[6] The reasons for fund inflows and outflows are themselves a widely studied topic in the finance literature. Sirri and Tufano (1998) are the first to identify the "flow performance" relationship for mutual fund investors, finding that investors respond far more to top performance than to poor performance, while studies examining retail investor flows find that mutual fund redemptions are idiosyncratic and based upon investors' liquidity needs (e.g., Chevalier and Ellison, 1997).

no profitable trading opportunities) versus "simply doing nothing" (not trading out of laziness or shirking), managers trade even though they have no reason to prefer one asset over another. A manager engaging in window dressing strategies or trading to appear active to impress current or prospective investors is likely to make trading decisions without reference to the efficiency of the portfolio. In short, the trading has nothing to do with costs or optimization.

Finally, a recent literature has developed to investigate whether people trade because of behavioral biases. One such documented bias that has direct implications for trade duration is the "disposition effect," which is the tendency of investors to ride losses and realize gains, based on prospect theory and mental accounting. The disposition effect was initially documented as a behavioral bias of individuals (Shefrin and Statman, 1985), but Frazzini (2005) finds evidence that mutual fund managers are subject to the disposition effect in his study of post-earnings announcement drift. Overconfidence, the tendency of investors to trade frequently but unprofitably, has been documented among individual investors (e.g., Barber and Odean, 2001; Odean, 1999), but not among institutional portfolio managers to our knowledge.[7] Overconfidence suggests that short-duration trades should have low returns, while the disposition effect suggests they should have high returns. Other studies find mutual fund managers exhibiting a range of behavioral biases. Coval and Moskowitz (1999, 2001) document managers' preference to invest proportionately more in the stock of companies whose headquarters are located near the mutual fund. Pool, Stoffman, and Yonker (2012) find that stocks of firms located in the state where the portfolio manager grew up are disproportionately represented in the manager's portfolio. Bailey, Kumar, and Ng (2011) show that behavioral biases of investors spill over into their choice of mutual fund investments, which in turn could affect the holdings of these funds. With the exception of the disposition effect and overconfidence, these behavioral biases do not lead to specific predictions about the length of trade holding period of funds (except perhaps to prefer a longer holding period), but they generally

[7] In a recent study of Swedish mutual fund managers, Bodnaruk and Simonov (2012) find that managers exhibit a negative disposition effect (selling losers and holding onto winners) in their personal portfolios, but they do not examine trades in the mutual funds. Although not directly related to fund management, Graham & Harvey (2003) find that chief financial officers, a group that should be more sophisticated, exhibit overconfidence.

suggest that trading strategies are chosen for reasons other than those captured in our baseline model of the rational optimizer.

2.3 Hypotheses

Informed optimizer. If institutional trading is responsible for increased efficiency in security pricing, we expect to find evidence that trading horizons are related to portfolio optimization, fund flows, and information. We refer to this description as the "informed optimizer" hypothesis.

The baseline model suggests that when transaction costs are lower or volatility is higher, institutions should trade more frequently. This has several implications for the frequency of trades of different holding periods. Institutions should choose longer holding periods for stocks with higher transactions costs.[8] Times of higher market volatility should lead to an increase in short-duration trades, as the cost of having a sub-optimal portfolio allocation is greater when volatility is higher. Furthermore, optimizing institutions should quickly respond to investor flows because holding cash positions for outflows or enlarging cash positions for inflows reduces portfolio efficiency. Thus higher volatility in mutual fund flows should result in more short-duration trading.

The baseline model predicts that there should be no relation between returns and trading horizon, because all optimizers choose efficient portfolios and optimize trade holding periods based on costs. Extending the rational optimizer intuition to the case where institutions have information, fund managers should choose the holding period that maximizes the advantage of the information. Since some information is likely to be short-lived and other information is likely to be long-lived, institutions optimizing based on their informational advantages should not in aggregate lead to systematic patterns of returns across different holding periods unless it is the case that the majority of information has a particular lifespan.

[8] Goncalves-Pinto (2009) derives a similar prediction in a model of delegated portfolio management with fund-flow-to-performance, finding that a liquidity-constrained money manager engages in more active trading in more liquid assets.

Behavioral rent-seeker. The competing description of institutional investors is that they do not make decisions based on informed optimization but rather allow agency problems and behavioral factors to drive their portfolio choices. We refer to this description as the "behavioral rent-seeker" hypothesis.

If managers engage in trades that are not optimal, they will increase transaction costs and reduce the efficiency of the portfolio. This implies that trades related to behavioral, rent-seeking strategies will have low returns and managers will not be responsive to fund flows since the efficiency of the portfolio is not as important as other factors. If we assume that the reference point is the price at which a trade is initiated, the disposition effect implies that shorter duration trades should have higher returns and longer duration trades should have lower returns, as portfolio managers sell winners and hold on to losers. Overconfidence implies that short-duration trades should have lower returns, as overconfident investors have a propensity to trade frequently but unsuccessfully. Trading simply to show that a portfolio manager is active should also lead to more short-duration trades with low returns, as they are undertaken for reasons other than maximizing returns. Window dressing could lead to low returns on either long- or short-duration trades, as window dressing has no direct implications for how long trades are held.

3. Data, Methodology, and Sample

We obtain institutional trading data from Ancerno Ltd., a widely recognized consulting firm that monitors execution trading costs for institutional clients. In order to provide execution cost analysis, Ancerno collects detailed transaction information for all equity transactions executed by each client. Ancerno's clients include pension funds (such as CALPERS, the Commonwealth of Virginia, and the YMCA retirement fund) and money managers (such as Massachusetts Financial Services, Putnam Investments, Lazard Asset Management, and Fidelity).[9] We also collect stock data and mutual fund turnover statistics from the Center for Research in Securities Prices (CRSP), pension fund turnover

[9] Previous academic studies that use Ancerno data include Anand, Irvine, Puckett, and Venkataraman (2012), Goldstein, Irvine, Kandel, and Wiener (2009), and Puckett and Yan (2011). Puckett and Yan (2011) estimate that Ancerno clients represent approximately 10% of all institutional trading volume in the period 1999 to 2005.

statistics from Mobius Group, and mutual fund flow data from the Lipper U.S. Funds Flow database, provided by Thomson Reuters.

3.1 Identifying Round-Trip Trades

To identify round-trip trades and their holding periods, we match buy and sell transactions for the same stock within the same fund. In this section we describe the two methods by which we match buy and sell transactions: first-in-first-out (FIFO) and last-in-first-out (LIFO). There is no clear consensus on which method should be used to match buy and sell transactions into round-trip trades. On one hand, a consultant to institutional fund managers told us that "the clock starts when you enter the trade," implying the FIFO approach may be more appropriate. On the other hand, LIFO may more accurately capture the change in opinion or information that causes a manager to switch from buying to selling or vice versa. In most of our analyses, the FIFO and LIFO trade matching methodologies yield identical inference, so we present only results based on the FIFO methodology; where the results differ materially we present and discuss both.

From the Ancerno database, we obtain the following information for each transaction: the ticker symbol of the security (*symbol*), the transaction date (*tradedate*),[10] the identifier for the institution (*clientcode*), such as Fidelity or Putnam, the identifier for the fund within an institution (*clientmgrcode*), such as Fidelity Magellan or Fidelity Equity Income fund, the transaction direction (*side*, which is 1 for buy and -1 for sell transactions), volume of shares transacted (*volume*), and transaction price (*price*). All *clientcodes* and *clientmgrcodes* are expressed as numbers, so although we can identify all the transactions executed by the same institution or the same fund, we cannot determine the identity of the institution or fund. For each *symbol-clientcode-clientmgrcode* combination, we use data from January 1997 to December 2009 to identify round-trip trades. A round-trip trade for a stock is defined as a purchase and a sale of the same number of shares in the same fund (identified by *clientcode-clientmgrcode*).

[10] Because the intraday timestamps in Ancerno are incomplete (e.g., Anand, Irvine, Puckett, and Venkataraman, 2011), we identify intraday trades only as round-trip trades in which both the buy and sell transactions occur within the same day; we cannot determine precisely for how many hours or minutes they are held.

To identify the FIFO-based (LIFO-based) round-trip trades, we assemble the transaction information for each *symbol-clientcode-clientmgrcode* combination chronologically into a queue, and when a transaction in the opposite direction enters the queue, we match it with the earliest (most recent) existing transaction in the queue. The number of trading days between the buy transaction and the sell transaction is the holding period of the round-trip trade, and the number of shares bought and sold (which are equal under the definition of a round-trip trade) is the round-trip trade quantity. Below we provide examples of our FIFO and LIFO trade matching procedures.

Exhibit A shows that *clientmgrcode* (fund) 131 of *clientcode* (institution) 515 made ten purchases (and no sales) of the stock Amgen Inc. (symbol = AMGN) over the period March 19, 1998 through December 16, 1998, at prices ranging from a low of $56.56 to a high of $86.22. Then on March 25, 1999, this fund made two sales of AMGN, one at $75.27 for 500 shares and the other at $75.14 for 2400 shares.

<u>Exhibit A: Buy and sell transactions</u>

Symbol	tradedate	clientcode	clientmgrcode	side	volume	price
AMGN	1998-03-19	515	131	1	800	60.96
AMGN	1998-04-07	515	131	1	700	57.62
AMGN	1998-04-17	515	131	1	700	57.11
AMGN	1998-04-22	515	131	1	700	57.63
AMGN	1998-04-27	515	131	1	700	56.56
AMGN	1998-05-04	515	131	1	700	58.33
AMGN	1998-05-11	515	131	1	600	59.47
AMGN	1998-12-15	515	131	1	400	81.72
AMGN	1998-12-15	515	131	1	600	82.90
AMGN	1998-12-16	515	131	1	800	86.22
AMGN	1999-03-25	515	131	-1	500	75.27
AMGN	1999-03-25	515	131	-1	2400	75.14

Exhibit B presents the round-trip trades arising from the buy and sell transactions in Exhibit A using FIFO matching. From March 19 through December 16, 1998, all the buy transactions enter our trade calculation queue. Since there are no sell transactions for this *symbol-clientcode-clientmgrcode* combination in 1998, there are no round-trip trades in 1998. We match the first sell transaction for 500 shares on March 25, 1999 (*tradedate*) to the first buy transaction in our queue, which occurred on March 19, 1998 (*matchtradedate*), to generate the first round-trip trade of 500 shares. The holding period (*rtdays*) for this round-trip trade is 257 trading days, the buy price (*bp*) is $60.96, and the sell price (*sp*) is $75.27. The next sale of 2400 shares is matched to the 300 shares left over from the trade on March 19, 1998, and three transactions of 700 shares each, on April 7, April 17, and April 22, 1998. There are 3,800 shares left in the queue, ready to be matched against incoming sell transactions.

