A First Glimpse into the Short Side of Hedge Funds[☆]

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Dec 15, 2016

Abstract

We provide direct evidence about the profitability of hedge fund short trades in equities. We identify the opening and closing of equity short sales (and long side trades) by hedge funds and other institutional investors by combining data on the detailed transactions and holdings of the investors. Hedge fund short sales covered within five trading days are highly profitable, earning an average abnormal return of 14 bps per day, but short positions kept open longer than five days are not profitable. In contrast, non-hedge fund institutional investors do not make profits but rather tend to suffer losses on their short trades. Additional evidence suggests that some of the profitability of short trades is due to information and some stems from liquidity provision in both opening and covering trades, and that short selling profitability is persistent.

JEL Classification: G12, G14, G23

Keywords: Hedge funds, short sale profitability, short sales, institutional investors

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1. Introduction

Short interest and other proxies for short-selling activity predict stock returns.[1] However, there is little evidence about the identities of most short sellers and the profitability of their short trades. For example, while it is reasonable to think that a large fraction of short-selling is done by institutional investors, particularly hedge funds, little is known about the short-selling of these investors.[2] Existing research on the trading of equity hedge funds comes primarily from "snapshots" of long positions disclosed in their quarterly Form 13F filings. For example, Brunnermeier and Nagel (2004), Griffin and Xu (2009), and Agarwal et al. (2013) use Form 13F data to examine the long side holdings of hedge funds, but are not able to study the funds' short positions because the 13F forms do not report them. The lack of evidence regarding hedge fund and other institutional short selling, combined with its likely importance in the price discovery process, motivates its study. The limited evidence of positive abnormal returns to hedge fund long equity positions in Griffin and Xu (2009) and to the positions disclosed in the funds' original 13F filings in Agarwal et al. (2013) also raises the question of whether equity hedge funds are able to generate positive abnormal performance on their short trades.[3]

This paper provides direct evidence regarding the profitability of hedge fund short trades in equities. As explained below, we identify the opening and covering of equity short sales (and also long side trades) by hedge funds and other institutional investors at the level of individual investment management companies by using a novel algorithm to combine data from two different datasets on the detailed transactions and holdings of institutional investors. Based on

[1] See, for example, Asquith and Meulbroek (1996), Desai et al. (2002), Asquith, Pathak, and Ritter (2005), Boehmer, Jones, and Zhang (2008), Diether, Lee, and Werner (2009), Kelley and Tetlock (2014), Boehmer, Huszhár, and Jordan (2015), and Engleberg, Reed, and Ringgenberg (2015), among others.

[2] An exception to this statement is Jank and Smajbegovic (2015), who use a limited sample of large short sales in European stocks between November 2012 and December 2014 to study the performance of short sellers. Chen, Desai, and Krishnamurthy (2013) study the performance of the stocks sold short by mutual funds, but are unable to determine the profitability of the short sales because they do not observe when the short positions are closed or the prices at which they are closed. As in Hong et al. (2015), the ability of measures of shorting activity to predict stock returns does not imply that shorting is profitable because short sellers might incur significant price impact costs in unwinding their trades, especially if the trades are crowded.

[3] Agarwal et al. (2013) focus on the difference in the performance of the long equity positions disclosed in hedge funds' amended and original 13F filings, and find that the hedge funds that are not disclosed in the original filings exhibit superior performance. Using Daniel et al. (1997) characteristic-adjusted returns they find only weak evidence of superior performance on the positions disclosed in the funds' original 13F filings. Because the "confidential" positions that are not disclosed in the original 13F filings are small relative to the overall aggregate hedge fund positions, the weak evidence of superior performance on the disclosed positions also applies to the overall aggregate hedge fund position.

our identification of trades, we examine the profitability of hedge fund short trades, including whether hedge funds have skills in both short opening and covering short positions. Hedge fund short sales covered within five trading days are highly profitable, earning an average abnormal return of 13.7 basis points per day, which translates to about 34% per year. For short sales kept open longer than five days the estimates of average abnormal returns are not significantly different from zero and the point estimates are close to zero. In contrast, non-hedge fund institutional investors are not particularly profitable in their short trades and rather tend to suffer losses.

We also present evidence about some of the sources of the abnormal returns. Hedge fund short positions opened in a short window prior to earnings announcements predict negative earnings surprises, and their short trades that are open during the earnings announcement and covered within five trade dates of being opened are profitable, consistent with a role for private information. In contrast, short selling by non-hedge fund investors does not show any correlation with firms' earnings surprises. Some of the hedge fund short sale profitability appears to consist of profits from liquidity provision, as short positions opened on trading dates with positive abnormal stock returns and closed with five trading dates are profitable on average while those opened on trading days with negative abnormal returns are not profitable. Short sale profitability is also partly due to liquidity provision through short covering, as short positions covered on negative return days predict positive abnormal returns for the next three days. Hedge fund short-selling abnormal performance is persistent, consistent with it being due to skill. In addition, we present corresponding results about the profitability of the hedge fund and non-hedge fund investor long side trades. Our result contrast with existing studies that are unable to identify short sales at the manager level but rather examine whether short sales (by unidentified investors) reflected in short interest and other proxies for shorting activity predict future stock returns.

The transaction data we use are from ANcerno, a trade execution cost consulting firm, and include on a daily basis all transactions by a set of institutional investors. Anand, Irvine, Puckett, and Ventakaraman (2012), Puckett and Yan (2011), and Jame (2015) have used ANcerno data to study institutional investors' trading ability. The version of the dataset we use includes the names of fund management companies and both their long and short transactions, including the transaction prices. We combine these data with institutional holdings obtained from 13F forms, which report only long positions. The idea of our algorithm is to combine quarterly

snapshot of long positions from the 13F data with the ANcerno data on all trades to determine the long or short position of each investment manager at the time of each trade, enabling us to identify the trades that open short positions. We also identify three other types of trades, these being purchases that cover short positions (short buys), purchases that establish long positions (long buys), and sales that close long positions (long sells). After identifying their trades we categorize investment management firms into hedge funds and non-hedge fund investors using information in the investment managers' Form ADV filings.

Through this algorithm, we identify short sales (short sells), short buys, long buys, and long sells for 94 hedge fund management companies and 298 non-hedge fund management companies from January 1999 through September 2011. The data include a total of 4,666,766 daily hedge fund net trades, of which 766,550 are trades that either open or close short positions. To check whether the algorithm correctly identifies short sales, we examine the identified short sales during September and October of 2008 when short sales of the stocks of a set of financial firms were banned by the SEC. There is a dramatic decrease in hedge funds short sales of financial company stocks on the date of the ban and an even more dramatic increase on the termination of the ban, verifying that our algorithm successfully identifies short sales. Similar changes in short sales around the period of the short sale ban are reported in Boehmer, Jones, and Zhang (2013).

Having identified the short sales and other trades, we first provide evidence about the profitability of short sales by hedge funds in comparison to the other non-hedge fund institutional investors. To this end, we exploit the unique feature of our data and examine the profitability of the closed hedge fund short sales. We find that hedge fund short sales in our sample are profitable, especially for short horizons. Specifically, hedge fund short trades that are covered within five trading days on average earn an abnormal return based on characteristic-matched portfolios (Daniel, Grinblatt, Titman, and Wermers 1997) of 13.7 basis points per day, which translates to greater than 34% per year. After rebate fees and transaction costs, these trades earn 8.3 basis points per day (21% per year). For short sales kept open longer than five days the estimates of average abnormal returns are not significantly different from zero and the point estimates are close to zero. The returns on short sales by non-hedge fund investors are quite different. Their short sales covered within five trading days actually generate on average a loss of 3.6 basis points per day. Non-hedge fund short sales covered in longer horizons are not

particularly profitable either. We obtain similar results by examining the abnormal returns or "alphas" of calendar-time portfolio return regressions using the Carhart (1997) four-factor model.

Having established that hedge fund short trades are profitable, we next test whether the profitability in hedge fund short trades is due to informed trading. Specifically, we examine whether increased short selling activities by hedge funds have predictive power for future negative earnings surprises. For this purpose, we construct short intensity measures for each stock using the ratio of total dollar amounts shorted by all hedge fund managers to the total dollar amounts of all trades by all managers. We find that greater short selling intensity by hedge funds predicts more negative earnings surprises. This predictability of negative earnings surprises is concentrated in short horizons, within five days, which is consistent with our earlier results that hedge fund short trades are profitable for short horizons. Also, hedge fund short trades that are open during earnings announcements and covered within five trades tend to be profitable. In contrast, short selling by non-hedge funds does not show any correlation with firms' earnings surprises.

We also provide evidence that suggests that some of the hedge fund short sale profits are due to liquidity provision by showing that hedge fund short positions opened on trading dates with positive abnormal stock returns and closed with five trading dates are profitable on average while those opened on trading days with negative abnormal returns are not profitable. There is no evidence that non-hedge fund institutional investors profit from liquidity provision, as non-hedge fund institutional investors on average experience losses on short positions opened on trading dates with positive abnormal stock returns and closed with five trading dates. The point estimates of these losses are actually greater than the losses they suffer on short positions opened on trading dates with negative abnormal stock returns and closed with five trading days.

The unique advantage of our dataset is that it also enables us to examine profitability due to short covering trades. We find evidence that profitability in hedge fund short positions are also due to liquidity provision through short covering trades. In particular, short positions that are opened on negative return days (and thus likely to be liquidity providing short sells) and covered within five days on negative return days are particularly profitable. These short covering trades also predict positive abnormal returns for the next three trade days, ruling out the possibility that hedge fund short sellers are subject to the disposition effect and have a tendency to cover their positions when the short positions become profitable.

Lastly, we investigate whether hedge funds have skill in short selling by exploring the extent to which the profits from short selling are persistent. Our data set provides a unique advantage over previous databases to examine short selling skills, since it tracks short trades at the individual manager level, allowing us to track the persistence of the profitability of hedge fund short positions. In particular, we examine whether past successful short sellers who are profitable on their short positions also profit from their short positions in the following periods. We find evidence of such persistence, consistent with the hypothesis that hedge funds possess short selling skills. The hedge funds in the highest quintile of profitability on their previous short trades continue to execute profitable short trades in subsequent quarters, consistent with having short-selling skill.

These findings are related to several strands of literature. As noted above, Griffin and Xu (2009) and Agarwal et al. (2013) find that hedge funds' long equity holdings and disclosed long equity holdings, respectively, display only limited positive abnormal performance relative to the DGTW characteristic-matched benchmarks.[4] Our finding that hedge fund long trades are not profitable relative to the DGTW characteristic-matched benchmarks is consistent with these results, especially once one recognizes our profitability estimates reflect the transaction costs of entering and exiting the positions and the Griffin and Xu (2009) and Agarwal et al. (2013) estimates of abnormal performance do not. More importantly, we add to this literature by documenting that hedge funds earn significant profits on some of their short trades, those closed within five trading days, but not on those held open for longer periods. This finding is consistent with the results in Jame (2015) that U.S. equity hedge funds have short term trading skills and profit from liquidity provision, but that overall the average hedge fund does not earn significant abnormal returns on its equity holdings. Our finding that hedge fund short sales of U.S. stocks held open for long periods are not profitable contrasts with the results in Jank and Smajbegovic (2015) who examine the performance of hedge funds that short sell European stocks using a sample of large short sales in European stocks transacted between November 2012 and December 2014 and find that the hedge funds earn profits.

[4] Agarwal et al (2013) report abnormal returns for the disclosed and undisclosed hedge fund positions separately (see their Table V) and not the overall hedge fund portfolios. However, the fact that the aggregate undisclosed position is small relative to the aggregate disclosed position indicates that, aggregating across funds, the abnormal performance of the total hedge fund long equity positions is similar to the performance of the disclosed positions. Agarwal et al (2013, Table V) do find some evidence of positive abnormal performance using the "alphas" from calendar-time regressions using the four-factor Carhart (1997) model.

Overall, our findings that hedge fund long trades are not profitable, short trades closed within trading five days are profitable, and other short trades are not profitable is broadly consistent with the subset of the hedge fund literature that finds limited evidence of superior performance by hedge funds, for example Dichev and Yu (2011), Aiken, Clifford, and Ellis (2013), and Jame (2015).

Our results also add to the literature that investigates what kinds of short sales are informed. Boehmer, Jones, and Zhang (2008) use NYSE data and find that institutional short sales are more predictive of future stock returns than others and Kelly and Tetlock (2014) examine short selling by retail investors, but how particular types of institutional investors, for example hedge funds, perform on their short sales has not previously been studied.

Finally, our results are related to the broader literature showing that short interest and other proxies for short-selling activity predict stock returns cited above. As pointed out previously, the ability of measures of shorting activity to predict stock returns does not imply that shorting is profitable because short sellers might incur significant price impact costs in unwinding their trades, especially if the trades are crowded (Hong et al. 2015). Our results suggest that the caveat that predictability does not imply profitability is important.