Exhibit B: FIFO-matched round-trip trades

Symbol	client_mgr	tradedate	matchtradedate	volume	rtdays	bp	sp
AMGN	515_131	1999-03-25	1998-03-19	500	257	60.96	75.27
AMGN	515_131	1999-03-25	1998-03-19	300	257	60.96	75.14
AMGN	515_131	1999-03-25	1998-04-07	700	244	57.62	75.14
AMGN	515_131	1999-03-25	1998-04-17	700	237	57.11	75.14
AMGN	515_131	1999-03-25	1998-04-22	700	234	57.63	75.14

Exhibit C presents the round-trip trades arising from the buy and sell transactions in Exhibit A using LIFO matching. The difference from the FIFO matching procedure is that under LIFO, when a transaction in the opposite direction enters the queue, we match it with the most recent (rather than the earliest) existing transaction in the queue.

Exhibit C: LIFO-matched round-trip trades

Symbol	client_mgr	tradedate	matchtradedate	volume	rtdays	bp	sp
AMGN	515_131	1999-03-25	1998-12-16	500	68	86.22	75.27
AMGN	515_131	1999-03-25	1998-12-16	300	68	86.22	75.14
AMGN	515_131	1999-03-25	1998-12-15	600	69	82.90	75.14
AMGN	515_131	1999-03-25	1998-12-15	400	69	81.72	75.14
AMGN	515_131	1999-03-25	1998-05-11	600	221	59.47	75.14
AMGN	515_131	1999-03-25	1998-05-11	500	226	58.33	75.14

As in this example, the FIFO and LIFO methodologies generally lead to different round-trip trade matching.[11] We conduct all of our analyses on both sets of round-trip trades, and where the results for FIFO- and LIFO-based round-trip trades differ materially we present and discuss both.

We note that the Ancerno dataset has no information on a fund's holdings at any time; only transactions are reported to Ancerno. Our method effectively initializes each *symbol-clientcode-clientmgrcode* combination with zero shares, and we discard the first two years of the dataset to minimize the effect the initialization may have on our identification of round-trip trades. All of our analyses are based on round-trip trades from the sample period January 1999 to December 2009.

[11] The two methods would yield identical sets of round-trip trades only if a fund executes either only one buy and one sell transaction in a stock or alternating buy and sell transactions of identical size for the entire period, which rarely occurs in practice.

We apply the following filters to remove potentially misleading or erroneous trades. We discard all trades with *clientcode* equal to zero, which indicates that Ancerno cannot reliably track the fund over time. We also discard trades with buy price or sell price less than one cent. To ensure that the number of shares traded and the trade prices are comparable between the buy and sell dates, we exclude round-trip trades in which the buy and sell dates straddle a stock split date, e.g., the stock was bought before a split date and sold after the split date.[12] Approximately 6% of the FIFO round-trip trades (5% of the LIFO round-trip trades) are eliminated from our sample by this screen; fewer LIFO trades are eliminated because they tend to be shorter and span fewer of the stock split dates.

3.2 Calculating Returns

We calculate the raw return for each round-trip trade as the percentage price change over the holding period. We also calculate a market-adjusted return for each round-trip trade by subtracting the return on the S&P 500 index over the trade holding period from the round-trip trade's raw return.

3.3 Sample Descriptive Statistics

Table 1 presents descriptive statistics for the full sample of round-trip trades and for the subsample of trades made by funds that are present in the Ancerno universe for at least five years. A natural concern when analyzing trade holding periods is whether the incidence of short-duration trades is unduly influenced by the presence of funds that remain in the universe for only a short period of time. For example, we cannot observe round-trip trades longer than one year for a fund that is in the universe for only one year. Of the 4053 unique funds appearing in the universe between 1999 and 2009, 1059 funds are present for only one year or less, and 1186 funds are present for five or more years. In Table 1 we present descriptive statistics for both the full sample of 4053 funds and the subsample of 1186 funds that

[12] From CRSP, we identify 4800 stock splits and stock dividends (CRSP DISTCD = 5523, 5533, 5543) involving 2795 stocks in our sample. (See Appendix for details of matching Ancerno data to CRSP.) We note that the inclusion of dividend distributions in this filtering treatment is a conservative approach. If managers typically keep the shares they receive as a stock dividend, retaining trades straddling dividend dates will affect the quantity in the calculation of round-trip trades; however, if managers automatically convert dividend distributions into cash, stock dividends would be immaterial to our round-trip trade calculations. Since we cannot identify which action specific managers adopt with respect to stock dividends, we discard all round-trip trades straddling stock dividend distributions as well as stock splits.

are present for at least five years, which are the focus of our study; in the remainder of the paper we present results only for the sample of funds present for at least five years.

[Table 1 here]

Panel A of Table 1 shows that the 4053 funds in the full sample belong to 772 distinct institutions; the subsample of 1186 funds present for five or more years belong to 324 distinct institutions. In both samples the median institution has three funds. In the full sample, there are over 329 billion shares and over $10 trillion in round-trip trades.[13] Although only 29% of the funds in Ancerno are present for five or more years (1186 of the 4053 funds), they account for about 89% of the share volume and dollar volume in the full sample. These long-lived funds also trade over 96% of the stocks traded in the full sample. In both the full sample and the subsample of funds present five or more years, the majority of the funds are pension funds, but the majority of trading is done by money managers. For example, among the funds present five or more years, money managers represent only seven percent of the funds but account for over 93% of the share volume traded. We analyze money managers and pension funds separately because their differences may lead to different inference (e.g., Lakonishok, Shleifer, and Vishny, 1992).

Panel B of Table 1 shows that the trades in both the full sample and the subsample of funds present for five or more years are heavily weighted towards large-capitalization stocks. Over 80% of the share volume in each sample occurs in stocks in the two largest market-capitalization deciles, while less than half a percent of the share volume occurs in the two smallest deciles. This pattern of much higher institutional trading volume in large-cap stocks is consistent with the literature on institutional holdings. For example, Lewellen (2011) finds that between 1980 and 2007, large-cap stocks (above the NYSE 80th percentile) account for over 80% of institutional holdings, while micro-cap stocks (below the NYSE 20th percentile) constitute about 1% of total institutional holdings.

[13] We note that the number of round-trip trades, also reported in the table for completeness, may not be as informative as the volume statistics, both because the average size of equity trades falls considerably during the sample period (Chordia, Roll, and Subrahmanyam, 2011) and because in some cases our identification of round-trip trades counts orders that are executed in multiple pieces as separate trades. Hvidkjaer (2008) provides evidence that institutions increasingly engage in order splitting strategies resulting in more small trades originating from large institutional investors.

Before turning to the analysis of how long institutions hold their trades, it is useful to consider what we already know about institutional turnover. Table 2 presents mean and median fund turnover statistics for mutual funds for the length of our sample period and for pension funds for most of the period.[14] The time-series averages of the mean and median turnover percentages in both types of institutional funds are below 100%, with pension funds generally exhibiting lower turnover than mutual funds. But there may be considerable dispersion in trade holding periods within and across funds. For example, a turnover rate of 100% could arise from a fund trading all of its positions once a year, or trading half of its positions twice a year and not trading the other half of its positions, or a wide array of other combinations of short- and long-duration trades. Clearly, the greater the dispersion of trade durations that make up a turnover rate, the less informative is the turnover rate about trade durations.[15] Our dataset of round-trip trades at the fund level provides a window into the trade durations behind fund turnover numbers.

[Table 2 here]

Table 3 presents the breakdown of institutional round-trip trades by holding period, from less than one day to four or more years. Panel A shows the breakdown for round-trip trades identified using the FIFO method, and Panel B shows analogous breakdowns using the LIFO method. The columns labeled "Aggregate Shares" in each panel report holding-period share percentages calculated across all trades in each sample. A significant portion of trades are held for short holding periods. For example, using the FIFO method (Panel A), over seven percent of share volume occurs in trades with round-trip durations of less than one month and over 23% of share volume occurs in round-trip trades lasting less than three months (see Aggregate Shares, Cumulative % column). Using the LIFO method to identify round-trip trades results in even more short-duration trades, mainly for the mechanical reason that the LIFO method matches a transaction to its most recent preceding opposite-side transaction, rather than the

[14] The pension fund dataset provided by Mobius Group, from which we derive these statistics, ends in 2008.
[15] Investment Management Association (2011) points out that both the SEC and its European equivalent explicitly state that a fund's turnover rate is meant only to give investors a sense of how portfolio turnover and resulting transaction costs affect fund performance, not to give an indication of trade holding periods.

longest-ago opposite-side transaction under FIFO. Panel B shows that, using the LIFO method, over 32% of share volume occurs in trades held less than one month and over 51% in trades held less than three months (Aggregate Shares, Cumulative % column). Within these categories, the incidence of trades lasting less than one day (0.32% of FIFO and 6.37% of LIFO share volume) is particularly surprising for institutional money manager and pension fund portfolios.

Further insight is provided by the cross-sectional fund-level statistics in the last four columns of Table 3, which report the mean and median across the individual funds' cumulative percentages. While the mean and median fund-level cumulative percentages are broadly in line with the aggregate cumulative percentages, money managers on average do more short-duration trades than pension funds, and the shortest duration trades are clearly more concentrated in a smaller number of funds.[16] For example, Panel B shows that in aggregate 17.45% of share volume occurs in LIFO trades held less than one week (Panel B, Aggregate shares, Cumulative %), but the average money manager and pension funds, respectively, have only 8.77% and 2.35% of their share volume in trades held less than one week. Because our hypotheses concern the behavior of individual fund managers, our subsequent analysis will examine fund-level behavior as well as the aggregate sample of trades.