2. Data and Variable Construction

Our analysis of hedge fund short sales requires that we match the institutional investor transactions data from ANcerno to the holdings data from the Form 13F filings. We describe the transactions data and how we match it to the Form 13F holdings data, and then explain how we classify the institutions' transactions as short sales, short buys, long buys, and long sells.

2.1. Institutional Trading Data from ANcerno

The transaction-level institutional trading data are from ANcerno (formerly Abel/Noser), an execution cost consulting firm. The data cover the period from January 1999 to September 2011 and are representative of institutional investor transactions.[5] Versions of the dataset have previously been used by Bethel et al. (2009), Chemmanur et al. (2009), Goldstein et al. (2009), Hu (2009), Green and Jame (2011), Anand et al. (2012), Agarwal et al. (2014), Green et al.

[5] For example, ANcerno reports that over the period from the fourth quarter of 2009 to the third quarter of 2010 the dataset includes data on trades involving 133 billion shares with total market value of $3.4 trillion in over 8,390 stocks and ADRs.

(2014), and Hu et al. (2014). Fields in the dataset include detailed information on institutional stock transactions including CUSIP and ticker identifiers, transaction dates, the number of shares transacted, whether the transaction is a buy or a sell, transaction prices, and market prices at the time of transactions. Unlike most other research using ANcerno data, our version of the dataset includes the names of the institutional managers who execute the transactions. This enables us to use the names to merge the ANcerno data with the 13F holdings data and construct estimates of the institutional investors' positions on each date, and thus identify whether the transactions (changes in positions) are short sales, short buys, long buys, or long sells.

2.2. Merging the Transaction and Holdings Data

We match institutional managers in ANcerno with those in the 13F holdings data by "manually" compare the manager names to find a match that is exact up to abbreviations and minor variations in the manager names. We augment original 13F filings with amendments to the original filings to address the confidential filing issue reported in Agarwal et al. (2013). Before matching on holdings, we filter the ANcerno data according to the following criteria used also by Hu, Ke, and Yu (2015). If an ANcerno manger does not have trades in every month of a given quarter, the manager's trades for the quarter are dropped. We require that the manager have trades in every month of the quarter in order to screen out managers who enter or exit the ANcerno database during a quarter and managers who do not report their trades for every month, because in these cases their cumulative transactions will not be for a full quarter and cannot be expected to match quarter end snapshot data from the 13F filings. Second, for each combination of firm and calendar quarter we retain only those that have the following characteristics: (a) the firm must be a U.S. firm that issues only one class of common stock traded on one of the three major stock exchanges; (b) the stock does not get delisted or undergo an initial public offering during the quarter; (c) the stock price at the beginning of the calendar quarter is greater than $5 and the number of common shares outstanding at the beginning of the calendar quarter is greater than one million; (d) the net quarterly institutional ownership change is greater than 500 shares; and (e) the firm must have institutional trading or holdings data in both databases (though not necessarily by the same institutions). Of total 862 unique investor managers in the ANcerno database, we have 648 investor managers after the data clean-up process. Among the 648 managers, we are able to match 392 of them to the managers reported in the 13F filings.

Identifying management companies as a hedge fund is not a clear-cut process; some investment managers have both hedge fund and mutual fund units. We use the SEC Form ADV, following the approach in Brunnermeier and Nagel (2004), Griffin and Xu (2009), and Jame (2015). Specifically, we classify a management company (asset manager, or fund company) as a hedge fund manager if both of the following conditions are met. First, item 5D of Form ADV indicates that more than half of the management company's investor base is high net worth individuals or pooled investment vehicles. Second, item 5E of Form ADV indicates that the management company charges a performance fee. When a Form ADV is not available for a management company, we use asset manager type information available in 13F.[6] Of the 392 ANcerno managers that we match to 13F managers, we identify 94 as hedge funds and 298 as non-hedge fund investment managers.

2.3. Classifying Transactions as Short Sells, Short Buys, Long Buys, and Long Sells

After matching the ANcerno investment managers to the managers in the13F filings we combine the manager positions reported in the 13Fs with transactions (changes in positions) from the ANcerno data to construct estimates of the holdings of each manager in each stock on each date. Once we know managers' positions on each date we can identify transactions as short sales, short buys, long buys, and long sells. For example, we classify a decrease in a non-positive position as a short sale and an increase in a negative position as a short buy (or short covering). Similarly, an increase in a non-negative position is a long buy and a decrease in a positive position is a long sell.

It is straightforward to estimate manager *A*'s holdings in stock *X* for each date as long as manager *A* reports holdings in stock *X* for at least one quarter-end date. However, it is possible that ANcerno reports transactions by a manager in stock *X*, but the manager never files a 13F reporting holdings of stock X because the manager's position never meets or exceeds the Form 13F reporting threshold of 10,000 shares or $200,000. In this case we can construct upper bounds on the manager's positions in stock *X* on each date by using the fact that manager *A*'s maximum position in stock *X* across all dates must have been less than the reporting threshold.

Let $I(t, A, X)$ represent the estimate of the inventory of ANcerno manager *A* in stock *X* at the end of trading day *t*. Negative values of $I(t, A, X)$ mean *A* has an open short position in stock

[6] We thank Vikas Agarwal for sharing the list of hedge funds based on information available in 13F filings.

X. For each date *t* for which the Form 13F of manager *A* reports a position in stock *A*, we set $I(t, A, X)$ equal to the number of shares listed in the 13F. We then use the ANcerno data to assign values to $I(t, A, X)$ on trade dates between 13F filings and also on trade dates before and after the first and last 13F filings reporting holdings in stock *X*. For each combination of manager *A* and stock *X*, there are four cases: (1) dates *t* that fall between two ends of quarter dates for which manager *A* reports holdings of stock *X*; (2) dates *t* that are before the date of manager *A*'s first 13F that reports holdings of stock *X*; (3) dates *t* that are after the date of manager *A*'s last 13F that reports holdings of stock *X*; and (4) manager *A* never reports a holding of stock *X*.

Case 1: Dates t that are in between two quarter-end reporting dates for which manager A reports holdings of stock X

Let t_n, $n = 1, 2, \ldots, N$ be the dates for which manager *A* has filed Form 13F. Consider a date *t* falling in between two quarter-end reporting dates for which managers *A's* 13F filings report holdings in stock *X*, and let t_m and t_n be the latest quarter-end before date *t* and earliest quarter-end after date *t* for which manager *A*'s Forms 13F show a holding in stock *X*, respectively. The dates t_m and t_n need not be consecutive quarter-end dates. Let $I_1(t, A, X)$ be the estimate of the inventory of *A* in stock *X* at time *t* computed from the number of shares in stock *X* reported in the 13F for date t_m, incremented and decremented by buys and sells reported in the ANcerno data, and let $I_2(t, A, X)$ the estimate of the inventory of *A* in stock *X* at time *t* computed from the number of shares in stock *X* reported in the 13F at date t_n, incremented and decremented by sells and buys reported in the ANcerno data. In both cases we adjust for stock splits when incrementing and decrementing the inventories. If the two estimates based on the reported holdings at t_m and t_n agree then we set $I(t, A, X) = I_1(t, A, X) = I_2(t, A, X)$. It is also possible that $I_1(t, A, X)$ and $I_2(t, A, X)$ do not agree due to errors in either the ANcerno or 13F holdings data; in this case we estimate $I(t, A, X)$ as a weighted average of $I_1(t, A, X)$ and $I_2(t, A, X)$, that is we set

$$I(t, A, X) = w \times I_1(t, A, X) + (1 - w) \times I_2(t, A, X), \qquad (1)$$

where $w = (t_n - t)/(t_n - t_m)$.

Case 2: Dates t prior to the first date for which manager A reports holdings of stock X

Let t_n be the earliest quarter-end date after *t* for which manager *A* has filed a 13F reporting a position in stock *X*. For dates $t < t_n$, the inventory $I(t, A, X)$ is computed by starting from the number of shares in stock *X* reported in the 13F on date t_n, $I(t_n, A, X)$, and incrementing and decrementing that value using sells and buys reported in the ANcerno data.

Case 3: Dates t after the last date for which manager A reports holdings of stock X

Let t_m be the latest end of quarter date before t for which a manager A has filed Form 13F holdings in stock X. For dates $t > t_m$, the inventory $I(t, A, X)$ is computed by starting from the number of shares in stock X reported in the 13F on date t_m, $I(t_m, A, X)$, and incrementing and decrementing that value using buys and sells reported in the ANcerno data.

Case 4: Manager A does not report holdings in stock X

If none of manger A's 13Fs report holdings in stock X but the ANcerno data show that A trades in stock X, we calculate the relative holdings, $RI(t, A, X)$, of manager A in stock X by assuming that manager A's initial holding of stock X over the date range of the ANcerno dataset is zero. That is, if the first transaction in the ANcerno data has A buying 200 shares of X at time t, then $RI(t, A, X) = 200$. After calculating $RI(t, A, X)$, we then adjust inventory values so that the maximum inventory over the entire period for which ANcerno data are available for that manager is the 13F reporting threshold, i.e., the smaller of 10,000 shares and $200,000. That is, we set $I(t, A, X) = RI(t, A, X) - \max_t\{RI(t, A, X)\} + RT$, where RT is the 13F reporting threshold. This results in overestimating manager A's inventory of stock X on each date, as it sets each value $I(t, A, X)$ equal to the maximum possible value that is consistent with manager A never reporting a long position in stock X.

2.4. Identifying Short Sales, Short Buys, Long Sales and Long Buys

Using the estimates of $I(t, A, X)$, we are able to identify short positions and short sales. A has a short position in stock X when $I(t, A, X) < 0$. A short sale occurs when $I(t, A, X)$ is initially non-positive and the net number of daily shares bought in X is negative. Using a similar approach, we are able to identify daily transactions as short buys, long sells, and long buys. A short buy occurs if $I(t, A, X)$ is initially negative, the net number of shares bought in X is positive and the new value of $I(t, A, X)$ remains negative. A long buy occurs if $I(t, A, X)$ is initially non-negative and the net number of shares bought in X is positive. A long sell occurs if $I(t, A, X)$ is initially positive, the net number of shares bought in X is negative, and the new value of $I(t, A, X)$ remains positive.[7] This classification scheme allows for short buys and long buys to occur on the same date, as well as long sells and short sells. Once we have the number of shares in short sales,

[7] If the daily change is from holding x shares to a short position of y shares, we treat this as a long sale of x that brings the long position to zero and a short sale of y shares. Similarly we treat a change from a short position of x shares to a long position of y shares as a short buy of x shares and a long buy of y shares.

we calculate the dollar volume short sold by multiplying the number of shares in each short sale by their transaction prices.

Summary statistics of the trade classifications are presented in Table 1. The ANcerno data has 22,982,337 net daily stock-manager trades. Long buys are the majority of the daily trades with a sample size of 11,421,242; followed by long sells (9,007,837), short sells (1,324,861), and short buys (1,228,397). Short buys and sells consist of 11.1% of the sample trades. For hedge fund only transactions, of the 4,666,766 net daily stock-hedge fund trades; 1,928,342 are long buys, 1,971,874 are long sells, 412,128 are short sells and 354,422 are short buys. Short sells consist of 16.4% of the sample hedge fund trades. [8]

Table 1 also shows nontrivial amounts of shorting by non-hedge fund investors. Note first that short sales by mutual funds are increasing in recent periods (Chen, Desai, and Krishnamurthy, 2013). More importantly, the classification of hedge fund versus non-hedge fund managers is not always clear-cut. Often times investment companies manage both hedge funds and mutual funds. In Table A.1 in Appendix, we examine the distribution of hedge funds among investment managers in our sample (both hedge fund and non-hedge fund managers) using the TASS database. Panel A shows that the median number of hedge funds they manage is zero, some non-hedge fund investment managers in our sample also manage hedge funds. These results show that our classification of hedge fund investment managers is good.

Panel A of Table A.1 also shows that most hedge fund managers that are found in the TASS data manage only a few hedge funds. The median number of hedge fund is only three and the 25 percentile is only one. The fund managers not reported in TASS might be smaller ones and are also likely to hold only one fund. Nevertheless, having multiple funds in one management company can lead to misrepresentation of short positions in our sample. In Appendix A, we address this issue by replicating our main results using the subsample of investment managers in which both ANcerno and 13F agree on quarterly holdings of investment managers. By matching on both names and quarterly changes in holdings we ensure that the ANcerno data captures close to all the trades made by the managers during the quarter. In Table A.2, we show that our main results provided in Section 4 remain qualitatively the same.

[8] In Table A.4 provided in Appendix, we replicate our main results using an alternative classification of hedge fund versus non-hedge fund investment managers. Specifically, we classify as hedge fund managers investment companies that manage at least one hedge fund investing mainly in U.S. equities. Our results remain qualitatively similar.