[Table 3 here]

Together, Tables 2 and 3 suggest that although the average trade holding period (reflected in turnover statistics in Table 2) for institutional funds is much longer, many institutional money managers undertake a significant number of short duration trades (Table 3). Figure 1 provides further insight into the prevalence of short-duration trades at the fund level. The incidence of short-duration trades is not driven by only a few extremely active funds in the Ancerno universe: Of the 1186 funds that are present for five or more years, only 42 of the funds engage in no round-trip trades lasting less than one month based on the FIFO method of identifying round-trip trades (top graph). Of the other 1144 funds, trades lasting less than one month account for up to 10% of trading volume in 994 funds, 10% to 20% of trading

[16] Note that the aggregate share measures simply sum across all shares traded, irrespective of the funds in which they occur, so they are not equal to the sum of the mean for money managers and the mean for pension funds.

in 106 funds, and over 20% in the remaining 44 funds. The remaining graphs in Figure 1 depict the analogous fund frequency distributions for trades defined under the LIFO method and for trade holding periods of less than three months.

[Figure 1 here]

Why do institutional fund managers engage in these short-duration trades? The evidence on the relationship between turnover and performance is mixed. Grinblatt and Titman (1989) and Lakonishok, Shleifer, and Vishny (1992) document a positive relation between turnover and portfolio performance, while Carhart (1997) finds a negative relation between turnover and net mutual fund returns. At the stock level, Datar, Naik, and Radcliffe (1998) and Lee and Swaminathan (2000) find that, on average, low turnover stocks earn higher returns than high turnover stocks. In the following two sections we examine several hypotheses regarding the frequency and returns of trades with different holding periods in an attempt to understand why institutions that generally hold long-term portfolios engage in short-duration trades.

4. Informed optimizer results

This section examines the hypotheses that are derived from the notion of the institutional fund manager as an informed optimizer. If fund managers behave as informed optimizers, we expect to see shorter trade holding periods when market volatility is higher and when fund flow volatility is higher. We also expect to see longer trade holding periods for stocks that are more illiquid, and no relation between holding period and trade return.

Table 4 presents the results from Fama-MacBeth style regressions of fund-level trade holding periods on market volatility (measured by the volatility of the S&P 500 index), fund flow volatility (measured by the volatility of Lipper mutual fund flows), illiquidity (measured by the Fong, Holden, and Trzcinka, 2012, FHT illiquidity measure), and trade return, controlling for trade size relative to a fund's average trade size. All of the explanatory variables are standardized (by subtracting the variable's mean and dividing by its standard deviation), so coefficient estimates indicate the change in holding period in days for a one standard deviation change in the explanatory variable. We run a separate regression for each of the 1186 funds, then report the mean coefficient values and related statistics across the 84 money manager funds (left columns) and the 1102 pension funds. Panel A presents the results for FIFO-based round-trip trades, and Panel B presents the results for LIFO-based round-trip trades.

[Table 4 here]

The relation between market volatility and trade holding period is negative for pension funds, consistent with the informed optimizer prediction, but insignificant for money managers. Contrary to the informed optimizer predictions, both money managers and pension funds have longer trade holding periods when mutual fund flow volatility is higher. In terms of liquidity, we find no support for the informed optimizer prediction of longer holding periods for more illiquid stocks: money manager FIFO trades and both LIFO and FIFO trades of pension funds have shorter holding periods for more illiquid stocks, while money manager LIFO trades show an insignificant relation between holding period and stock illiquidity. Finally, we find a strong positive relation between trade return and trade holding period, contrary to the informed optimizer prediction that fund managers should choose the most profitable holding period for each trade, leading to no relation between holding period and return. Not only is the relation between return and holding period strongly positive, it is also the largest coefficient among all of the explanatory variables in each regression.[17]

5. Behavioral rent-seeker results

In this section we examine predictions derived from the depiction of fund managers as behavioral rent-seekers. We first examine the distribution of short-duration trades during the year, and then move on to analyze in more detail the positive relation between trade returns and trade holding periods that emerged above.

Figure 2 presents the calendar-month distribution of trades that are held for less than one month as a percentage of all trades initiated in the month. While the informed optimizer model does not predict

[17] Because the explanatory variables are standardized, the relative magnitude of their coefficients can be compared across explanatory variables.

any seasonality in trade holding periods, some behavioral rent-seeker explanations could give rise to seasonality in the distribution of trade durations. For example, window dressing would be expected to induce more trading near year-end, which could lead to a higher proportion of short-duration trades if the positions are held only temporarily. Figure 2 shows that the amount of observed seasonality depends on the type of fund, with money managers showing an increase in short-duration trades in the fourth quarter and pension funds showing less variation across months. The two graphs in Figure 2 also show that the seasonality is sensitive to the method used to identify round-trip trades, with more seasonality apparent under the FIFO than under the LIFO method. (Note that as in the tables, the money manager and pension fund values report the mean values across funds, which do not sum to the aggregate trade statistics.)

[Figure 2 here]

While the informed optimizer depiction of institutional fund managers predicts no relation between trade holding periods and returns, the behavioral rent-seeker depiction suggests several possible relations. The disposition effect predicts that institutional managers will sell winners and hold on to losers, which would result in higher returns for shorter-duration trades and lower (or negative) returns on longer-duration trades. In contrast, the overconfidence hypothesis suggests that short-duration trades should have low returns, as overconfident managers tend to trade frequently but unprofitably. Trades undertaken to show that fund managers are active are also expected to have low returns, as they are undertaken for reasons unrelated to profit maximization and on average are likely to lose the bid-ask spread.

Table 5 presents average raw returns (Panel A) and market-adjusted returns (Panel B) for round-trip trades by their holding periods; trade returns are weighted by principal amount (initial share price times number of shares) within each holding period category. The first two columns of each panel (labeled "Aggregate Trade Returns") report average raw and market-adjusted returns across all trades in each holding period category. The last eight columns of each panel (labeled "Fund-level Trade Returns") examine the dispersion of trade returns across funds, by calculating the raw and market-adjusted returns for the trades of each fund in each holding period category and presenting the mean and median fund returns for money managers and pension funds separately. We note that we report returns as the percentage price change in the stock, ignoring explicit transaction costs such as commissions, so the returns calculated here should be viewed as the upper limit on a trade's true profit.

[Table 5 here]

The aggregate trade returns columns in Table 5 show that with the exception of intraday trades, the average raw and market-adjusted return is generally lower for trades held less than two years than for trades held longer than two years. Furthermore, average returns for trades held longer than one day and less than one year are generally negative, even on a market-adjusted basis.[18] The fund-level trade returns columns show the mean and median returns across the short-duration trades of funds are also negative except for the intraday trades. The results in Table 5 do not support the informed optimizer prediction of equal returns across trade holding periods. Neither do the results show much evidence of the disposition effect, i.e., that managers sell winners and hold onto losers; however, it is worth noting that our interpretation of the disposition effect assumes that the purchase price is the reference point.[19] The results are broadly consistent with the overconfidence hypothesis of managers trading frequently and unprofitably, but they could also reflect the agency costs of short-duration trades undertaken for reasons such as to show that managers are active. Overall, the pattern of returns raises an important question: Why are institutional investors engaging in so many short-duration trades, which do not appear to generate positive returns and appear inconsistent with our general impression of institutional money managers and pension funds as long-term investors with low turnover?

One potential explanation is that fund managers may unwind loss-making trades early because they receive new information suggesting that the trades will be even more unprofitable over the longer term, so they "cut their losses." To examine this possibility, in Table 6 we perform the following simulation. For each trade that is held for less than one month in Table 5, we calculate what its return

[18] Puckett and Yan (2011) find that fund managers earn positive returns on round-trip trades that occur completely within a calendar quarter, which are a subset of the short-duration trades held less than three months in our sample.
[19] Our results are consistent with Ben-David and Hirshleifer's (2012) finding that, contrary to the standard predictions of the disposition effect, at short holding periods individual investors are more likely to sell stocks with big losses than those with small losses.

would have been if it had been held for a full year (the point where the average fund-level return turns positive in Table 5). For example, if a trade was initiated on January 15, 2006, and closed out on February 1, 2006, we calculate its hypothetical return if it had instead been held from January 15, 2006 to January 15, 2007.

[Table 6 here]

The results in Table 6 show that both in aggregate and at the fund level, the mean and median trades that were actually held less than one month would have produced a positive return had they been held for a full year. This suggests that the negative returns earned on short-duration trades are not explained by fund managers cutting their losses in light of new information they receive shortly after they initiate trades.

Although short-duration trades do not earn positive returns on average, some funds do earn positive returns in each holding period category (e.g., in Table 5 the 75th percentile is positive in most holding period categories), which could be due to trading skill, information, or simply luck. To examine the extent to which information or skill can explain the fund-level results, we examine the persistence of funds' short-duration trade performance in Table 7.

[Table 7 here]

Table 7 presents the results of tests for return persistence for short-duration trades at the fund level. In each semiannual period we sort funds into quintiles based on their performance for short-duration trades held less than one day (Panels A and B) or less than three months (Panels C and D). Note that the returns reported are for a particular category of trades within each fund, not for the fund's overall performance.[20] We report the average market-adjusted return for funds in each quintile in the base semiannual period (when the quintiles are assigned) and in the four subsequent semiannual periods. For example, Panel B shows that the best-performing quintile of pension funds in trades lasting less than one day earned an average of 7.10% in the base period (Panel B, Q5 row, Base period column), while the

[20] Because we do not have information about a fund's holdings, only its transactions, we cannot calculate a fund's overall performance.

worst-performing quintile of funds earned an average of -5.30% (Panel B, Q1 row, Base period column). The difference of 12.41% between the best and worst-performing quintiles is statistically significant, with a *t*-statistic of 8.1. Although the differences are smaller in subsequent semiannual periods, they are statistically significant one and three periods later, suggesting that pension funds do benefit from persistent skill or information advantages in their shortest-duration trades. The subsequent outperformance is driven by the outperformance of funds in Quintile 5, while the Quintile 1 funds exhibit subsequent returns that are not significantly different from zero. Panel A shows less return persistence for the intraday trades of money managers, with return differences not significantly different from zero in the four semiannual periods following quintile formation. The weaker significance for money managers may in part reflect the small number of money managers in the sample: 84 money managers versus 1102 pension funds.

Panels C and D of Table 7 present analogous tests for money managers and pension funds based on trades lasting less than three months. Short-duration trade return persistence continues to be stronger for pension funds, though the broader definition of short-duration trades reveals significant persistence for money managers, too. In contrast to the intraday trades (Panels A and B), for trades held less than three months (Panels C and D), the subsequent outperformance of Quintile 5 over Quintile 1 is generally driven by the underperformance of funds in Quintile 1. Panels C and D show that those funds with the least skill in trades lasting less than three months generally continue to exhibit poor returns in the subsequent four semiannual periods, which suggests that overconfidence or trading to appear active is also persistent and often involves money-losing trades, likely reflecting high bid-ask spreads.

The return persistence demonstrated by funds' short-duration trades in Table 7 is consistent with both Odean's (1999) overconfidence theory and Dow and Gorton's (1997) agency theory of trading to appear active. To further investigate the overconfidence explanation, we examine the link between returns and subsequent short-duration trading activity. When combined with attribution bias, overconfidence predicts that following a period of high (low) realized returns, investors mistakenly attribute the returns to their own skill and as a consequence tend to trade more (less) in subsequent periods (Gervais and Odean, 2001). Trading to appear active predicts no relation between returns and subsequent trading activity. In Table 8 we sort funds into quintiles based on their short-duration trade returns in the base period (as in Table 7), but we report the average percentage of short-duration trading (rather than the trade returns) in each subsequent period in the table. In most cases the amount of short-duration trading is not higher in subsequent periods for funds with the highest base-period returns (Quintile 5) than for funds with the lowest base-period returns (Quintile 1). The only three subsequent-period observations with significant Quintile 5 minus Quintile 1 differences occur for money managers and provide mixed results: for trades held less than one day (Panel A) the difference is significantly positive two periods after the base period (consistent with overconfidence), but for trades held less than three months (Panel C) the difference is significantly negative two and four periods after the base period. Overall, the picture that emerges suggests that whatever overconfidence fund managers may be exhibiting is not directly related to attribution bias.

[Table 8 here]

6. Robustness checks

Results for the full sample of funds in the Ancerno universe (4053 funds) are qualitatively similar to those presented in the paper (which are based on the 1186 funds present for five or more years), with the exception that the full sample implies that a larger proportion of trades are short-duration, because funds that are present for only a short period of time can contribute only short-duration trades. For brevity, in most tables we present only results using the FIFO method to identify round-trip trades; results using the LIFO method yield identical inference except where both FIFO and LIFO results are presented. Results are not driven by the financial crisis of 2008; all results are qualitatively similar when 2008 is dropped from the sample period. Alternative measures of market-wide volatility including the VIX index and range-based measures of S&P 500 index volatility yield qualitatively similar results. Using the Amihud (2002) measure of illiquidity leads to qualitatively similar results as the FHT measure of illiquidity presented here. Defining short-duration trades alternatively as trades held for less than one week or less than one month does not change the inference from the return persistence or overconfidence analyses (Tables 7 and 8). All results involving trades held for up to one week, up to one month, and up to three months are robust to dropping intraday trades.

7. Conclusion

Examining the daily U.S. equity trades of 1186 institutional funds present in the Ancerno database for at least five years, we identify holding periods and returns of over 105 million round-trip trades between 1999 and 2009, with a total volume of over 292 billion shares. We find wide dispersion in trade holding periods. All of the institutional funds execute round-trip trades lasting over a year, and 96% of them also execute trades lasting less than one month. In aggregate over seven percent of volume occurs in trades that are held for less than one month (23% are held for less than three months). Within the less-than-one-month category are a significant number of trades that are held for less than a week and even less than one day. The prevalence of short-duration trades appears surprising in light of the typically low turnover rates for mutual funds and pension funds.

While there is some evidence that holding periods are shorter when market volatility is higher, the pattern of holding periods otherwise appears broadly inconsistent with the predictions of a model of institutional investors as rational informed optimizers. On average most short-duration trades do not generate high returns; on the contrary, the average returns for trades held less than a year are mostly negative, whether measured as raw returns or adjusted for market returns. The exception is intraday trades, which earn positive returns on average. Our analysis of trade returns at the fund level shows that while the mean and median funds do not earn positive returns on short-duration trades other than intraday trades, some funds do earn positive returns on short-duration trades and their returns tend to persist, suggesting some benefit from trading skill and/or information. But other funds exhibit persistent poor performance in short-duration trades, consistent with managers who are overconfident or trading to appear active.

Appendix A: Matching Ancerno trade records to CRSP data

Although the Ancerno data include identifiers for each stock, the variables named "ticker" and "cusip" are not the same as those used in databases such as CRSP, and different Ancerno clients report different tickers and cusips for the same stock. Ancerno provides a unique identifier for each stock – the *stockkey* – but this identifier is not present in CRSP. Because there is no linking variable that joins the CRSP and Ancerno data, we use a multi-step process to match firms in the Ancerno database to firms in the CRSP database. For every date, ticker, cusip, and stockkey combination in Ancerno, we match the Ancerno ticker to the CRSP permno using the ticker and cusip. For stockkey assignments that match multiple tickers, we generate a list of all the variations of the ticker symbol in Ancerno and match it to the most likely valid ticker from CRSP. For example, for the ticker AAPL in CRSP, Ancerno has AAPL, AAPL.OQ, AAPL US, AAPL.O, AAPL.NC, and several others. For all non-strict matches (in this example, AAPL.OQ, AAPL US, AAPL.O, and AAPL.NC), we compare the prices of the ticker AAPL to these other ticker symbol variations. If they exactly match in price on the same date, we assume that these are the same security – AAPL. Using this logic, we create a master file that produces a one-to-one match between each Ancerno stockkey and CRSP permno. We use this linking master file to merge the Ancerno records on daily institutional transactions to CRSP data.

Appendix B: Implementation of double-clustered standard errors

Short-duration round-trip trade returns may be correlated over time and/or across funds or stocks, so using standard *t*-statistics may overstate significance. To account for dependencies both in the cross section and over time, all of the *t*-statistics reported in our analyses are based on standards errors that are clustered on both time and fund (or stock), following Thompson (2011). In this appendix we outline how we implement the double-clustered standard errors for trades or funds within a single quintile and then for tests of the differences between trades or funds in the top versus bottom quintile. We illustrate the methodology using the example of the return persistence analysis in Table 7, which includes both individual quintile and quintile difference tests.[21]

Individual quintile. For the funds in each quintile, we run the following regression:

$$Return_{f,t} = \alpha + \varepsilon_{f,t} \qquad (3)$$

where $Return_{f,t}$ is the average return for short-duration trades in fund *f* in semiannual period *t*; α is a constant, and $\varepsilon_{f,t}$ is the error term. The estimated α is the average value, and its *t*-statistic is computed using the double-clustered standard error methodology of Thompson (2011), clustering on fund (*f*) and semiannual period (*t*).

Difference between quintiles. We first stack all of the $Return_{f,t}$ observations for Quintile 1 and Quintile 5 into one panel, adding a new variable $Top_{f,t}$ which is equal to 1 for observations from Quintile 5, else zero. We then run the following regression:

$$Return_{f,t} = \alpha + \beta Top_{f,t} + \varepsilon_{f,t} \qquad (4)$$

The estimated coefficient β is the average difference, and the *t*-statistic for β is computed using the double-clustered standard error methodology of Thompson (2011), clustering on fund (*f*) and semiannual period (*t*).

[21] Code for calculating the standard errors can be derived from Thompson (2011) or is available on request from the authors, who thank Andy Puckett for sharing his code with them as well.

REFERENCES

Amihud, Yakov, 2002, Illiquidity and stock returns: cross section and time-series effects, *Journal of Financial Markets* 5, 31-56.

Anand, Amber, Paul Irvine, Andy Puckett, and Kumar Venkataraman, 2011, Market crashes and institutional trading, Working paper.

Anand, Amber, Paul Irvine, Andy Puckett, and Kumar Venkataraman, 2012, Performance of institutional trading desks: An analysis of persistence in trading costs, *Review of Financial Studies* 25, 557-598.

Bailey, Warren, Alok Kumar, and David Ng, 2011, Behavioral biases of mutual fund investors, *Journal of Financial Economics* 102, 1-27.

Berk, Jonathan B., and Jules H. van Binsbergen, Measuring managerial skill in the mutual fund industry, NBER Working paper.

Barber, Brad M., and Terrance Odean , 2001, Boys will be boys: gender, overconfidence, and common stock investment, *Quarterly Journal of Economics* 116, 261-292.

Ben-David, Itzhak, and David Hirshleifer, 2012, Are investors really reluctant to realize their losses? Trading responses to past returns and the disposition effect, *Review of Financial Studies*, forthcoming.

Boehmer, Ekkehart, and Eric Kelley, 2009, Institutional investors and the informational efficiency of prices, *Review of Financial Studies* 22, 3563-3594.

Bloomfield, Robert J., Maureen O'Hara, and Gideon Saar, 2005, The "make or take" decision in an electronic market: evidence on the evolution of liquidity, *Journal of Financial Economics* 75, 165-199.

Bodnaruk, Andriy, and Andrei Simonov, 2012, Do financial experts make better investment decisions? Working paper.

Busse, Jeffrey, Amit Goyal, and Sunil Wahal, 2010, Performance and persistence in institutional investment management, *Journal of Finance* 65, 765-790.

Carhart, Mark M., 1997, On persistence in mutual fund performance, *Journal of Finance* 52, 57-82.

Chevalier, Judith, and Glenn Ellison, 1997, Risk taking by mutual funds as a response to incentives, *Journal of Political Economy* 105, 1167-1200.

Chordia, Tarun, Richard Roll, and Avanidhar Subrahmanyam, 2011, Recent trends in trading activity and market quality, *Journal of Financial Economics* 101, 243-263.

Chung, Kee H., and Hao Zhang, 2011, Corporate governance and institutional ownership, *Journal of Financial and Quantitative Analysis* 46, 247-273.

Cohen, Randolph, 2002. Dimensional Fund Advisors, Harvard Business School Case 294-025.

Coval, Joshua, and Tobias Moskowitz, 1999, Home bias at home: Local equity preference in domestic portfolios. *Journal of Finance* 54 (6), 2045-2073.

Coval, Joshua, and Tobias Moskowitz, 2001, The geography of investment: Informed trading and asset prices, *Journal of Political Economy* 109 (4), 811-841.

Coval, Joshua, and Erik Stafford, 2007, Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* 86, 479-512.

Datar, Vinay, Narayan Naik, and Robert Radcliffe, 1998, Liquidity and stock returns: An alternative test, *Journal of Financial Markets* 1, 203-219.