3. Short Sales During the Short Sale Ban: A Reality Check on Our Identification of Short Sales

3.1. Hedge Fund Short Sales during the Short Selling Ban

In an effort to "protect the integrity and quality of the securities market and strengthen investor confidence," the Securities and Exchange Commission (SEC) banned short selling in a list of financial companies starting on September 19, 2008.[9] This short sale ban remained in effect until short sales of financial sector stocks were allowed to resume on October 9, 2008. Prior to the announcement of the short sale ban, on September 17, 2008, the SEC banned naked short selling in all stocks.[10] We check our classifications of trades by examining the estimated short sales of financial sector stocks during this period when short sales of financial stocks were banned. Our algorithm, if correct, should identify short selling by hedge funds as close to zero during this period.

Figure 1(a) shows estimates of hedge funds' dollar volume of short sales and long sales, respectively, during September and October 2008. On September 18, just prior to the announcement of the ban, we estimate that hedge funds had an average of just over $25 million in short sales proceeds. Then at the onset of the ban the average dollar value of shares sold short drops steeply to close to zero.[11] The average dollar value of financial shares short sold remains close to zero until the ban is lifted on October, 9, on which date the average dollar volume short sold by hedge funds rises dramatically to slightly over $40 million. While the ban was intended to halt the slide in the price of financial stocks, in actuality the ban resulted in a short run bump to prices, but by the end of the ban, the financial sector was down nearly 26%.[12] We estimate that there was a dramatic decline in short sales on the implementation of the ban and an even greater increase in short sales at the end of the ban. Our algorithm produces results that are consistent with financial events.

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[9] See http://www.sec.gov/news/press/2008/2008-211.htm. The ban was announced after the close of trading on September 18, 2008, and was effectively immediately.

[10] See https://www.sec.gov/news/press/2008/2008-204.htm.

[11] The graph does not show short selling falling to $0 during the 09/19/08 to 10/08/08 period, because the ban does not apply to registered market makers, block positioners, other market makers in over-the-counter markets, or any person that effects a short sale as a result of automatic exercise or assignment of an equity option held prior to the order.

[12] See http://www.wsj.com/articles/SB122351280409217645

We also illustrate, in Figure 1(b), the dollar-value of long selling by hedge funds in financial stocks. Following the short sale ban, and the temporary increase in the price of financial stocks, hedge funds reduce their long selling in financial stocks. However, unlike the drastic reduction in short sales, the average dollar volume of long sales on September 19 is $275 million –i.e. long selling does not fall anywhere close to $0 on 09/19/08. During the period of the short sale ban, the long selling by hedge fund increases as financial stock prices decline. Average long sales by hedge funds reach $163 million on September 29, 2008. When the ban on short sales in financial stocks is lifted on October 9, the proceeds from long sales drop significantly from $157 million the previous day to approximately $25 million as hedge funds resume short selling. The differences in short selling and long selling trading activity by hedge funds during the short sale ban are indicative that our algorithm correctly identifies short sales.

Figures 1(c) and 1(d) present non-hedge fund institutional investors' dollar volume of short sales and long sales in financial stocks over the short sale ban period. The trading activities of institutional investors are similar to hedge funds over the short sale ban. This suggests that we are also able to correctly distinguish between institutional investor's short sales and long sales. Similar to hedge funds, we find institutional investors' short sales in financial stocks drop significantly once the short sale ban is enacted, and rises sharply once the ban is repealed. However, the average short sales by institutional investors are higher that hedge funds during the ban period. This result is consistent with Boehmer et al. (2013). They find that during the shorting ban, short sales do not decline to zero as institutional investors, such as market makers, block positioners, or holders of options acquired prior to the ban, were able to short sell during the ban. Similar to hedge funds' trading activity, we show that institutional investors' long sales decrease following the ban, but the decrease is not as steep, and the long sales continue to decline once the ban is repealed. Institutional investors exhibit different short selling and long selling trading activity during the short sale ban.

4. The Profitability of Hedge Fund Short Sales

There is an extensive literature documenting that short interest and other measures of shorting activity predict stock returns. Most these studies, however, rely on aggregate measures of shorting activity and do not have access to account-level data, and thus they do not examine actual profitability of short sales. Although suggestive, the finding that short sale activity

predicts stock returns does not imply that it is profitable. Investors might close their short positions at unfavorable times, or the price impact of their short covering trades might reduce the trades' profitability. This is likely if the short trades are "crowded," as point out by Hong et al. (2015). An advantage of our data over previous databases is that we can determine when investors open and close their trades and thus compute the profitability of the trades. Below we present the profitability of trades that are open for various lengths of time or trade lengths.

4.1. Calculating Trade Length

We compute trade profitability from closed trades. Specifically, for each short buy transactions in our data, we identify the most recent short sell trades that correspond to the short buy transactions. We count the short buy (closing) and corresponding short sell (opening) transactions as a completed trade, and compute trade lengths and profitability from these transactions. For example, suppose a manager has a short position of 300 shares in a stock and buys back 100 shares (that is, a short buy of 100 shares) on January 12, 2005, at which time the short position becomes 200 shares. We then trace back from January 12 to find the most recent short sales that contributed to the short position of 300 shares. If there are multiple such short sales on different dates, we assign all these dates as separate opening dates. For example, if the short position goes from 100 to 200 on January 5, 2005 and 200 to 300 on January 6, 2005 so that the most recent short sales are the two 100-share transactions on January 5 and 6, we treat these as two short trades, one opened on January 5 and closed on January 12 and one opened on January 6 and closed on January 12. In this sense, our calculations are based on a last-in-first-out (LIFO) rule. We use the LIFO rule because it seems reasonable, but also because other rules such as first-in-first-out (FIFO) are not feasible because we do not observe the opening dates of trades that were opened before investment managers entered the ANcerno dataset. Rather than arbitrarily assuming a starting date of a stock's short position, looking at the most recently opened position compared to neighboring closing transaction allows a more consistent measure of trade length across shorted stocks.

For the analyses in this paper, based on the trade length measure, we only include short sell observations with computable trade length of less than one year. This restriction reduces our short sale sample by 20%. Due to the sample period having defined starting and ending dates, 20% is an upper bound on the fraction of short trades that have trade length of more than a year.

Since our focus of analysis is in the profitability of short sale trade that are covered in less than one year, excluding these observations does not compromise our conclusion.

Table 2 provides the summary statistics of the trade lengths that are less than one year. Panel A compares average short side trade lengths of hedge fund and non-hedge fund investors. Hedge fund managers' average short side trade length is 48.92 days, 6.66 days shorter than the non-hedge fund investor's trade length of 55.58 days. Panel B shows the distribution of long side trade lengths for the hedge fund and non-hedge fund managers. On average, hedge fund managers' long side trade length of 55.64 days is 5.84 days greater than the non-hedge fund investors' long side trade length of 49.80 days. In both cases the difference in average trade length are statistically significant. Hedge funds are somewhat faster to cover their short positions and slower to cover their long positions as compared to non-hedge fund investors.

4.2. Are Hedge Fund Short Sales Profitable?

We form five daily value-weighted portfolios of shorted stocks based on ranges of the stocks' trade length (trade length = 0 day, 0 day < trade length ≤ 5 days, 5 days < trade length ≤ 21 days, 21days < trade length ≤ 63 days, and 63 days< trade length ≤ 252 days) for hedge fund investors. On each trading day, we allocate stocks that are short sold by hedge fund investors into the trade length portfolios and keep the stocks in the portfolios from the opening to the closing of the short trades. Portfolio weights are based on the dollar amounts shorted for the stocks by all hedge funds. Similarly, we form trade length portfolios of shorted stocks also for non-hedge fund investors as well. We use actual transaction prices reported in ANcerno for stock returns on short opening and covering days and use daily returns available in CRSP for portfolio holding days other than short opening and covering days. We calculate abnormal portfolio returns by benchmarking to the size, book-to-market, and momentum characteristics-matched portfolios proposed by Daniel, Grinblatt, Titman, and Wermers (DGTW). We also report portfolio alphas estimated from Carhart (1997) four factors.

Panel A of Table 3 reports DGTW-adjusted returns on the five portfolios with different trade lengths for hedge fund (HF) and non-hedge fund managers (NHF). Hedge fund managers have strong profitability for short positions covered in less than five trading days. We find the average DGTW-adjusted return on this portfolio is −13.7 bps per day with a *t*-statistic of −3.08, which indicates that the short sale portfolio is highly profitable. (The returns that we report are the returns to long positions, so a negative return implies that the short trade was profitable.)

Hedge fund short trades covered greater than five days but less than or equal to 21 days are also profitable with an abnormal return of −3.4 bps per day with a t-statistic of −1.89. In contrast, non-hedge fund managers exhibit negative profitability in short trades with trade length less than or equal to five days. The average return on this portfolio is positive 3.6 bps per day, although not statistically significant at conventional levels. Thus, non-hedge fund managers tend to lose money on their short-horizon short sales. In addition, for short trades that are open and covered on the same day shown on the last column ($TL = 0$), hedge fund short-sale portfolios are profitable with an average return 4.5 bps per day, which translates to approximately 11.25% per year and is also statistically significant at the 5% level. In sum, the results in Panel A show strong profitability for hedge fund short sales only for the short-term trades with trade length less than or equal to five days.

Panel B reports abnormal returns (alphas) on the trade length portfolios estimated using the Carhart four-factor model (Carhart 1997). The results based on the four-factor alphas are consistent with those in Panel A based on DGTW-adjusted returns. Hedge fund portfolios exhibit negative alphas for shorter-term trades. For the short portfolio covered in less than five trading days ($0 < TL \leq 5$), the estimated alpha from the four-factor model is −13.8 bps per day with a *t*-statistic of −3.00. In contrast, the non-hedge fund short sale portfolio in the short horizon portfolio with a trade length of less than or equal to five days shows a positive alpha of 3.6 bps per day, consistent with the results based on DGTW-adjusted returns that non-hedge fund investors tend to lose money on short-horizon short sales.

The bottom two rows of the table report alphas based on Dimson (1979) sum betas and the four-factor model as a check to confirm that the results for the four-factor alphas are not driven by non-synchronous trading. We use factor returns lagged up to two trading days. These results based on Dimson betas are consistent with the previous alphas reported above. In addition, in untabulated results we estimate alphas for equal-weighted TL portfolios and obtain qualitatively similar results. Overall, the results in Table 3 Panels A and B show that hedge funds' short horizon short trades are highly profitable.

In Table A.3 provided in Appendix, we include shorting costs and trading fees (e.g., rebate rates and commissions) in portfolio return measurement and reproduce the main results. We use commission fees available from ANcerno for each buy and sell transaction and rebate fee data from Markit. We find from table A.3 that our main results are qualitative similar after these

fees. Hedge fund short trades covered less than or equal to five days are profitable with an abnormal return of −8.7 bps per day (21.8% per year) with a t-statistic of −1.97. Thus rebate fees and commissions do not tend to explain away the substantial profitability on the short-horizon short sale trades.

We provide more robustness checks in Appendix. Our results in Table 3 are based on the HF classification using the Form ADV. The non-hedge fund managers include investment managers that also have mutual funds if mutual fund clients do not exceed 50% of their total assets. In Table A.4, we employ alternative classification of hedge fund and non-hedge fund managers. In particular, we reclassify investor managers as non-hedge fund managers if they do not appear in the TASS database or if they only manager funds that invest mainly in non-U.S. equities (i.e., when fund style in TASS is one of Emerging Markets, Fixed Income Arb, Fund of Funds, or Managed Futures). We include the remaining fund managers in hedge fund managers. We reproduce the results in Table A.4. Based on this alternative classification, we find that the results are largely similar, except the non-hedge fund managers are profitable in 21 to 63 days horizons by exhibiting statistically significant alpha. Overall, Table A.4 shows that our results are not sensitive to our classification of hedge fund managers.

Table 4 explores the profitability of the long side trades of the hedge fund and non-hedge fund investors. Similar to the short sale portfolios, we place the long side trades into value-weighted portfolios based on their trade lengths. Panels A and B report average DGTW-adjusted returns and alphas from the four-factor models, respectively, for hedge fund and non-hedge fund investor long trades. The results provide no evidence that hedge fund long trades are profitable. In Panel A, the point estimate for the DGTW-adjusted returns on the portfolio with trade length less than or equal to five days is −2.4 bps per day with a t-statistic of -1.03. The average returns for the other three hedge fund portfolios are more or less close to zero in magnitudes, although the portfolios with trade lengths between 5 and 21 and between 63 and 252 days are statistically significant at the 10% level. The four-factor model alphas in Panel B are in line with the average DGTW-adjusted returns in Panel A. Overall, the hedge fund results in Table 4 are consistent with previous studies such as Griffin and Xu (2009), who find limited evidence that hedge funds' long positions have positive abnormal returns. The profitability of the non-hedge fund investors' long side trades is lesser than that of the hedge fund trades for all four trade length portfolios. For example, the average DGTW-adjusted return non-hedge fund investors' trades with trade length

less than or equal to five days is −11.8 bps with a *t*-statistic of −10.07, and the corresponding alpha in Panel B is −13.6 bps with a t-statistic of −10.21. All of the other point estimates of the average abnormal returns on non-hedge investor portfolios are also negative.