Dow, James, and Gary Gorton, 1997, Noise trading, delegated portfolio management, and economic welfare, *Journal of Political Economy* 105, 1024-1050.

Elton, Edwin J., Martin J. Gruber, Christopher R. Blake, Yoel Krasny, and Sadi O. Ozelge, 2010, The effect of holdings data frequency on conclusions about mutual fund management behavior, *Journal of Banking and Finance* 34, 912-922.

Fama, Eugene, and Kenneth French, 2010, Luck versus skill in the cross section of mutual fund α estimates, *Journal of Finance* 65, 1915–1947.

Fong, Kingsley, Craig W. Holden, and Charles A. Trzcinka, 2012, What are the best liquidity proxies for global research? Working paper.

Frazzini, Andrea, 2005, The disposition effect and underreaction to news, *Journal of Finance* 61, 2017-2046.

Gervais, Simon, and Terrance Odean, 2001, Learning to be overconfident, *Review of Financial Studies* 14, 1-27.

Goldstein, Michael A., Paul Irvine, Eugene Kandel, and Zvi Wiener, 2009, Brokerage commissions and institutional trading patterns, *Review of Financial Studies* 22, 5175-5212.

Goncalves-Pinto, Luis, 2009, How does illiquidity affect delegated portfolio choice? Working paper.

Graham, John R. and Campbell R. Harvey, 2003, Expectations of equity risk premia, volatility and asymmetry from a corporate finance perspective, Working paper.

Grinblatt, Mark, and Sheridan Titman, 1989, Mutual fund performance: An analysis of quarterly portfolio holdings, *Journal of Business* 62, 394-415.

Gruber, Martin, 1996, Another puzzle: The growth in actively managed mutual funds, *Journal of Finance* 51, 783-810.

Hvidkjaer, Soeren, 2008, Small trades and the cross-section of stock returns, *Review of Financial Studies* 21, 1123-1151.

Investment Management Association, 2011, Understanding equity turnover data: Initial findings from IMA research submitted to the Kay review, 1-8.

Jensen, Michael, 1968, The performance of mutual funds in the period 1945-1964, *Journal of Finance* 23, 389-416.

Karlin, Samuel, and Howard Taylor, A First Course in Stochastic Modeling, third edition, *Academic Press*, 1998.

Kosowski, Robert, Allan Timmerman, Russ Wermers, and Hal White, 2006, Can mutual fund "stars" really pick stocks? New evidence from a bootstrap analysis, *Journal of Finance* 61, 2551-2595.

Lakonishok, Josef, Andrei Shleifer, Richard Thaler, and Robert Vishny, 1991, Window dressing by pension fund managers, *American Economic Review* 81, 227–231.

Lakonishok, Josef, Andrei Shleifer, and Robert Vishny, 1992, The structure and performance of the money management industry, *Brookings Papers: Microeconomics*, 339–391.

Lee, Charles, and Bhaskaran Swaminathan, 2000, Price momentum and trading volume, *Journal of Finance* 55, 2017-2069.

Lewellen, Jonathan, 2011, Institutional investors and the limits of arbitrage, *Journal of Financial Economics* 102, 62–80.

Odean, Terrance, 1999, Do investors trade too much? *American Economic Review* 89, 1279-1298.

Pool, Veronika Krepely, Noah Stoffman, and Scott E. Yonker, 2012, No place like home: Familiarity in mutual fund manager portfolio choice, Working paper, Indiana University.

Puckett, Andy, and Xuemin (Sterling) Yan, 2011, The interim trading skills of institutional investors, *Journal of Finance* 66, 601-633.

Shefrin, Hersh, and Meir Statman, 1985, The disposition to sell winners too early and ride losers too long: Theory and evidence, *Journal of Finance* 40, 777-791.

Sias, Richard W., and Laura T. Starks, 1997, Institutions and individuals at the turn-of-the-year, *Journal of Finance* 52, 1543-1562.

Sirri, Eric, and Peter Tufano, 1998, Costly search and mutual fund flows, *Journal of Finance* 53, 1589-1622.

Thompson, Samuel, 2011, Simple formulas for standard errors that cluster by both firm and time, *Journal of Financial Economics* 99, 1-10.

Wang, Z. Jay, and Vikram Nanda, 2011, Payout policies and closed-end fund discounts: Signaling, agency costs, and the role of institutional investors, *Journal of Financial Intermediation* 20, 589-619.

Yan, Xuemin (Sterling), and Zhe Zhang, 2009, Institutional investors and equity returns: Are short-term institutions better informed? *Review of Financial Studies* 22, 893-924

Table 1: Sample descriptive statistics
Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009. The table presents statistics for all FIFO round-trip trades in common stocks for the entire universe of pension and money manger funds reporting to Ancerno (*Full Sample*) and the subset of funds that are present in the Ancerno database for five or more years (*Funds present 5 or more years*). Panel A presents descriptive statistics for the two samples, and Panel B presents the distribution of round-trip trades for each sample by stock market capitalization decile. Market capitalization deciles are determined from CRSP, based on the market capitalization of each stock at the end of the year prior to the initiation of the trade.

Panel A: Funds, institutions, and round-trip trades

	Full Sample	Funds present 5 or more years
Number of funds	4,053	1,186
Pension funds	3,811	1,102
Money managers	242	84
Number of institutions	772	324
Median number of funds per institution	3	3
Total share volume of round-trip trades (billion)	329.66	292.05
Pension funds	30.29	18.93
Money managers	299.37	273.12
Total dollar volume of round-trip trades ($ trillion)	10.12	8.97
Pension funds	0.91	0.55
Money managers	9.21	8.42
Total number of round-trip trades (million)	121.24	105.74
Pension funds	9.53	6.26
Money managers	111.71	99.47
Total number of stocks traded	9,737	9,407

Panel B: Distribution of round-trip trades by stock market capitalization decile

	Full Sample			Funds present 5 or more years		
Decile	% Share Volume	% Dollar Volume	% Trades	% Share Volume	% Dollar Volume	% Trades
D1 (Smallest)	0.03	0.02	0.04	0.03	0.01	0.03
D2	0.11	0.03	0.13	0.11	0.02	0.09
D3	0.26	0.08	0.28	0.26	0.08	0.23
D4	0.63	0.19	0.75	0.62	0.19	0.68
D5	1.25	0.50	1.64	1.26	0.50	1.56
D6	2.24	1.03	3.02	2.21	1.01	2.90
D7	4.05	2.24	5.30	4.01	2.21	5.07
D8	7.37	4.89	8.92	7.30	4.84	8.61
D9	15.21	11.97	14.97	15.14	11.87	14.49
D10 (Largest)	68.85	79.04	64.95	69.06	79.26	66.35
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 2: Turnover statistics for institutional fund managers

The table presents fund turnover statistics for mutual funds, calculated from the CRSP Survivorship-free Mutual Fund database, and for pension funds, calculated from quarterly surveys provided by Mobius Group (subsumed by Informa PSN after 2008).

	Mutual Funds		Pension Funds	
Year	Mean Turnover %	Median Turnover %	Mean Turnover %	Median Turnover %
1999	93.4	70	66.8	45
2000	100.5	75	67.5	45
2001	106.8	77	74.6	46
2002	102.7	71	73.5	46
2003	91.7	65	73.1	44
2004	83.9	62	63.8	45
2005	82.7	62	61.6	43
2006	81.2	64	61.6	42
2007	80.6	62	62.3	45
2008	93.5	69	65.8	46
2009	95.4	69	n/a	n/a
Average	92.0	67.8	67.2	44.5

Table 3: Round-trip trades by holding period

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. Panel A presents statistics based on round-trip trades defined using FIFO methodology; Panel B presents statistics based on round-trip trades defined using LIFO methodology. *Holding period* refers to the time between when a trade is initiated and when it is unwound. The columns labeled *Aggregate Shares* present percentages calculated across all round-trip trades in each category; the columns labeled *Fund-level Cumulative Percentages* present statistics about the cumulative percentages of share volume in trades with holding periods less than or equal to the period specified, across the funds in each sample.

Panel A: FIFO round-trip trades

				Fund-level Cumulative Percentages (%)			
Holding Period		Aggregate Shares		Money Manager		Pension	
At least	Less than	%	Cumulative %	Mean	Median	Mean	Median
	1 day	0.32	0.32	0.23	0.13	0.23	0.00
1 day	1 week	1.38	1.70	1.60	1.17	1.52	0.31
1 week	1 month	5.78	7.48	7.43	6.11	5.38	3.54
1 month	2 months	7.97	15.45	15.43	14.46	11.92	9.55
2 months	3 months	7.85	23.30	23.29	23.21	18.66	16.15
3 months	4 months	7.47	30.76	30.50	29.96	25.23	23.38
4 months	5 months	6.80	37.56	37.05	36.91	31.28	30.25
5 months	6 months	6.00	43.57	42.93	42.85	36.72	36.34
6 months	9 months	14.75	58.32	57.23	58.44	50.68	52.36
9 months	1 year	10.56	68.87	67.73	70.23	61.36	64.52
1 year	2 years	19.71	88.58	88.95	90.62	84.34	89.04
2 years	3 years	6.72	95.29	95.99	97.03	93.30	96.61
3 years	4 years	2.63	97.92	98.41	99.18	97.10	99.24
4 years		2.08	100.00	100.00	100.00	100.00	100.00

Panel B: LIFO round-trip trades

				Fund-level Cumulative Percentages (%)			
Holding Period		Aggregate Shares		Money Manager		Pension	
At least	Less than	%	Cumulative %	Mean	Median	Mean	Median
	1 day	6.37	6.37	2.14	1.33	0.39	0.00
1 day	1 week	11.08	17.45	8.77	6.79	2.35	0.84
1 week	1 month	15.04	32.49	21.72	19.57	8.75	6.38
1 month	2 months	11.13	43.62	33.05	31.72	17.68	15.26
2 months	3 months	7.88	51.51	41.75	41.86	25.78	23.94
3 months	4 months	6.14	57.64	48.68	49.48	33.05	31.93
4 months	5 months	4.98	62.62	54.57	56.19	39.31	39.35
5 months	6 months	4.11	66.73	59.30	61.51	44.81	45.27
6 months	9 months	8.98	75.71	70.06	73.01	58.02	61.08
9 months	1 year	6.04	81.75	77.69	80.18	67.62	71.94
1 year	2 years	11.15	92.90	92.14	93.35	86.96	90.81
2 years	3 years	3.94	96.84	96.85	97.40	94.22	96.90
3 years	4 years	1.71	98.55	98.70	99.27	97.48	99.20
4 years		1.45	100.00	100.00	100.00	100.00	100.00

Table 4: Fama-MacBeth regression results

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. The table reports the results of Fama-MacBeth style regressions of holding periods for FIFO trades on several explanatory variables. Panel A presents results based on round-trip trades defined using FIFO methodology; Panel B presents results based on round-trip trades defined using LIFO methodology. Regressions are run separately for each fund, and cross-sectional statistics are presented for Money Managers (left panel) and Pension Funds (right panel). *Holding period* (the dependent variable) is measured as the number of trading days between the time the trade is entered into and when it is closed out. All explanatory variables are standardized by subtracting the mean and dividing by the standard deviation, so coefficients represent the change in holding period for a one standard deviation change in the explanatory variable. *Market Volatility* is the volatility of the S&P 500 index in the month the trade is closed out. *Fund Flow Volatility* is the volatility of the Lipper mutual fund flows in the month the trade is closed out. *Stock Illiquidity* is the FHT measure in the month the trade is closed out. *Trade Return* is the percentage price change over the trade holding period. *Relative Trade Size,* a control variable, is the ratio of the trade's size to the average trade size for the fund.