In summary, we find that hedge funds are profitable on their short positions especially for short-horizon trades. They earn approximately 14 bps per day (9 bps after shorting costs) on their short positions. The point estimate of abnormal returns on short trades covered within a month also is consistent with profitability, though the magnitudes are small. In contrast, we find no significant positive performance for non-hedge funds on short positions and in particular for their short-horizon trades. Although hedge funds' short-term short sales have strong profitability, we find no evidence that their long trades are profitable in our sample.

4.3. Are Hedge Funds Informed Short Sellers?

The results in the previous section show that hedge funds' short-term short trades are profitable. A natural question that arises is what is the source of their profitability. Here, we explore one possible event about which hedge fund investors might have information by examining whether their trading prior to earnings announcements predicts earnings surprises. In particular, we focus on whether hedge fund short selling predicts negative earnings surprises, which are typically associated with negative stock returns. Thus, if hedge funds are informed traders we expect that hedge funds will short stocks before negative earnings surprises.

To test this hypothesis, we estimate the regression model

$$SUE_{i,\tau} = \beta_1 SSI_{i,t} + \beta_2 SBI_{i,t} + \beta_3 LSI_{i,t} + \beta_4 LBI_{i,t} + Controls_{i,t} + \varepsilon_{i,t} . \qquad (2)$$

The standardized unexpected earnings ($SUE_{i,\tau}$) for firm i in quarter τ is the difference between quarterly earnings announced in τ and earnings announced in τ-4, normalized using its standard deviation and average over the preceding eight quarters, as in, e.g., Bernard and Thomas (1989), Ball and Bartov (1996), and Sadka (2006). The main explanatory variables are short sale intensity, ($SSI_{i,t}$), short buy intensity, ($SBI_{i,t}$), long sell intensity, ($LSI_{i,t}$), and long buy intensity, ($LBI_{i,t}$). $SSI_{i,t}$ is defined as $\sum_j SS_{i,j,t} / \sum_j (SS_{i,j,t} + SB_{i,j,t} + LS_{i,j,t} + LB_{i,j,t})$ where $SS_{i,j,t}$, $SB_{i,j,t}$, $LS_{i,j,t}$, and $LB_{i,j,t}$ are the dollar volumes of short sells, short buys, long sells, and long buys by manager j respectively. $SBI_{i,t}$, $LBI_{i,t}$,and $LSI_{i,t}$ are calculated similarly. We omit a constant term to avoid perfect collinearity.

Short sales intensity captures the degree or intensity of short selling in a stock on a given trading day by all managers. This variable is a proxy of the overall managers' view on a given stock. Greater short selling by managers in the stock will result in a higher short sales intensity. In order to examine how soon before an event hedge fund investors become informed, we compute the measures using trading volume from two different windows prior to the earnings announcements. We use average short intensities during one week before earnings announcement ($\tau - 5$, $\tau - 1$) and during the period between one and four weeks before earnings announcement ($\tau - 21$, $\tau - 6$). In selecting the control variables for our regression, we follow Fama and French (2006) and include a dummy variable indicating negative previous earnings (NEGE), dummy variables indicating negative (ACC-) and positive accruals per share (ACC+), percent change in total assets (AG), a dummy variable indicating zero dividends (DD), dividends per share (DPS), and log book-to-market (BE/ME). The regressions are pooled with both firm and quarter fixed effects and standard errors are clustered by date and firm. If hedge funds are informed short sellers, then there should be a negative relationship between short sale intensity, ($SSI_{i,t}$) and standardized unexpected earnings (SUE).

Table 5 reports the results of regressing SUE on the various measures of buy and sell intensities. We find that higher hedge fund short sale intensities predict lower SUE within five days. For example, the coefficient on the hedge fund short intensity during the week before the earnings announcement is –0.268. The economic significance is substantial; a one-standard-deviation increase in short sell intensity (0.409) is associated with a 10.97% decrease in the earnings surprise. The coefficient estimate is highly statistically significant with a *t*-statistic of –3.72. Also the predictability of earnings surprises by hedge funds are stronger in the short horizon (less than or equal to five days), which is consistent with the profitability results presented in Table 4. In contrast, the other hedge fund intensities (i.e., *SBI*, *LSI*, and *LBI*) tend to be statistically insignificant, except for *LBI* in the longer horizon at the 5% level, which indicates hedge fund buys tend to predict positive SUE. Interestingly, we also find that non-hedge funds' long trades are predictive of future earnings surprises for both long and short horizons. In sum, we find that hedge funds' short trades can forecast future unexpected earnings.

In Table 6, we further examine whether hedge funds are able to earn higher profits during earnings announcement periods by comparing short positions that are open before announcement and covered after the announcement with short positions that are not open during earnings

announcements periods. For both short positions, we form two portfolios based on trade length: one for trades length less than or equal to five trading days ($0 < TL \leq 5$) and the other for trade length greater than five and less than or equal to twenty one trading days ($5 < TL \leq 21$). A few observations are in order. First, we find that hedge funds' short sale profitability is slightly stronger during earnings announcement periods, although the difference (0.6 bps per day) is not statistically significant, the returns on the short positions during earnings announcement periods is −14.1 bps in contrast to −13.5 bps during non-earnings announcement periods. Second, we do not find any profitability of hedge fund short positions for long-horizon trades ($5 < TL \leq 21$). If any, profitability is negative. Lastly, non-hedge funds' trades are not significantly profitable for any horizons during earnings announcement periods. In sum, short-term short sales by hedge funds are profitable during periods of earnings announcement.

Overall, our results in Tables 5 and 6 suggest that hedge funds' short sales predict future negative earnings surprise and suggest that hedge funds are informed short sellers. Note also that the results in Table 6, that hedge funds earn returns of 13.5 bps per day during non-earnings announcement periods, indicate that hedge funds are also profitable during non-earnings seasons, indicating that informed trading about earnings information is not the only source of hedge fund profitability.

4.4. Are Hedge Funds Profitable Short Sale Liquidity Providers?

In this section, we examine whether hedge funds obtain profits from their short selling by acting as liquidity providers. Diether et al. (2009) find that short sellers increase their short selling following positive returns. The advantage of our dataset is that it allows us to identify when short sales are also covered. Thus, we can examine whether short sellers provide liquidity not only when they initiate trades but also when they cover them.

To proxy for liquidity providing short sales, we use short trades that are initiated when contemporaneous daily returns are positive. Temporary buying pressure on a stock will cause short-term appreciation in stock prices that will subside over the next few days. As Diether et al. (2009) note, short sellers might step in to provide liquidity by opening short trades, attempting to profit when the buying pressure dissipates and prices converge to fundamental levels. These short sellers can also provide liquidity by covering their positions when other traders sell and push down prices to fundamentals. To examine this liquidity provision through short coverings, we use short buy trades when stock returns are negative on short covering days.

Specifically, we sort short trades with trade length less than or equal to five days ($0 < TL \leq 5$) into two value-weighted portfolios based on whether the return to the shorted stock on the short opening day (R_t) positive or negative. To prevent selection bias in performance due to portfolio sorting based on opening day returns, we measure the return on short opening day R_t as a within-day return on the shorted stock from the market closing of the previous day to the time of the short sale transaction. Stocks are then held in the portfolio from the opening day until the closing day of the short trade.

Table 7 presents results that help answer whether the profitability of hedge fund short sales is associated with liquidity provision by opening short trades. We observe in Panel A that hedge fund short sales are significantly profitable only when contemporaneous stock returns on short opening days (R_t) are positive. This result is robust to controlling for factor returns. In Panel B, the alpha estimate is −16.5 bps daily with a *t*-statistic of −3.16, showing that the profitability is significant both economically and statistically. The difference in returns between positive and negative opening return days is also quite substantial, −13.6 bps with a *t*-statistic of −2.00, as shown in Panel A. In contrast to hedge funds, we find that non-hedge fund short sales are not particularly profitable when short opening day returns are positive.

We next use the uniqueness of our dataset to examine whether the profitability of short covering is associated with liquidity provision. In Table 8, we further split short portfolios that we report in Table 7 into portfolios with positive versus negative covering day returns on shorted stocks (R_{t+k}). Similar to portfolio sorting returns R_t in Table 7, we use as R_{t+k} within-day stock returns from the time of short covering to the end of day, to prevent selection bias in performance measurement. We find that the profitability of hedge fund short sales is mostly pronounced on days when stock returns are negative on short covering days. For example, hedge fund returns are striking −22.0 bps per day on short positions that are opened when stock returns are positive and that are covered when stock returns are negative. In contrast, non-hedge fund investors are not profitable on short trades covered on negative return days. In sum, we find that profits to hedge fund short sellers acting as liquidity providers come mainly from short sellers closing their position.

4.5. Is Short Horizon Profitability Due To the Disposition Effect?

Tables 7 and 8 provide evidence that hedge funds' profits from short selling are also due to hedge funds acting as liquidity providers. When there is excessive buying pressure on a stock,

on a day when the stock's return is positive, hedge funds open their short position. They provide liquidity for the buying pressure. Hedge funds close their short positions on days when the stock's return is negative, thereby obtaining a profit on their liquidity providing trade.

An alternative story that explains profitability in the short horizon is the disposition effect, that is, the tendency of traders to realize gains and leave unprofitable positions open. The disposition effect might also explain the results in Table 8 if traders have a tendency to cover their positions when the short positions become profitable.

In Table 9, we show that the profitability of hedge fund managers in short horizon is not driven by the disposition effect. In particular, we examine future returns on the short portfolios with trade lengths less than or equal to five after short covering. If hedge fund managers suffer from the disposition effect, then the covering of short trades should not forecast higher future returns. The results in Table 9 show otherwise. In Panel A, we find that future cumulative returns on covered stocks are positive for the next three days. For example, the return on the day after short covering is 9.5 bps and statistically significant at the 5% level. We find similar results for alphas estimated from the four factor model in Panel B. In summary, the results in Table 9 show that short covering trades also predict positive abnormal returns for the next three trade days, ruling out the possibility that hedge fund short sellers are subject to the disposition effect and our results for short sale profitability are due to selection biases in short covering.

4.6. Is Hedge Fund Short Sale Profitability Persistent?

In this section, we test whether hedge funds are skilled short sellers by examining the persistence of hedge fund short sale profitability. Each quarter, we separately rank the hedge fund and non-hedge fund investment managers based on the past quarter's performance on their short positions. Then following Daniel, Grinblatt, Titman, and Wermers (1997), we group them into five hedge fund manager quintiles and five non-hedge fund manager quintiles. Next, we compute the value-weighted average returns on the managers' short positions. We perform these analyses separately for short sales with trade lengths less than or equal to five days and short sales with trade length greater than five days for the next four quarters. Finally, we compute equal-weighted averages of the managers' value-weighted returns.

Panels A and C of Table 10 show the results for the hedge fund trades with trade length less than or equal to and greater than five days, respectively, while Panels B and D presents the corresponding results for the non-hedge fund trades. In each Panel, the first column of results

headed “Formation Period” presents the average returns during the formation period, and the four columns headed “Q1,” “Q2,” “Q3,” and “Q4” show the average returns in the four quarters following the end of the formation period. Portfolio 1 consists of the managers that had the most profitable short positions during the formation period and Portfolio 5 consists of the managers that had the least profitable short positions during the formation period.

The results in Panel A indicate that the profitability of the short positions of the hedge funds that were most profitable during the portfolio formation period is lower during the subsequent four quarters than it was during the portfolio formation period, which is unsurprising, but the point estimates indicate continued profitability in all four quarters and that the estimate in the column headed “Q1” is significant. The profitability of the short positions of the hedge funds that were least profitable during the portfolio formation period is higher during the subsequent four quarters than it was during the portfolio formation period, which is again unsurprising, but the point estimates indicate continued losses (except in “Q2”) and the estimates in the columns headed “Q1” and “Q3” are significant at the 5% and 1% levels, respectively. The difference between the low and high quintile portfolios are negative in three of the next four quarters (Q1, Q3, and Q4) and are statistically significant with *t*-statistics of –3.28, –3.20, and –2.32 for Q1, Q3, and Q4, respectively. The economic magnitudes are also quite sizable with daily returns ranging between –53.7 bps and –82.6 bps per day. These results indicate that the short-sale performance is persistent, which is consistent with it being due to skill.

Likewise, the results for non-hedge fund investors’ short-term trades (trade length less than five days) in Panel B show that their short sale performance is also persistent. Note that the persistent of performance is also driven strongly by persistent poor performance, as evidence by the significant losses (i.e., positive returns) on short portfolios in the high quintile portfolios.

In contrast, the results for longer term trades of hedge fund (Panel C) and non-hedge fund (Panel D) investors provide much weaker evidence of persistence. In Panel C, the differences “Low – High” are not all statistically significant and only one of the differences, the one in the column headed “Q3”, is statistically significant. In panel D, the low-minus-high differences are statistically significant at the 10% level in three columns, but we also find that the performance persistence is largely driven by persistent bad performance in the high quintile portfolio. That is, the limited evidence of persistence that is found does not originate from persistence of good

performance, as the low quintile portfolio returns are not statistically significant in most cases in both the panels.