Panel A: FIFO round-trip trades

	Money Managers				Pension Funds			
	Mean	StdDev	t-stat	p-value	Mean	StdDev	t-stat	p-value
Market Volatility	3.3	37.6	0.80	0.4258	-23.9	57.5	-13.80	0.0000
Fund Flow Volatility	16.8	23.7	6.49	0.0000	17.2	54.7	10.44	0.0000
Stock Illiquidity	-5.9	23.1	-2.36	0.0206	-24.5	73.6	-11.05	0.0000
Trade Return	22.4	65.8	3.12	0.0025	26.3	75.9	11.48	0.0000
Relative Trade Size	-10.5	24.6	-3.89	0.0002	-11.8	35.1	-11.21	0.0000
Constant	245.8	77.5	29.06	0.0000	284.9	136.0	69.58	0.0000
Number of Funds	84				1102			

Panel B: LIFO round-trip trades

	Money Managers				Pension Funds			
	Mean	StdDev	t-stat	p-value	Mean	StdDev	t-stat	p-value
Market Volatility	2.8	25.2	1.01	0.3135	-21.2	52.4	-13.44	0.0000
Fund Flow Volatility	9.5	16.6	5.28	0.0000	14.3	52.3	9.10	0.0000
Stock Illiquidity	-1.9	23.1	-0.75	0.4567	-15.6	60.6	-8.52	0.0000
Trade Return	14.2	60.3	2.16	0.0334	22.5	70.3	10.62	0.0000
Relative Trade Size	2.9	19.4	1.35	0.1802	-4.9	35.7	-4.60	0.0000
Constant	155.0	52.9	26.87	0.0000	241.7	120.9	66.39	0.0000
Number of Funds	84				1102			

Table 5: Trade returns by holding period

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. The table reports FIFO round-trip trade average returns that are weighted by principal amount (initial share price times number of shares) within each holding period category. Raw return (Panel A) is the percentage price change over the holding period; market-adjusted return (Panel B) subtracts the S&P index return over the holding period from the raw return. No market-adjusted returns are available for trades lasting less than one day because intraday time stamps are incomplete.

Panel A: Raw returns

Holding Period		Aggregate Trade Returns	Fund-level Trade Returns							
			Money Managers				Pension Funds			
At least	Less than		Mean	Median	25th P'tile	75th P'tile	Mean	Median	25th P'tile	75th P'tile
	1 day	0.02	0.17	-0.01	-0.14	0.22	1.18	0.06	-0.21	1.26
1 day	1 week	-1.00	-0.82	-0.54	-1.51	0.36	-1.52	-0.54	-4.14	1.94
1 week	1 month	-2.72	-2.06	-1.56	-3.81	-0.44	-3.14	-2.48	-7.46	1.29
1 month	2 months	-3.99	-0.80	-2.36	-5.18	0.58	-3.07	-2.59	-7.65	2.15
2 months	3 months	-5.22	-2.64	-2.94	-6.59	0.41	-3.37	-3.41	-8.82	2.13
3 months	4 months	-4.88	-3.24	-3.37	-6.95	-0.27	-3.12	-2.82	-8.86	2.76
4 months	5 months	-5.07	-2.85	-3.75	-6.56	0.13	-2.93	-2.85	-9.60	3.40
5 months	6 months	-5.32	-2.87	-3.30	-7.50	0.13	-2.35	-2.37	-9.60	4.35
6 months	9 months	-4.79	-1.89	-1.94	-7.51	1.69	-2.11	-1.48	-8.52	4.59
9 months	1 year	-4.36	-2.10	-1.07	-7.89	3.20	-0.97	-0.56	-8.71	6.81
1 year	2 years	-2.31	0.14	0.41	-6.66	7.53	1.27	1.79	-7.80	11.07
2 years	3 years	1.46	3.66	5.36	-7.35	14.12	3.19	4.73	-9.63	18.42
3 years	4 years	6.71	5.93	10.31	-6.62	24.23	4.06	6.87	-12.63	24.84
4 years		11.11	3.18	4.59	-13.92	22.10	6.76	10.03	-12.81	31.02

Panel B: Market-adjusted returns

Holding Period		Aggregate Trade Returns	Fund-level Trade Returns							
			Money Managers				Pension Funds			
At least	Less than		Mean	Median	25th P'tile	75th P'tile	Mean	Median	25th P'tile	75th P'tile
	1 day	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1 day	1 week	-0.99	-0.75	-0.65	-1.67	0.31	-1.65	-0.67	-4.26	1.54
1 week	1 month	-2.45	-1.73	-1.35	-3.54	-0.22	-3.00	-2.32	-6.91	1.00
1 month	2 months	-3.48	-0.56	-1.92	-4.36	0.38	-2.86	-2.52	-7.11	1.55
2 months	3 months	-4.15	-1.85	-2.46	-4.90	0.08	-2.88	-2.98	-7.72	1.80
3 months	4 months	-3.44	-2.22	-2.19	-5.16	0.09	-2.41	-2.58	-7.78	2.60
4 months	5 months	-3.19	-1.77	-2.06	-4.89	0.03	-2.06	-2.34	-7.58	2.75
5 months	6 months	-3.24	-1.70	-1.70	-4.20	0.72	-1.37	-1.93	-7.32	3.81
6 months	9 months	-2.17	-1.07	-1.02	-3.63	1.27	-1.05	-1.19	-6.33	4.02
9 months	1 year	-0.96	-0.49	-0.19	-4.04	2.21	0.52	0.18	-5.71	5.82
1 year	2 years	1.01	2.42	1.93	-1.27	5.91	3.27	2.26	-3.77	9.47
2 years	3 years	0.11	1.32	0.43	-4.74	8.00	5.81	4.89	-4.37	16.40
3 years	4 years	0.21	0.55	1.82	-7.10	8.48	5.65	5.71	-8.91	22.98
4 years		0.26	-3.09	-1.55	-13.55	12.73	5.72	7.64	-12.04	30.17

Table 6: Trade returns by holding period IF trades had been held for 1 year instead of less than 1 month

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. For each actual trade in the database that was held for less than one month under the FIFO method, we calculate the "what-if" one-year return as the return the trade would have earned if it had been held for a full year instead of closed within one month. The table reports round-trip trade average "what-if" raw returns that are weighted by principal amount (initial share price times number of shares) within each holding period category.

Raw returns on trades held less than one month IF they had been held for one year

Actual Holding Period		Aggregate 1-year "What-if" Trade Returns	Fund-level 1-year "What-if" Trade Returns							
			Money Managers				Pension Funds			
At least	Less than		Mean	Median	25th P'tile	75th P'tile	Mean	Median	25th P'tile	75th P'tile
	1 day	31.01	20.00	13.32	3.68	29.91	36.23	4.64	-16.81	39.20
1 day	1 week	34.11	15.36	11.39	2.14	24.28	7.29	3.05	-13.28	18.32
1 week	1 month	31.04	31.23	8.90	4.34	22.44	13.21	5.14	-6.80	17.27

Table 7: Short-duration trade return persistence at the fund level

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. Analysis is run for separately for money manager funds and for pension funds. In each panel, funds are sorted into quintiles based on the average returns on their short-duration FIFO round-trip trades in each semiannual period, and the average fund returns (in %) for each quintile are reported in the quintile formation period (*Base period*) and the subsequent four semiannual periods (*Base+1* , *Base+2* , *Base+3* , and *Base+4*). Average returns for each fund's round-trip trades within each holding period category are weighted across trades by principal amount (initial share price times number of shares). Returns for trades lasting less than three months (Panels C and D) are market-adjusted; returns for trades lasting less than one day (Panels A and B) are not market-adjusted because intraday timestamps are incomplete. Numbers in parentheses are *t* -statistics, which are computed based on two-way clustered standard errors.

Panel A: Trades held less than one day, Money Managers

	Semiannual periods				
Quintile	Base period	Base +1	Base +2	Base +3	Base +4
Q1	-1.53	-0.13	0.12	0.07	0.12
	(-7.7)	*(-0.9)*	*(0.6)*	*(0.8)*	*(0.7)*
Q2	-0.27	0.06	-0.06	-0.10	0.03
	(-6.5)	*(0.5)*	*(-0.4)*	*(-0.6)*	*(0.6)*
Q3	0.02	-0.02	-0.05	0.09	-0.02
	(1.4)	*(-0.1)*	*(-0.6)*	*(0.4)*	*(-0.2)*
Q4	0.41	0.04	0.07	0.02	-0.13
	(8.1)	*(0.4)*	*(0.8)*	*(0.1)*	*(-1.3)*
Q5	2.28	0.53	0.39	0.20	0.57
	(6.9)	*(1.7)*	*(1.3)*	*(0.6)*	*(1.5)*
Q5-Q1	3.81	0.66	0.27	0.13	0.45
	(10.9)	*(1.8)*	*(0.8)*	*(0.4)*	*(1.6)*

Panel B: Trades held less than one day, Pension Funds

	Semiannual periods				
Quintile	Base period	Base +1	Base +2	Base +3	Base +4
Q1	-5.30	0.03	1.01	0.01	-0.23
	(-5.5)	*(0.0)*	*(1.4)*	*(0.0)*	*(-0.3)*
Q2	-0.21	-0.29	-1.28	0.76	1.36
	(-4.3)	*(-0.5)*	*(-0.7)*	*(1.5)*	*(2.0)*
Q3	0.03	0.11	0.02	-0.53	1.17
	(0.0)	*(0.4)*	*(0.1)*	*(-1.0)*	*(1.3)*
Q4	0.61	0.71	0.30	-1.86	1.15
	(6.1)	*(2.3)*	*(0.3)*	*(-0.8)*	*(1.5)*
Q5	7.10	2.22	1.26	2.34	0.65
	(7.6)	*(3.5)*	*(2.3)*	*(3.1)*	*(0.8)*
Q5-Q1	12.41	2.19	0.25	2.33	0.88
	(8.1)	*(2.0)*	*(0.3)*	*(2.5)*	*(1.0)*

Panel C: Trades held less than three months, Money Managers

Quintile	Semiannual periods				
	Base period	Base +1	Base +2	Base +3	Base +4
Q1	-16.65	-3.30	-3.41	-0.73	-0.97
	(-10.8)	*(-2.3)*	*(-1.8)*	*(-0.4)*	*(-0.5)*
Q2	-5.59	-2.45	-2.43	-1.89	-1.27
	(-7.5)	*(-2.9)*	*(-2.1)*	*(-2.8)*	*(-1.3)*
Q3	-2.00	-0.99	-1.78	-1.32	-1.24
	(-3.8)	*(-1.7)*	*(-3.0)*	*(-2.0)*	*(-1.8)*
Q4	1.56	-0.92	-0.28	-0.66	-1.72
	(3.1)	*(-1.2)*	*(-0.4)*	*(-0.7)*	*(-1.7)*
Q5	12.45	2.10	3.47	1.24	2.74
	(7.7)	*(1.7)*	*(2.0)*	*(0.9)*	*(2.4)*
Q5-Q1	29.09	5.40	6.88	1.97	3.72
	(10.6)	*(3.6)*	*(3.0)*	*(1.1)*	*(2.3)*

Panel D: Trades held less than three months, Pension Funds

Quintile	Semiannual periods				
	Base period	Base +1	Base +2	Base +3	Base +4
Q1	-21.50	-5.42	-5.48	-4.80	-4.23
	(-12.3)	*(-4.8)*	*(-5.5)*	*(-4.7)*	*(-4.0)*
Q2	-7.37	-4.19	-4.60	-3.89	-3.65
	(-9.2)	*(-5.3)*	*(-5.3)*	*(-4.2)*	*(-4.1)*
Q3	-2.43	-2.86	-2.41	-2.88	-2.99
	(-5.1)	*(-4.2)*	*(-3.2)*	*(-4.2)*	*(-4.4)*
Q4	1.75	-1.85	-1.57	-1.68	-2.01
	(5.1)	*(-2.7)*	*(-2.2)*	*(-2.6)*	*(-3.2)*
Q5	16.45	0.58	-0.35	-0.59	-0.06
	(15.3)	*(0.7)*	*(-0.4)*	*(-0.6)*	*(-0.1)*
Q5-Q1	37.95	6.00	5.12	4.22	4.17
	(16.0)	*(5.0)*	*(5.6)*	*(4.2)*	*(5.0)*

Table 8: Short-duration trading amount following returns

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. Analysis is run separately for money manager funds and for pension funds. In each panel, funds are sorted into quintiles based on the average returns on their short-duration FIFO round-trip trades in each semiannual period, and the average percentages of share volume that occurs in short-duration trades (in %) for each quintile are reported in the quintile formation period (*Base period*) and the subsequent four semiannual periods (*Base+1*, *Base+2*, *Base+3*, and *Base+4*). Numbers in parentheses are *t*-statistics, which are computed based on two-way clustered standard errors.

Panel A: Trades held less than one day, Money Managers

	Semiannual periods				
Quintile	Base period	Base +1	Base +2	Base +3	Base +4
Q1	0.22	0.22	0.24	0.31	0.19
	(2.6)	*(4.1)*	*(2.4)*	*(1.9)*	*(5.0)*
Q2	0.24	0.32	0.26	0.22	0.27
	(8.2)	*(3.6)*	*(2.8)*	*(4.5)*	*(2.7)*
Q3	0.61	0.33	0.32	0.26	0.31
	(3.5)	*(3.1)*	*(3.3)*	*(2.8)*	*(2.4)*
Q4	0.30	0.27	0.24	0.24	0.30
	(5.4)	*(4.9)*	*(6.1)*	*(4.5)*	*(3.2)*
Q5	0.27	0.30	0.36	0.26	0.24
	(3.0)	*(2.7)*	*(2.8)*	*(5.5)*	*(5.1)*
Q5-Q1	0.05	0.09	0.12	-0.05	0.04
	(0.4)	*(0.7)*	*(2.9)*	*(-0.3)*	*(1.0)*

Panel B: Trades held less than one day, Pension Funds

	Semiannual periods				
Quintile	Base period	Base +1	Base +2	Base +3	Base +4
Q1	2.10	2.42	3.31	1.61	5.25
	(3.8)	*(2.0)*	*(1.9)*	*(2.5)*	*(1.4)*
Q2	5.30	3.49	2.49	6.04	2.84
	(4.0)	*(2.7)*	*(1.7)*	*(1.9)*	*(1.9)*
Q3	3.61	4.30	5.33	4.46	7.20
	(3.7)	*(3.6)*	*(2.7)*	*(3.4)*	*(2.4)*
Q4	2.11	2.35	4.58	7.27	4.67
	(3.3)	*(2.2)*	*(2.1)*	*(2.2)*	*(2.5)*
Q5	0.84	2.09	1.49	2.19	0.83
	(6.1)	*(2.4)*	*(2.2)*	*(1.5)*	*(3.1)*
Q5-Q1	-1.26	-0.33	-1.82	0.58	-4.42
	(-2.2)	*(-0.3)*	*(-1.0)*	*(0.8)*	*(-1.1)*

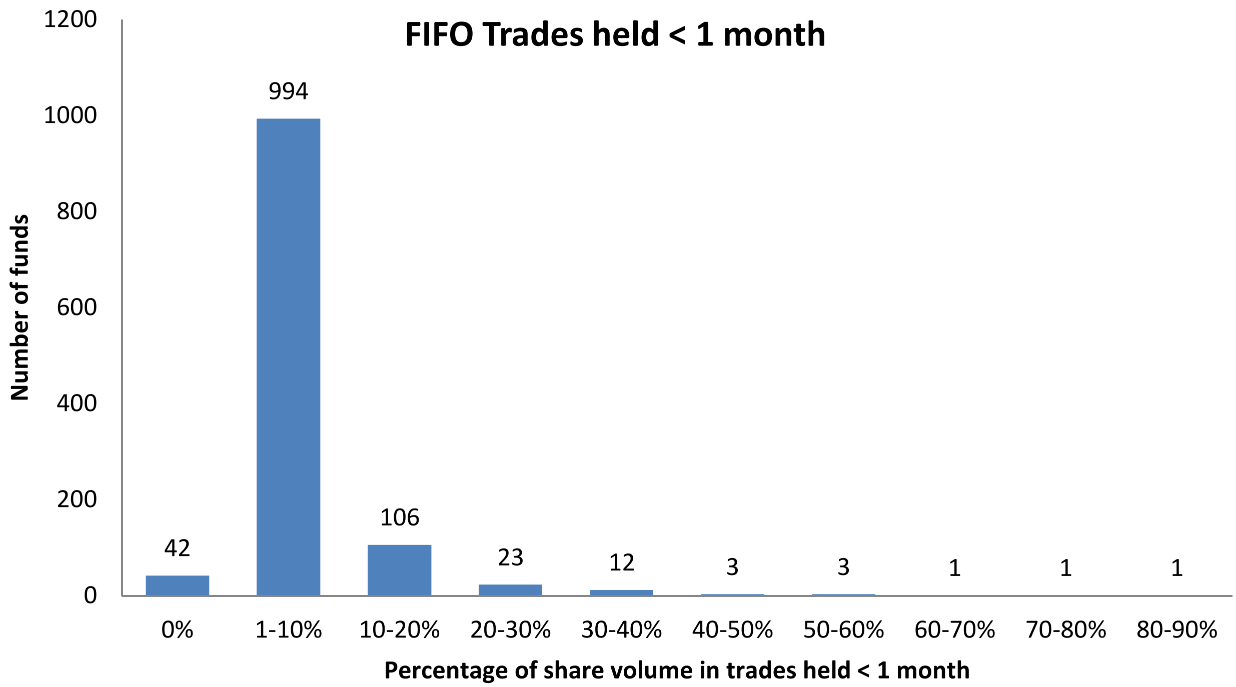
Panel C: Trades held less than three months, Money Managers