In sum, we find substantial persistence in hedge fund short selling profitability for short short-horizon trades (trade length less than or equal to five days). This trade category, hedge fund short-horizon short sales, is one for which there was evidence of profitability in Table 3; the persistence results are consistent with this profitability being due to skill. We also find evidence of non-hedge fund profitability for short-horizon trades in Panel B.

5. Conclusion

We combine data on transactions and holdings of institutional investors do identify the short sells, short buys, long sells, and long buys of hedge fund managers and other non-hedge fund institutional investors. The main idea of the approach to identify the trades is to use the fact that if an institutional investor whose transactions are in the ANcerno data ever reports a holding of a stock in a 13F filing, then we know the investor's position on one date and we can use the ANcerno transactions to construct the investor's position in the stock on all other dates. Knowledge of the investor's position in a stock on each date allows us to determine whether a sell trade is opening or increasing a short position or closing a long position and whether a buy trade is opening or increasing a long position or closing a short position. One piece of evidence that the approach successfully identifies short sales by hedge funds is the fact that it captures the 2008 short sale ban.

We obtain novel empirical results using these data. First, we find that hedge funds, compared with other institutional investors, tend to make profits from short-horizon trades that are covered within one week. Second, we document that hedge fund short sales have predictive power for future earnings announcements. Third, hedge funds engage in profitable short selling as liquidity providers. Fourth, hedge fund short positions exhibit persistent performance. In sum, we provide the first evidence in the literature that hedge funds are skilled short sellers.

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Appendix

Table A.1 Distribution of Hedge Funds in Our Sample Investment Managers

This table provides the summary statistics of hedge funds for the investment managers of our sample using the TASS hedge fund database. Panel A reports distributional statistics for the numbers and styles of hedge funds managed by hedge fund investors and non-hedge fund investors. Panel B reports the numbers (*# HFs*) and assets under management (*AUM*) of hedge funds by hedge fund style for both hedge fund and non-hedge fund investment managers.

Panel A: The Number of Hedge Funds and Styles Per Manager

	Hedge Fund Managers (N=54)							
	Mean	Min	p10	p25	p50	p75	p90	Max
# Hedge Funds per Manager	4.15	1	1	1	3	5	10	19
# Styles per Manager	1.41	1	1	1	1	2	2	4
	Non-Hedge Fund Managers (N=298)							
	Mean	Min	p10	p25	p50	p75	p90	Max
# Hedge Funds per Manager	0.36	0	0	0	0	0	1	15
# Styles per Manager	0.18	0	0	0	0	0	1	4

Panel B: Hedge Fund Styles

	Hedge Fund Managers			Non-Hedge Fund Managers		
		AUM ($ million)			AUM ($ million)	
	# HFs	Mean	StdDev	# HFs	Mean	StdDev
Convertible Arbitrage	8	196	164	3	15	9
Equity Market Neutral	17	68	78	16	213	775
Event Driven	11	184	230	5	96	143
Global Macro	10	1938	4096	1	23	0
Long/Short Equity	115	98	160	66	45	53
Multi-Strategy	11	457	1233	6	293	433
Other	19	233	232	3	32	15

Appendix A. Matching ANcerno with 13F Data by Quarterly Holdings Changes

In this Appendix, we explain the matching process between institutional managers in ANcerno and the13F holdings data by comparing both the quarterly changes in holdings computed from the two datasets and the manager names. In Table A.2, we replicate the results in Table 3 using this subsample of investment managers that are matched both on quarterly holdings changes and names.

For each combination of stock and quarter we begin by computing the holdings changes from the beginning to the end of the quarter by cumulating the transactions reported in the ANcerno data. We then compare the holdings changes computed from the ANcerno data to the holdings changes computed directly from the 13F holdings to identify for each ANcerno investment manager the ten managers in the 13F data for which the 13F holdings changes most closely match the ANcerno holdings changes. Having identified the ten most closely matching managers based on the holdings changes, we then include only those investment managers that are also matched on a name basis. By matching on both names and quarterly changes in holdings we ensure that the managers in the ANcerno data and the13F filings are the same and that the ANcerno data captures close to all the trades made by the managers during the quarter.

Specifically, for each ANcerno manager we consider each 13F manager, and count the number of firm-quarters for which the holdings changes computed from the ANcerno data is identical to the holdings changes computed from the 13F data. Dividing this count by the number of available firm-quarters for the ANcerno manager, for each ANcerno manager the result is a ranking of how closely the holdings changes of each of the 13F managers match the holdings changes of the ANcerno manager. We also construct an alternative ranking in which we count the number of firm-quarters for which the absolute difference between holdings changes computed from the ANcerno data and the holdings changes computed from the 13F data is less than ten percent of the absolute value of the change in holdings computed from the ANcerno data. Using these two rankings, for each ANcerno manager we select the ten most closely matching 13F managers . Finally, for each ANcerno manager we examine the names of the ten mostly closely matching 13F managers to find a match that is exact up to abbreviations and minor variations in the manager names. Using this procedure we are able to match 194 ANcerno managers to the managers reported in the 13F filings. We replicate Table 3 of the main paper in Table A.2 using this subsample of fund managers. We find largely similar results. For short trades covered within five days ($0<TL \leq 5$), the magnitude of abnormal returns is slightly smaller and not statistically significant, but the abnormal returns are negative and statistically significant at the 5% level. Short trades covered on the same day are also negative and statistically significant at the 5% level. Our main results and conclusions remain the same.

Table A.2 Profitability of Hedge Fund Short Trades: Top 10 Holdings Match Subsample

The sample includes ANcerno and 13F investment managers that are matched both on quarterly holdings changes and by names. Panel A provides daily returns on short side portfolios sorted on trade length (TL) for hedge funds (HF) and non-hedge (NHF) funds. The return bias is fixed for including the actual opening returns and closing returns based on the transaction price. We form six value-weighted TL portfolios (TL ≤ 5 , 5 < TL ≤ 21, 21 < TL≤ 63, 63 < TL ≤ 252, TL = 0) by including stocks in each portfolio from the opening until the closing of trades. Panel B reports the Carhart four factor model (Carhart, 1997) estimation results of the TL portfolio returns. We also report alpha estimates from Dimson's (1979) sum beta approach. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment for short trades

	0<TL ≤5		5 < TL ≤ 21		21 < TL ≤ 63		63 < TL ≤ 252		TL = 0	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF	HF	NHF
Returns	-0.090%	0.067%	-0.002%	0.016%	0.021%	0.003%	0.021%	0.024%	-0.045%**	0.025%*
	(-1.605)	(1.263)	(-0.048)	(0.439)	(0.694)	(0.08)	(0.741)	(0.821)	(-1.999)	(1.872)

Panel B: Alpha estimation from the four factor model of Carhart (1997) for short trades

	TL ≤ 5		5 < TL ≤ 21		21 < TL ≤ 63		63 < TL ≤ 252		TL = 0	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF	HF	NHF
α	-0.108%**	0.048%	-0.019%	-0.004%	-0.003%	-0.019%	-0.002%	0.004%	-0.055%**	0.015%
	(-2.274)	(1.129)	(-1.028)	(-0.228)	(-0.245)	(-1.389)	(-0.23)	(0.373)	(-2.421)	(1.102)
β_{MKT}	1.050***	1.143***	1.116***	1.198***	1.072***	1.123***	1.080***	1.081***	0.016	0.033***
	(28.333)	(34.257)	(75.197)	(79.545)	(130.542)	(106.938)	(170.259)	(126.888)	(0.888)	(3.064)
β_{HML}	-0.284***	-0.471***	-0.160***	-0.283***	0.085***	-0.202***	0.053***	-0.117***	0.034	-0.021
	(-4.131)	(-7.641)	(-5.834)	(-10.156)	(5.6)	(-10.417)	(4.495)	(-7.406)	(0.996)	(-1.069)
β_{SMB}	0.537***	0.580***	0.373***	0.462***	0.366***	0.440***	0.356***	0.328***	-0.002	0.003
	(7.445)	(8.927)	(12.893)	(15.745)	(22.865)	(21.468)	(28.768)	(19.766)	(-0.053)	(0.161)
β_{UMD}	-0.430***	-0.319***	-0.267***	-0.150***	-0.168***	-0.129***	-0.131***	-0.111***	-0.038*	0.038***
	(-9.074)	(-7.478)	(-14.047)	(-7.768)	(-16.023)	(-9.612)	(-16.095)	(-10.197)	(-1.658)	(2.796)
R^2	0.2921	0.3626	0.7120	0.7269	0.8751	0.8261	0.9210	0.8658	0.0016	0.0045
Dimson α	-0.105%**	0.045%	-0.019%	-0.006%	-0.001%	-0.019%	-0.000%	0.004%	-0.055%**	0.014%
	(-2.234)	(1.054)	(-1.033)	(-0.336)	(-0.076)	(-1.421)	(-0.056)	(0.389)	(-2.443)	(1.066)

Table A.3 Profitability of Hedge Fund Short Trades after Rebate and Transaction Fees

Panel A provides daily average returns on short side portfolios sorted on trade length (TL) for hedge funds (HF) and non-hedge (NHF) funds. We form six daily value-weighted TL portfolios ($0 < TL \leq 5$, $5 < TL \leq 21$, $21 < TL \leq 63$, $63 < TL \leq 252$, and $TL = 0$) by including stocks in each portfolio from the opening until the closing of trades. Portfolios are weighted by market values of short sale amounts. We measure returns each stock using actual opening and closing transaction prices after subtracting indicative rebate fees available from Markit and commission fees from ANcerno. When rebate fees are not available, we instead use the average rebate fees for the portfolio. Panel B reports the Carhart four factor model (Carhart, 1997) estimation results of the TL portfolio returns. We also report alpha estimates from Dimson's (1979) sum beta approach. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment for short trades

	$TL \leq 5$		$5 < TL \leq 21$		$21 < TL \leq 63$		$63 < TL \leq 252$	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF
Returns	-0.087%**	0.083%**	-0.019%	0.011%	0.019%	0.003%	-0.006%	0.020%**
	(-1.974)	(2.198)	(-1.062)	(0.738)	(1.193)	(0.29)	(-0.535)	(2.515)

Panel B: Alpha estimation from the four factor model of Carhart (1997) for short trades

	$TL \leq 5$		$5 < TL \leq 21$		$21 < TL \leq 63$		$63 < TL \leq 252$	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF
α	-0.088%*	0.083%**	-0.024%	0.010%	0.022%	0.003%	0.002%	0.016%*
	(-1.928)	(2.065)	(-1.249)	(0.585)	(1.326)	(0.227)	(0.143)	(1.835)
β_{MKT}	1.072***	1.138***	1.129***	1.177***	1.076***	1.112***	1.079***	1.071***
	(29.798)	(36.279)	(75.032)	(90.318)	(83.455)	(126.171)	(122.888)	(155.253)
β_{HML}	-0.311***	-0.439***	-0.256***	-0.243***	-0.119***	-0.163***	-0.158***	-0.095***
	(-4.667)	(-7.56)	(-9.21)	(-10.102)	(-4.984)	(-10.018)	(-9.715)	(-7.482)
β_{SMB}	0.519***	0.543***	0.432***	0.414***	0.398***	0.386***	0.393***	0.304***
	(7.414)	(8.878)	(14.725)	(16.281)	(15.851)	(22.494)	(22.948)	(22.59)
β_{UMD}	-0.416***	-0.305***	-0.317***	-0.144***	-0.320***	-0.138***	-0.289***	-0.122***
	(-9.044)	(-7.609)	(-16.491)	(-8.655)	(-19.405)	(-12.27)	(-25.763)	(-13.807)
R^2	0.3086	0.3850	0.7203	0.7719	0.7604	0.8675	0.8712	0.9062
Dimson α	-0.086%*	0.079%**	-0.025%	0.008%	0.023%	0.003%	0.002%	0.017%*
	(-1.889)	(1.978)	(-1.3)	(0.47)	(1.412)	(0.226)	(0.172)	(1.907)

Table A.3 Profitability of Hedge Fund Short Trades: Alternative Classification of Hedge Fund Managers

Panel A provides daily average returns on short side portfolios sorted on trade length (TL) for hedge funds (HF) and non-hedge (NHF) funds. We classify investor managers as non-hedge fund managers if they do not appear in the TASS database or if they only manager funds that invest mainly in non-U.S. equities (i.e., when fund style in TASS is one of Emerging Markets, Fixed Income Arb, Fund of Funds, or Managed Futures). We include the remaining fund managers in hedge fund managers We form six daily value-weighted TL portfolios ($0 < TL \leq 5$, $5 < TL \leq 21$, $21 < TL \leq 63$, $63 < TL \leq 252$, and $TL = 0$) by including stocks in each portfolio from the opening until the closing of trades. Portfolios are weighted by market values of short sale amounts. We measure returns each stock using actual opening and closing transaction prices. Panel B reports the Carhart four factor model (Carhart, 1997) estimation results of the TL portfolio returns. We also report alpha estimates from Dimson's (1979) sum beta approach. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment for short trades

	$TL \leq 5$		$5 < TL \leq 21$		$21 < TL \leq 63$		$63 < TL \leq 252$	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF
Returns	-0.137%***	0.056%	-0.029%*	-0.005%	0.022%	-0.020%*	-0.004%	0.002%
	(-3.246)	(1.297)	(-1.681)	(-0.322)	(1.469)	(-1.856)	(-0.384)	(0.206)

Panel B: Alpha estimation from the four factor model of Carhart (1997) for short trades

	$TL \leq 5$		$5 < TL \leq 21$		$21 < TL \leq 63$		$63 < TL \leq 252$	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF
α	-0.145%***	0.062%	-0.034%*	-0.007%	0.026%*	-0.023%*	0.004%	-0.007%
	(-3.337)	(1.372)	(-1.875)	(-0.375)	(1.663)	(-1.891)	(0.346)	(-0.778)
β_{MKT}	1.073***	1.162***	1.125***	1.193***	1.073***	1.127***	1.061***	1.086***
	(31.476)	(32.586)	(78.237)	(84.096)	(86.139)	(118.644)	(120.876)	(156.516)
β_{HML}	-0.289***	-0.370***	-0.252***	-0.210***	-0.168***	-0.128***	-0.203***	-0.043***
	(-4.568)	(-5.606)	(-9.462)	(-7.996)	(-7.272)	(-7.278)	(-12.524)	(-3.351)
β_{SMB}	0.493***	0.624***	0.368***	0.470***	0.348***	0.429***	0.342***	0.360***
	(7.43)	(8.978)	(13.131)	(16.978)	(14.336)	(23.162)	(19.989)	(26.608)
β_{UMD}	-0.359***	-0.352***	-0.257***	-0.187***	-0.267***	-0.151***	-0.276***	-0.126***
	(-8.24)	(-7.723)	(-13.992)	(-10.315)	(-16.738)	(-12.406)	(-24.56)	(-14.235)
R^2	0.3233	0.3404	0.7284	0.7500	0.7654	0.8537	0.8665	0.9081
Dimson α	-0.143%***	0.056%	-0.035%*	-0.009%	0.028%*	-0.023%*	0.004%	-0.006%
	(-3.3)	(1.238)	(-1.947)	(-0.478)	(1.748)	(-1.929)	(0.397)	(-0.706)

Table 1. Summary Statistics

Panel A provides the summary statistics of the dataset for both the hedge fund and non-hedge fund sample. We report the total numbers of daily level short sales and long buys and average daily dollar amounts for each transaction type. In panel B, we report the number of managers and average number of stocks in long and short positions, separately, for each sample year. The sample period covers from Jan 1999 to Sep 2011.

Panel A

	Hedge Fund	Non-Hedge Fund	Total
Total # of Managers	94	298	392
Total # of Traded Stocks	7,809	8,916	9,124
Total # of Short Sell	412,128	912,733	1,324,861
Total # of Short Buy	354,422	873,975	1,228,397
Total # of Long Buy	1,928,342	9,492,900	11,421,242
Total # of Long Sell	1,971,874	7,035,963	9,007,837
Average Dollar Amount of Daily Short Sell (in thousands)	670.00	567.38	599.30
Average Dollar Amount of Daily Short Buys (in thousands)	769.63	578.73	633.81
Average Dollar Amount of Daily Long Buys (in thousands)	730.05	693.89	699.99
Average Dollar Amount of Daily Long Sell (in thousands)	725.46	906.47	866.85

Panel B

Year	Total # of Manager		Average Number of Stocks in Long Position		Average Number of Stocks in Short Position	
	Hedge Fund	Non-Hedge Fund	Hedge Fund	Non-Hedge Fund	Hedge Fund	Non-Hedge Fund
1999	61	184	3,702	4,722	2,942	3,160
2000	62	189	3,357	5,033	3,177	3,348
2001	61	194	3,032	4,113	2,632	2,834
2002	63	207	2,878	3,760	2,936	3,171
2003	63	207	2,934	3,949	2,524	3,046
2004	64	210	3,223	4,145	2,993	3,404
2005	64	206	3,163	4,221	3,043	3,483
2006	69	211	3,206	4,138	3,000	3,983
2007	67	211	3,263	4,179	3,087	3,970
2008	66	208	2,944	3,790	2,742	3,836
2009	64	203	2,716	3,590	2,439	3,432
2010	64	193	2,651	3,610	2,408	3,362
2011	60	182	2,529	3,443	2,635	3,005

Table 2. Trade Length

Panels A and B report summary statistics for short and long side trade length (*TL*), respectively, in trading days for both hedge funds (*HF*) and non-hedge funds (*NHF*). The table reports means, standard deviations, and 5, 25, 50, 75, and 95 percentiles. The third row, *HF-NHF*, denotes the difference between hedge fund and non-hedge fund trade length. *t*-statistics are in parentheses below the estimates of the differences between hedge fund and non-hedge fund investor trade length. *, **, and *** indicate statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Short Side Trade Length

	Mean	Std. dev.	5%	25%	50%	75%	95%	No. obs.
HF	48.92	57.09	2	8	25	69	182	336,865
NHF	55.58	62.92	1	8	28	84	199	650,368
HF – NHF	–6.66***							
	(–51.41)							

Panel B: Long Side Trade Length

	Mean	Std. dev.	5%	25%	50%	75%	95%	No. obs.
HF	55.64	62.47	1	7	30	84	197	2,663,805
NHF	49.80	61.99	1	5	21	74	194	10,912,851
HF – NHF	5.84***							
	(137.65)							

Table 3. Profitability of Hedge Fund Short Trades

Panel A provides daily average abnormal returns on short side portfolios sorted on trade length (TL) for hedge funds (HF) and non-hedge (NHF) funds. We form six daily value-weighted TL portfolios ($0 < TL \leq 5$, $5 < TL \leq 21$, $21 < TL \leq 63$, $63 < TL \leq 252$, and $TL = 0$) by including stocks in each portfolio from the opening until the closing of trades. Portfolios are weighted by market values of short sale amounts. We measure returns each stock using actual opening and closing transaction prices. Panel B reports the Carhart four factor model (Carhart, 1997) estimation results of the TL portfolio returns. We also report alpha estimates from Dimson's (1979) sum beta approach. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment for short trades

	$0 < TL \leq 5$		$5 < TL \leq 21$		$21 < TL \leq 63$		$63 < TL \leq 252$		$TL = 0$	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF	HF	NHF
Returns	-0.137%***	0.036%	-0.034%*	-0.003%	0.011%	-0.005%	-0.011%	0.015%*	-0.045%**	0.018%
	(-3.083)	(0.966)	(-1.891)	(-0.196)	(0.707)	(-0.456)	(-1.008)	(1.886)	(-1.976)	(1.345)

Panel B: Alpha estimation from the four factor model of Carhart (1997) for short trades

	$0 < TL \leq 5$		$5 < TL \leq 21$		$21 < TL \leq 63$		$63 < TL \leq 252$		$TL = 0$	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF	HF	NHF
α	-0.138%***	0.036%	-0.039%**	-0.004%	0.014%	-0.005%	-0.004%	0.011%	-0.054%**	0.007%
	(-2.999)	(0.905)	(-2.031)	(-0.268)	(0.863)	(-0.438)	(-0.333)	(1.26)	(-2.413)	(0.552)
β_{MKT}	1.071***	1.137***	1.129***	1.177***	1.076***	1.112***	1.079***	1.071***	0.025	0.029***
	(29.773)	(36.257)	(75.005)	(90.343)	(83.46)	(126.129)	(122.887)	(155.259)	(1.431)	(2.781)
β_{HML}	-0.311***	-0.438***	-0.256***	-0.243***	-0.119***	-0.163***	-0.158***	-0.095***	0.027	-0.018
	(-4.664)	(-7.553)	(-9.205)	(-10.102)	(-4.982)	(-10.007)	(-9.714)	(-7.482)	(0.784)	(-0.901)
β_{SMB}	0.518***	0.543***	0.432***	0.413***	0.398***	0.387***	0.393***	0.304***	-0.003	0.009
	(7.399)	(8.874)	(14.719)	(16.279)	(15.853)	(22.494)	(22.958)	(22.602)	(-0.086)	(0.436)
β_{UMD}	-0.416***	-0.304***	-0.317***	-0.144***	-0.320***	-0.138***	-0.289***	-0.122***	-0.028	0.035***
	(-9.04)	(-7.581)	(-16.486)	(-8.651)	(-19.402)	(-12.262)	(-25.769)	(-13.812)	(-1.218)	(2.621)
R^2	0.3083	0.3846	0.7201	0.7719	0.7604	0.8674	0.8712	0.9062	0.0012	0.0038
Dimson α	-0.135%***	0.032%	-0.040%**	-0.006%	0.016%	-0.005%	-0.003%	0.012%	-0.055%**	0.007%
	(-2.966)	(0.811)	(-2.087)	(-0.393)	(0.947)	(-0.442)	(-0.307)	(1.329)	(-2.426)	(0.53)

Table 4. Profitability of Hedge Fund Long Trades

Panel A provides daily average abnormal returns on short side portfolios sorted on trade length (TL) for hedge funds (HF) and non-hedge (NHF) funds. We form four value-weighted TL portfolios (TL≤ 5, 5 < TL ≤ 21, 21 < TL≤ 63, and 63 < TL≤ 252) by including stocks in each portfolio from the opening until the closing of trades. Portfolios are weighted by market values of traded amounts. We measure returns each stock using actual opening and closing transaction prices. Panel B reports the the Carhart four factor model (Carhart, 1997) estimation results of the TL portfolio returns. We also report alpha estimates from Dimson's (1979) sum beta approach. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment for long trades

	TL≤5		5<TL≤21		21<TL≤63		63<TL≤252	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF
Returns	-0.024%	-0.118%***	0.014%*	-0.027%***	-0.008%*	-0.014%***	0.005%*	-0.001%
	(-1.026)	(-10.072)	(1.697)	(-4.363)	(-1.711)	(-3.215)	(1.665)	(-0.325)

Panel B: Alpha estimation from the four factor model of Carhart (1997) for long trades

	TL≤5		5<TL≤21		21<TL≤63		63<TL≤252	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF
α	-0.024%	-0.136%***	0.015%	-0.036%***	-0.011%**	-0.018%***	0.003%	-0.004%
	(-0.948)	(-10.205)	(1.537)	(-5.125)	(-2.033)	(-3.801)	(0.774)	(-1.149)
β_{MKT}	0.989***	1.015***	1.078***	1.106***	1.080***	1.103***	1.023***	1.071***
	(48.802)	(96.99)	(141.559)	(198.236)	(262.901)	(294.517)	(330.597)	(369.405)
β_{HML}	0.002	-0.149***	-0.022	-0.168***	0.054***	-0.127***	0.127***	-0.026***
	(0.052)	(-7.718)	(-1.544)	(-16.273)	(7.061)	(-18.314)	(22.122)	(-4.768)
β_{SMB}	0.171***	0.123***	0.215***	0.156***	0.183***	0.184***	0.155***	0.158***
	(4.336)	(6.03)	(14.511)	(14.39)	(22.88)	(25.23)	(25.705)	(28.019)
β_{UMD}	-0.046*	-0.122***	-0.095***	-0.091***	-0.062***	-0.068***	-0.016***	-0.013***
	(-1.769)	(-9.137)	(-9.744)	(-12.75)	(-11.756)	(-14.274)	(-4.142)	(-3.489)
R^2	0.4722	0.7876	0.8857	0.9384	0.9631	0.9708	0.9757	0.9805
Dimson	-0.026%	-0.136%***	0.014%	-0.036%***	-0.011%**	-0.018%***	0.003%	-0.004%
α	(-1.02)	(-10.493)	(1.451)	(-5.143)	(-2.089)	(-3.929)	(0.798)	(-1.173)

Table 5. Prediction of Earnings Surprises

This table reports the regression of future earnings surprise on short sell intensities of hedge funds and non-hedge funds. The dependent variable is a standardized unexpected earnings (*SUE*) calculated following Sadka (2006). The explanatory variables are short sell, short buy, long buy, and long sell intensities (*SSI*, *SBI*, *LBI*, and *LSI*, respectively), a dummy variable indicating negative earnings (*NEGE*), dummy variables indicating positive (*ACC-*) and negative accruals per share (*ACC+*), a percent change in total asset (*AG*), a dummy variable indicating zero dividends (*DD*), dividends per share (*DPS*), and log book-to-market (*ln(BE/ME)*). *SSI* and *LBI* are calculated as ratios of dollar amounts of short sells and long buys to dollar amount of total trades, respectively. Columns *Window 1* use explanatory variables known in the past week and Columns *Window 2* use explanatory variables in the past one week to one month. We include both firm and quarter fixed effects. The numbers in parentheses are time clustered t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels.