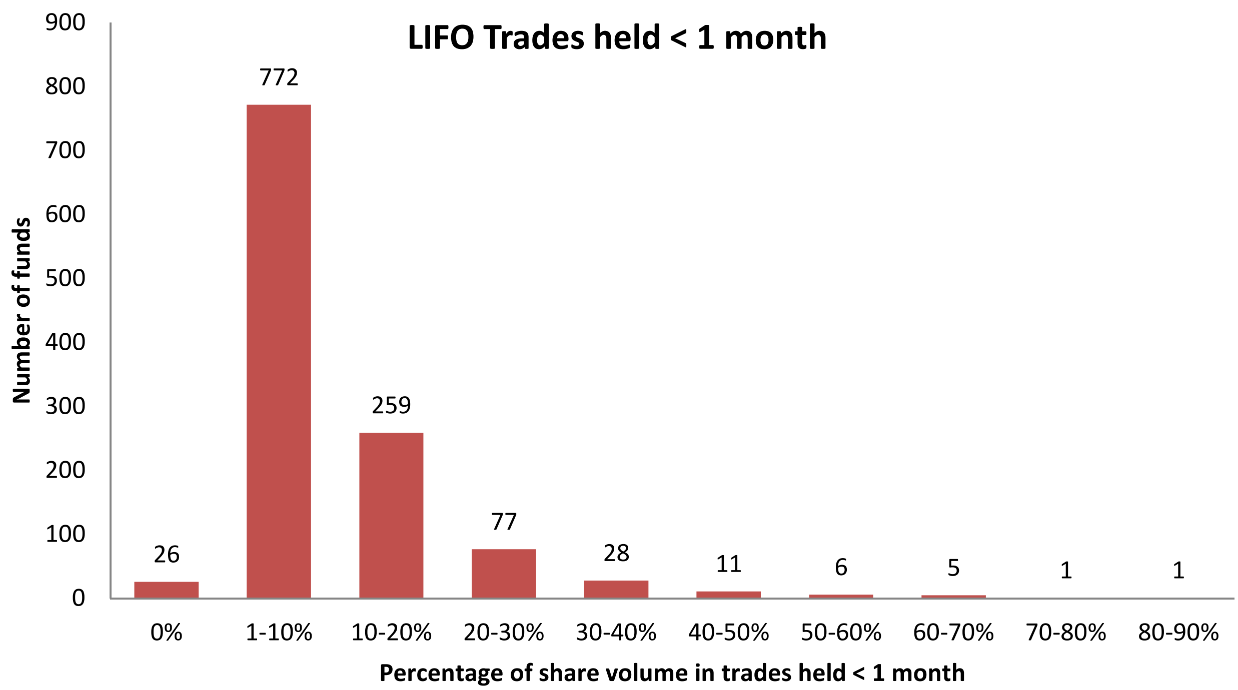
Quintile	Semiannual periods				
	Base period	Base +1	Base +2	Base +3	Base +4
Q1	15.84	17.39	20.06	19.55	28.12
	(5.8)	*(6.0)*	*(5.4)*	*(4.7)*	*(5.6)*
Q2	18.75	21.29	22.52	24.22	26.27
	(7.1)	*(6.8)*	*(5.9)*	*(5.8)*	*(5.5)*
Q3	21.39	20.99	20.45	20.93	20.88
	(7.1)	*(6.2)*	*(6.4)*	*(6.1)*	*(6.0)*
Q4	22.12	21.12	22.51	21.72	21.59
	(6.8)	*(6.3)*	*(5.1)*	*(5.8)*	*(4.4)*
Q5	18.53	16.84	14.32	17.33	16.98
	(5.2)	*(4.7)*	*(5.4)*	*(4.3)*	*(6.1)*
Q5-Q1	2.69	-0.55	-5.74	-2.22	-11.14
	(1.4)	*(-0.2)*	*(-2.2)*	*(-0.8)*	*(-3.1)*

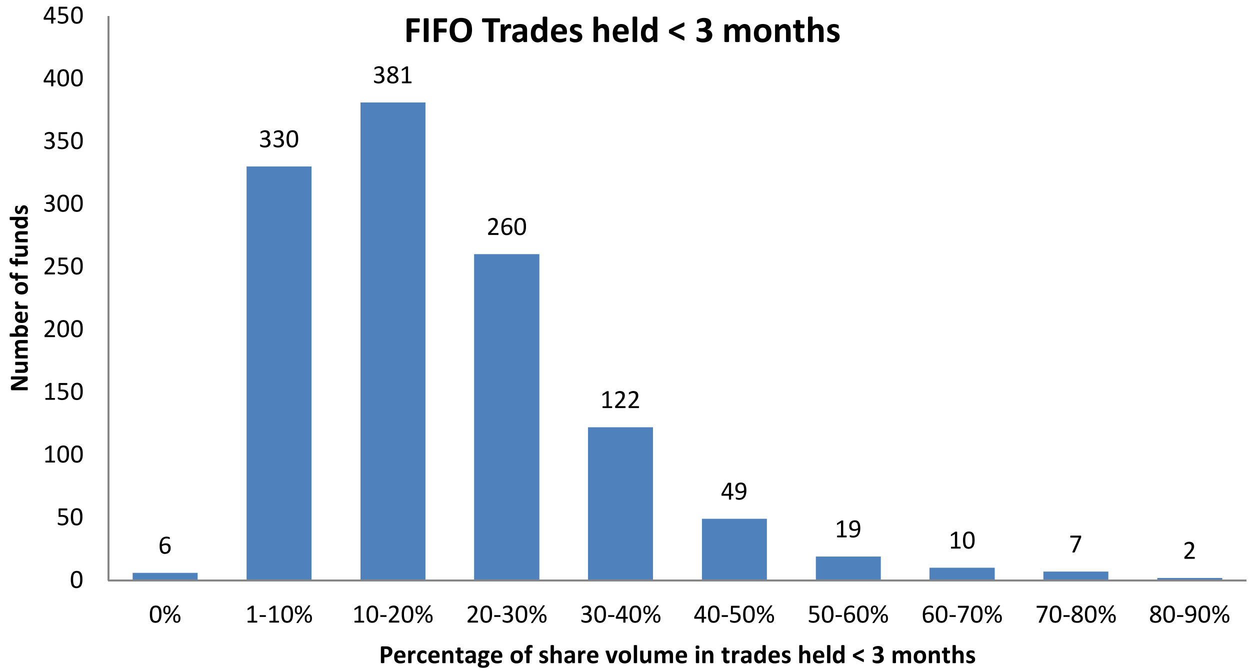
Panel D: Trades held less than three months, Pension Funds

Quintile	Semiannual periods				
	Base period	Base +1	Base +2	Base +3	Base +4
Q1	16.91	18.99	19.97	19.25	21.23
	(12.2)	*(11.3)*	*(12.9)*	*(11.2)*	*(11.4)*
Q2	20.86	20.82	21.27	22.84	23.57
	(14.2)	*(14.7)*	*(12.7)*	*(13.8)*	*(13.3)*
Q3	22.25	21.21	21.25	21.93	22.51
	(16.8)	*(15.0)*	*(13.2)*	*(12.1)*	*(11.7)*
Q4	21.09	19.97	20.45	21.91	22.32
	(15.3)	*(12.5)*	*(13.4)*	*(12.3)*	*(11.4)*
Q5	15.68	17.44	18.62	19.54	21.12
	(9.5)	*(11.1)*	*(9.9)*	*(9.2)*	*(9.4)*
Q5-Q1	-1.23	-1.55	-1.35	0.29	-0.12
	(-1.7)	*(-1.8)*	*(-1.8)*	*(0.3)*	*(-0.1)*

Figure 1: Proportion of short-duration trades by fund
Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. The first two graphs present the percentages of round-trip trading volume of each fund that occurs in trades held for less than one month under the FIFO and LIFO methods for identifying round-trip trades. For example, in the first graph the third bar shows that for 106 funds in the database, trades held less than one month account for between 10% and 20% of their total trading volume. The last two graphs present the percentages of round-trip trading volume for each fund that occurs in trades held for less than three months.






FIFO Trades held < 3 months
Number of funds
0
50
100
150
200
250
300
350
400
450
6
330
381
260
122
49
19
10
7
2
0%
1-10%
10-20%
20-30%
30-40%
40-50%
50-60%
60-70%
70-80%
80-90%
Percentage of share volume in trades held < 3 months

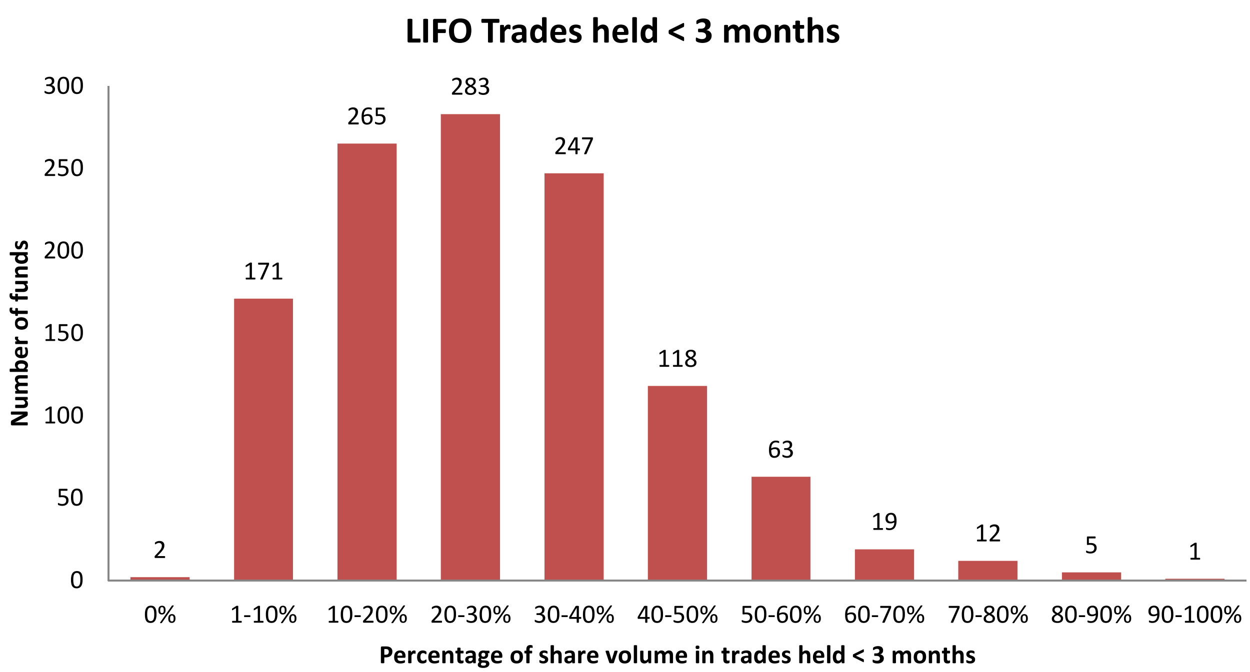

LIFO Trades held < 3 months
Number of funds
0
50
100
150
200
250
300
2
171
265
283
247
118
63
19
12
5
1
0%
1-10%
10-20%
20-30%
30-40%
40-50%
50-60%
60-70%
70-80%
80-90%
90-100%
Percentage of share volume in trades held < 3 months

Figure 2: Monthly periodicity of short-duration trades

Institutional trading data are from Ancerno Ltd. for trades executed between January 1, 1999, and December 31, 2009 by funds in the database for five or more years. Each graph portrays the percentage of trading volume in each month that consists of trades held for less than one month. Aggregate statistics are calculated across all trades in each month-year, and means are reported for each month. Fund-level averages are calculated for each fund-month-year, and means are reported for each month. In the top graph trades are identified using the FIFO method, and in the bottom graph they are defined using the LIFO method.