	Hedge Fund		Non-Hedge Fund	
	Window 1 (t-1 ~ t-5)	Window 2 (t-6 ~ t-21)	Window 1 (t-1 ~ t-5)	Window 2 (t-6 ~ t-21)
SSI	-0.268***	-0.199***	0.018	-0.065
	(-3.72)	(-2.67)	(0.19)	(-0.56)
SBI	0.048	0.042	0.177*	0.356***
	(0.68)	(0.57)	(1.85)	(3.00)
LBI	0.034	0.106**	0.083**	0.206***
	(0.83)	(2.44)	(1.98)	(4.13)
LSI	0.051	-0.017	0.047	0.103*
	(1.26)	(-0.39)	(0.99)	(1.78)
NEGE	0.091**	0.039	0.047	0.039
	(2.15)	(1.03)	(1.36)	(1.15)
ACC+	-0.000	-0.048	-0.059	-0.016
	(-0.00)	(-0.71)	(-0.91)	(-0.25)
ACC-	0.029	-0.010	-0.017	0.017
	(0.38)	(-0.14)	(-0.26)	(0.26)
AG	0.140	0.009	-0.006	-0.032
	(1.52)	(0.11)	(-0.07)	(-0.44)
DD	0.116***	0.151***	0.154***	0.168***
	(2.84)	(4.06)	(4.40)	(5.01)
DPS	-0.054	-0.030	-0.014	-0.018
	(-1.09)	(-0.87)	(-0.46)	(-0.58)
ln(BE/ME)	-0.355***	-0.344***	-0.354***	-0.339***
	(-16.51)	(-17.60)	(-18.88)	(-18.40)
R^2	0.066	0.066	0.063	0.063
Num. Obs.	51179	63038	68081	72053

Table 6. Short Sell Profitability from Earnings Announcements

This table provides average abnormal returns on short side portfolios sorted on trade length (TL) and earnings announcement for hedge funds (HF) and non-hedge (NHF) funds. We first sort stocks into two TL buckets based on trade lengths ($0 < TL \leq 5$ and $5<TL\leq21$). Within each bucket we form earnings announcement (EA) and non-earnings announcement (Non-EA) portfolios. If there is an earnings announcement of the stock within its trade length, we include the stock in the EA portfolio. Otherwise, we include the stock in the Non-EA portfolio. We calculate value-weighted abnormal returns on the portfolios from the opening until the closing of trades. The column Diff. reports the return difference between the EA and Non-EA portfolios. The numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels.

	$0 < TL \leq 5$						$5 < TL \leq 21$					
	Hedge Fund			Non-Hedge Fund			Hedge Fund			Non-Hedge Fund		
	EA	Non-EA	Diff.	EA	Non-EA	Diff.	EA	Non-EA	Diff.	EA	Non-EA	Diff.
Returns	-0.141%	-0.135%***	-0.006%	0.205%**	0.167%***	0.038%	0.071%*	-0.047%**	0.119%***	0.121%***	0.044%***	0.077%**
	(-1.014)	(-3.019)	(-0.042)	(2.247)	(5.976)	(0.406)	(1.806)	(-2.536)	(2.802)	(3.718)	(3.326)	(2.337)

Table 7. Short Sell Profitability (0<TL≤5) for Positive vs. Negative Opening Day Returns

Panel A provides average daily abnormal returns on short side portfolios for hedge funds (HF) and non-hedge (NHF) funds. We sort stocks with trade lengths less than or equal to five days into two value-weighted portfolios of positive opening day return ($R_t > 0$) and negative opening day return ($R_t \leq 0$). We include stock in each portfolio from the opening until the closing of trades. Panel B reports the Carhart four factor model (Carhart, 1997) estimation results of two portfolio returns. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment of Trades with 0<TL≤5

	Hedge Fund			Non-Hedge Fund		
	$R_t > 0$	$R_t \leq 0$	Diff.	$R_t > 0$	$R_t \leq 0$	Diff.
Returns	-0.166%***	-0.030%	-0.136%**	0.048%	-0.011%	0.059%
	(-3.31)	(-0.64)	(-2.00)	(1.16)	(-0.27)	(1.01)

Panel B: Four Factor Estimation for Portfolio Returns of Trades with 0<TL≤5

	Hedge Fund			Non-Hedge Fund		
	$R_t > 0$	$R_t \leq 0$	Diff.	$R_t > 0$	$R_t \leq 0$	Diff.
α	-0.165%***	-0.033%	-0.133%*	0.052%	-0.018%	0.070%
	(-3.16)	(-0.67)	(-1.9)	(1.18)	(-0.41)	(1.23)
β_{MKT}	1.062***	1.110***	-0.049	1.120***	1.210***	-0.090*
	(17.87)	(24.31)	(-0.69)	(27.09)	(28.24)	(-1.66)
β_{HML}	-0.253*	-0.342***	0.089	-0.392***	-0.427***	0.034
	(-1.69)	(-3.25)	(0.51)	(-4.28)	(-4.74)	(0.3)
β_{SMB}	0.596***	0.458***	0.138	0.560***	0.452***	0.108
	(6.66)	(4.62)	(1.08)	(5.86)	(5.51)	(0.91)
β_{UMD}	-0.362***	-0.377***	0.015	-0.249***	-0.254***	0.005
	(-5.47)	(-5.04)	(0.16)	(-4)	(-4.54)	(0.06)
R^2	0.2589	0.2957		0.3267	0.3573	

Table 8. Short Sell Profitability (0<TL≤5) for Positive vs. Negative Closing Day Returns

Panel A provides average daily returns on short side portfolios for hedge funds (HF) and non-hedge (NHF) funds. We sort stocks with trade lengths less than or equal to five days into four value-weighted portfolios: positive opening day and positive closing day returns ($R_t > 0$ and $R_{t+k} > 0$), positive opening day and negative closing day returns ($R_t > 0$ and $R_{t+k} \leq 0$), negative opening day and positive closing day returns ($R_t \leq 0$ and $R_{t+k} > 0$), and negative opening day and negative opening day returns ($R_t \leq 0$ and $R_{t+k} \leq 0$). We include stock in each portfolio from the opening until the covering of trades. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment of Trades with TL≤5 from Short Run Reversal

	Hedge Fund				Non-Hedge Fund			
	$R_t > 0$		$R_t \leq 0$		$R_t > 0$		$R_t \leq 0$	
	$R_{t+k} > 0$	$R_{t+k} \leq 0$	$R_{t+k} > 0$	$R_{t+k} \leq 0$	$R_{t+k} > 0$	$R_{t+k} \leq 0$	$R_{t+k} > 0$	$R_{t+k} \leq 0$
Returns	-0.149%***	-0.220%***	0.041%	-0.003%	-0.046%	0.053%	-0.003%	0.037%
	(-2.98)	(-3.68)	(0.76)	(-0.06)	(-1.19)	(1.07)	(-0.07)	(0.79)

Panel B: Four Factor Model Results for Portfolio Return of Trades with TL≤5 from Short Run Reversal

	Hedge Fund				Non-Hedge Fund			
	$R_t > 0$		$R_t \leq 0$		$R_t > 0$		$R_t \leq 0$	
	$R_{t+k} > 0$	$R_{t+k} \leq 0$	$R_{t+k} > 0$	$R_{t+k} \leq 0$	$R_{t+k} > 0$	$R_{t+k} \leq 0$	$R_{t+k} > 0$	$R_{t+k} \leq 0$
α	-0.138%***	-0.223%***	0.046%	-0.004%	-0.043%	0.050%	-0.003%	0.029%
	(-2.665)	(-3.607)	(0.823)	(-0.076)	(-1.02)	(0.95)	(-0.056)	(0.587)
β_{MKT}	-0.379***	0.065	-0.274***	-0.084	-0.253***	-0.376***	-0.364***	-0.147**
	(-4.988)	(0.701)	(-3.335)	(-0.973)	(-4.198)	(-4.945)	(-4.793)	(-2.06)
β_{HML}	1.061***	0.995***	1.130***	1.088***	1.046***	1.078***	1.275***	1.091***
	(26.264)	(20.627)	(25.817)	(24.173)	(32.15)	(26.016)	(30.873)	(28.17)
β_{SMB}	0.394***	0.652***	0.548***	0.306***	0.399***	0.621***	0.530***	0.460***
	(4.981)	(6.88)	(6.318)	(3.483)	(6.235)	(7.688)	(6.58)	(6.11)
β_{UMD}	-0.314***	-0.359***	-0.449***	-0.219***	-0.127***	-0.277***	-0.276***	-0.117**
	(-6.066)	(-5.714)	(-7.936)	(-3.764)	(-3.05)	(-5.266)	(-5.283)	(-2.384)
R^2	0.2567	0.1924	0.2674	0.2090	0.3116	0.2529	0.3086	0.2517
Dimson	-0.132%**	-0.222%***	0.066%	-0.004%	-0.042%	0.042%	-0.004%	0.029%
α	(-2.544)	(-3.588)	(1.189)	(-0.066)	(-1.007)	(0.8)	(-0.068)	(0.593)

Table 9. Return Predictability of Short Covering Trades with 0<TL≤5

Panel A provides average future daily abnormal returns on short side portfolios for hedge funds (HF) and non-hedge (NHF) funds after short positions are covered. We form five value-weighted portfolios of stocks with trade lengths less than or equal to five days that are covered on day *t+k* and track their cumulative returns from short covering until day *t+k+5*. Panel B reports the Carhart four factor model (Carhart, 1997) estimation results of two portfolio returns. All the numbers in the parenthesis are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Abnormal returns from DGTW adjustment for short trades

	R_{t+k} to R_{t+k+1}		R_{t+k} to R_{t+k+2}		R_{t+k} to R_{t+k+3}		R_{t+k} to R_{t+k+4}		R_{t+k} to R_{t+k+5}	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF	HF	NHF
Returns	0.095%**	0.088%**	0.066%*	0.028%	0.071%**	-0.013%	0.033%	-0.004%	0.021%	0.016%
	(2.406)	(2.282)	(1.94)	(0.917)	(2.3)	(-0.459)	(1.089)	(-0.143)	(0.733)	(0.692)

Panel B: Alpha estimation from the four factor model of Carhart (1997) for short trades

	R_{t+k} to R_{t+k+1}		R_{t+k} to R_{t+k+2}		R_{t+k} to R_{t+k+3}		R_{t+k} to R_{t+k+4}		R_{t+k} to R_{t+k+5}	
	HF	NHF	HF	NHF	HF	NHF	HF	NHF	HF	NHF
α	0.091%**	0.082%**	0.073%**	0.017%	0.076%**	-0.012%	0.038%	-0.002%	0.027%	0.015%
	(2.188)	(1.996)	(2.012)	(0.528)	(2.324)	(-0.402)	(1.198)	(-0.094)	(0.882)	(0.599)
β_{MKT}	1.191***	1.262***	1.166***	1.229***	1.162***	1.215***	1.180***	1.215***	1.199***	1.216***
	(36.781)	(39.157)	(41.197)	(47.711)	(45.409)	(51.838)	(47.159)	(58.334)	(50.569)	(61.521)
β_{HML}	-0.240***	-0.442***	-0.175***	-0.409***	-0.180***	-0.367***	-0.311***	-0.439***	-0.277***	-0.462***
	(-3.926)	(-7.408)	(-3.329)	(-8.603)	(-3.803)	(-8.467)	(-6.715)	(-11.406)	(-6.32)	(-12.652)
β_{SMB}	0.329***	0.310***	0.356***	0.344***	0.372***	0.321***	0.404***	0.339***	0.354***	0.326***
	(5.173)	(4.946)	(6.477)	(6.918)	(7.503)	(7.081)	(8.336)	(8.39)	(7.702)	(8.521)
β_{UMD}	-0.210***	-0.154***	-0.231***	-0.133***	-0.219***	-0.154***	-0.262***	-0.211***	-0.213***	-0.222***
	(-5.068)	(-3.742)	(-6.402)	(-4.046)	(-6.692)	(-5.152)	(-8.19)	(-7.925)	(-7.01)	(-8.79)
R^2	0.3815	0.4005	0.4236	0.4874	0.4677	0.5279	0.4954	0.5954	0.5204	0.6224

Table 10. Persistence of Short Side Profitability

This table reports average daily abnormal returns on hedge fund short portfolios sorted on the past profitability of short positions. In Panel A, we sort hedge fund managers at the end of each quarter ($t = 0$) into quintile portfolios based on the quarter's return on their short positions with trade length less than or equal to five. For the following four quarters (Q1 through Q4), we report equal-weighted averages of managers' value-weighted short portfolios with trade lengths less than or equal to five. We include stocks in the portfolios during actual opening and closing. The last row (*Low-High*) of the panel shows returns from the zero-cost portfolio that longs the lowest quintile portfolio and shorts the highest quintile portfolio. Panel B reports results for non-hedge fund managers. Panels C and D report results based on short positions with trade lengths greater than five for hedge funds and non-hedge funds, respectively. The numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

Panel A: Persistence of Hedge Fund Short Position Profitability (0<TL≤5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-1.695%***	-0.517%**	-0.104%	-0.641%***	-0.366%*
	(-6.62)	(-2.47)	(-0.69)	(-2.96)	(-1.97)
2	-0.527%***	-0.362%**	-0.292%**	-0.087%	-0.217%**
	(-7.85)	(-2.68)	(-2.52)	(-0.73)	(-2.19)
3	-0.109%**	-0.082%	-0.132%	-0.168%	-0.129%
	(-2.53)	(-0.53)	(-1.31)	(-1.61)	(-0.92)
4	0.371%***	0.075%	0.109%	-0.007%	0.055%
	(7.96)	(0.8)	(1.33)	(-0.05)	(0.61)
5 (High)	1.346%***	0.230%*	-0.238%	0.185%	0.171%
	(9.42)	(1.8)	(-1.04)	(1.53)	(1.25)
Low - High	-3.041%***	-0.747%***	0.134%	-0.826%***	-0.537%**
	(-10.01)	(-3.28)	(0.47)	(-3.2)	(-2.32)

Panel B: Persistence of Non-Hedge Fund Short Position Profitability (0<TL≤5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-1.508%***	-0.352%***	-0.302%**	-0.251%**	-0.240%**
	(-11.9)	(-3.23)	(-2.54)	(-2.47)	(-2.46)
2	-0.410%***	-0.053%	-0.173%**	-0.110%	-0.134%*
	(-11.16)	(-0.96)	(-2.41)	(-1.5)	(-1.94)
3	-0.014%	-0.040%	0.002%	-0.074%	-0.046%
	(-0.54)	(-0.82)	(0.03)	(-1.1)	(-0.72)
4	0.395%***	0.050%	0.046%	0.102%	0.007%
	(12.98)	(0.59)	(0.7)	(1.55)	(0.1)
5 (High)	1.006%***	0.165%*	0.242%***	0.211%***	0.133%
	(12.7)	(1.92)	(2.97)	(2.78)	(1.61)
Low - High	-2.514%***	-0.518%***	-0.544%***	-0.462%***	-0.373%***
	(-16.35)	(-3.44)	(-3.55)	(-3.78)	(-2.95)

Panel C: Persistence of Hedge Fund Short Position Profitability (TL>5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-0.351%***	-0.026%	-0.020%	-0.061%**	-0.007%
	(-8.02)	(-0.82)	(-0.86)	(-2.41)	(-0.3)
2	-0.093%***	-0.014%	-0.025%*	0.000%	-0.039%**
	(-8.7)	(-1.09)	(-2)	(0.05)	(-2.56)
3	-0.008%	-0.009%	-0.027%**	-0.023%**	-0.008%
	(-1.18)	(-1.03)	(-2.51)	(-2.4)	(-0.54)
4	0.085%***	0.019%	-0.004%	0.015%	0.023%
	(9.9)	(1.57)	(-0.19)	(1.01)	(1.39)
5 (High)	0.360%***	-0.056%	0.014%	0.025%	0.013%
	(8.36)	(-1.37)	(0.53)	(0.93)	(0.3)
Low - High	-0.711%***	0.031%	-0.034%	-0.086%***	-0.020%
	(-10.1)	(0.62)	(-0.99)	(-2.9)	(-0.44)

Panel D: Persistence of Non-Hedge Fund Short Position Profitability (TL>5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-0.337%***	0.014%	-0.003%	-0.016%	-0.017%
	(-15.59)	(0.71)	(-0.19)	(-0.89)	(-0.57)
2	-0.085%***	-0.006%	0.006%	0.006%	-0.007%
	(-11.89)	(-0.4)	(0.38)	(0.48)	(-0.63)
3	0.009%*	0.016%	0.015%*	-0.010%	0.003%
	(1.96)	(1.54)	(1.83)	(-1.25)	(0.37)
4	0.101%***	0.026%***	0.018%*	0.019%**	0.012%
	(12.54)	(2.77)	(1.76)	(2.12)	(1.09)
5 (High)	0.351%***	0.027%	0.047%**	0.056%**	0.058%*
	(13.44)	(1.61)	(2.55)	(2.31)	(1.71)
Low - High	-0.688%***	-0.013%	-0.050%**	-0.072%**	-0.076%*
	(-16.66)	(-0.49)	(-2.32)	(-2.61)	(-1.83)

Table 11. Persistence of Long Side Profitability

This table reports daily abnormal returns on hedge fund long portfolios sorted on the past profitability of long positions. The return bias is fixed for including the actual opening returns and closing returns based on the transaction price. In Panel A, we sort hedge fund managers at the end of each quarter (*t=0*) into quintile portfolios based on the quarter's return on their long positions with trade lengths less than or equal to five. For the following four quarters (Q1 through Q4), we report equal-weighted averages of managers' value-weighted long portfolios with trade lengths less than or equal to five. We include stocks in the portfolios during actual opening and closing. The last row (*Low-High*) of the panel shows returns from the zero-cost portfolio that longs the lowest quintile portfolio and shorts the highest quintile portfolio. Panel B reports results for non-hedge fund managers. Panels C and D report results based on long positions with trade lengths greater than five for hedge funds and non-hedge funds, respectively. The numbers in parentheses are t-statistics. *, **, and *** denote statistical significance at 10, 5, and 1% levels, respectively.

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Panel A: Persistence of Hedge Fund Long Position Profitability (0<TL≤5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-1.573%***	-0.085%	0.044%	0.234%	0.099%
	(-4.31)	(-0.41)	(0.23)	(1.15)	(0.71)
2	-0.543%***	-0.106%	0.066%	0.185%*	-0.133%
	(-5.79)	(-0.68)	(0.55)	(1.71)	(-0.93)
3	0.082%	-0.042%	-0.018%	-0.407%	0.029%
	(1.06)	(-0.22)	(-0.09)	(-1.53)	(0.17)
4	0.479%***	-0.027%	0.505%*	0.372%	0.340%*
	(4.63)	(-0.1)	(2.02)	(1.46)	(1.85)
5 (High)	1.789%***	0.949%**	0.604%	0.752%***	0.323%
	(8.47)	(2.44)	(1.59)	(3.28)	(0.8)
High - Low	3.362%***	1.035%**	0.560%	0.518%	0.223%
	(7.85)	(2.17)	(1.2)	(1.61)	(0.54)

Panel B: Persistence of Non-Hedge Fund Long Position Profitability (0<TL≤5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-1.429%***	-0.579%**	-0.161%	-0.322%	-0.415%**
	(-6.42)	(-2.63)	(-0.8)	(-1.18)	(-2.71)
2	-0.526%***	0.116%	-0.141%	-0.171%	0.043%
	(-6.56)	(1.33)	(-0.92)	(-1.49)	(0.33)
3	-0.043%	0.007%	-0.194%	-0.156%	-0.124%
	(-0.62)	(0.05)	(-1.49)	(-1.43)	(-1.2)
4	0.413%***	-0.221%*	-0.052%	-0.162%	-0.144%
	(4.41)	(-1.76)	(-0.44)	(-1.41)	(-0.83)
5 (High)	1.170%***	0.137%	0.126%	0.040%	-0.122%
	(8.36)	(0.76)	(1.07)	(0.26)	(-1.04)
High - Low	2.598%***	0.716%**	0.287%	0.362%	0.294%
	(9.77)	(2.43)	(1.18)	(1.1)	(1.46)

Panel C: Persistence of Hedge Fund Long Position Profitability (TL>5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-0.264%***	-0.035%	0.003%	-0.032%*	-0.010%
	(-10.85)	(-1.54)	(0.13)	(-1.97)	(-0.34)
2	-0.080%***	0.008%	-0.025%	0.006%	0.004%
	(-11.05)	(0.63)	(-1.48)	(0.26)	(0.24)
3	0.007%	0.019%	0.009%	0.007%	-0.004%
	(1.13)	(1.11)	(0.79)	(0.61)	(-0.25)
4	0.092%***	0.026%**	0.018%	0.014%	0.011%
	(9.57)	(2.68)	(1.05)	(1.12)	(0.55)
5 (High)	0.284%***	-0.002%	0.019%	0.033%	0.062%
	(10.87)	(-0.07)	(0.84)	(1.14)	(0.57)
High - Low	0.548%***	0.034%	0.016%	0.064%*	0.072%
	(14.59)	(1.05)	(0.5)	(1.93)	(0.66)

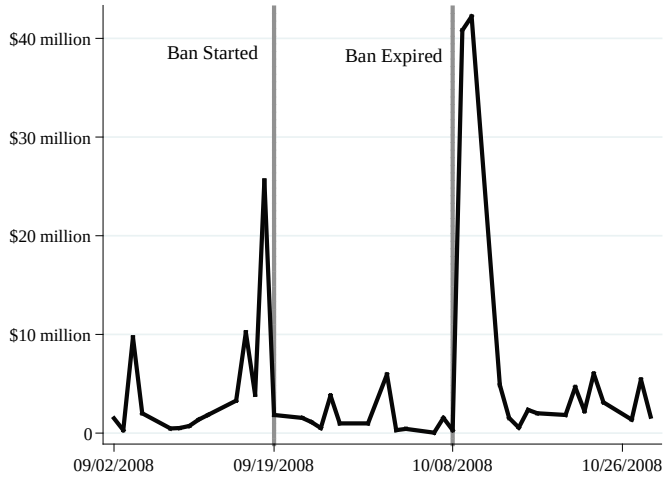
Panel D: Persistence of Non-Hedge Fund Long Position Profitability (TL>5)

	t = 0	Q1	Q2	Q3	Q4
1 (Low)	-0.390%***	-0.034%	-0.055%*	-0.010%	-0.015%
	(-9.89)	(-1.47)	(-1.78)	(-0.67)	(-0.75)
2	-0.099%***	-0.023%	-0.016%	-0.028%**	-0.031%**
	(-10.33)	(-1.4)	(-0.95)	(-2.05)	(-2.13)
3	-0.007%	-0.011%	0.006%	-0.001%	-0.011%
	(-1.1)	(-0.98)	(0.47)	(-0.1)	(-0.65)
4	0.094%***	0.022%*	0.008%	0.004%	-0.019%
	(9.81)	(2)	(0.62)	(0.29)	(-1.49)
5 (High)	0.377%***	0.021%	0.026%	0.014%	0.006%
	(10.15)	(0.61)	(1.14)	(0.52)	(0.25)
High - Low	0.767%***	0.055%	0.081%**	0.024%	0.022%
	(12.08)	(1.28)	(2.02)	(0.86)	(0.62)

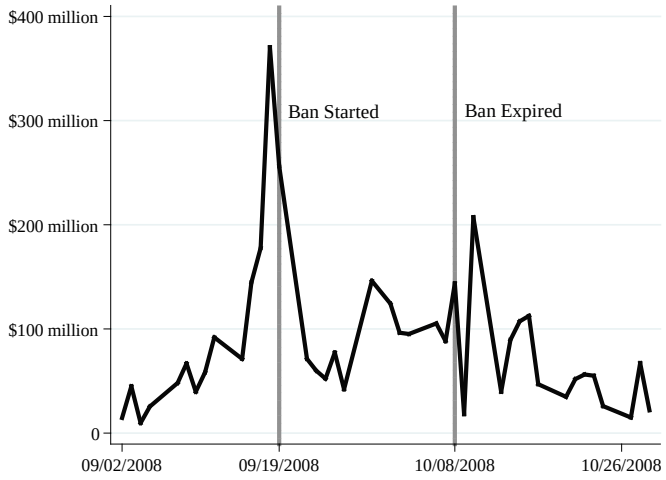
Figure 1. Short and Long Sales during the Short Sale Ban in September and October 2008

This figure plots (a) daily short sales and (b) long sales by hedge funds and (c) short sales and (d) long sales by all institutional investors during the period from September 15 2008 through October 15 2008. We only include financial stocks in the graphs. The two vertical dash lines in each graph denote the dates when the short sale ban was implemented (September 19) and repealed (October 8).

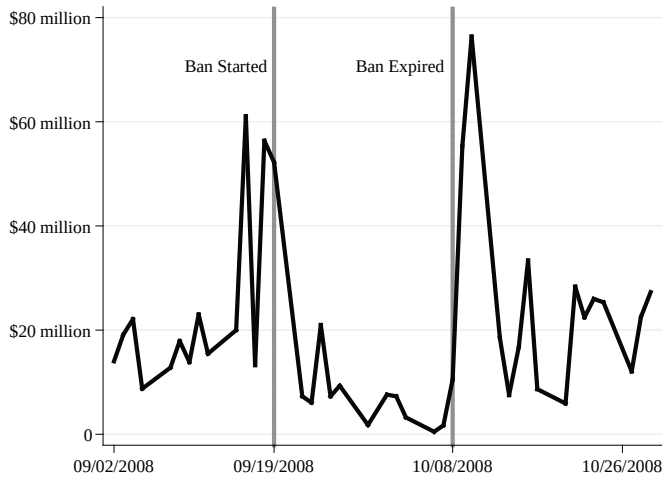
(a) Hedge Fund's Short Sales of Financial Stocks



(b) Hedge Fund's Long Sales of Financial Stocks



(c) All Institutional Investors' Short Sales of Financial Stocks



(d) All Institutional Investors' Long Sales of Financial Stocks