

Earnings Announcements: Good News for Institutional Investors and Short Sellers

Henk Berkman* and Michael D. McKenzie**

29 June 2009

Abstract

Both institutional owners and short sellers decrease their positions prior to earnings announcements, and increase their positions in the post-announcement period. Pre-announcement changes in institutional holdings and short interest have significant explanatory power with respect to abnormal earnings announcement returns, where most of the power comes from institutions and short sellers closing positions in order to avoid losses. Analysis of post-announcement returns indicates that aggressive trading by short sellers in reaction to earnings releases enhances price discovery and reduces their ability to profit from post-earnings announcement drift. The more muted reaction of institutional traders to earnings releases has no significant impact on earnings response coefficients, and allows institutions to successfully target stocks that underreact to earnings news.

JEL Classification : G14

Keywords : Informed Traders, Institutional Ownership, Short Selling, Earnings Announcements

We thank Dan Dhaliwal, Paul Koch, John Lee and Cameron Truong for their comments on an earlier version of this paper.

* University of Auckland.

** University of Sydney and CFAP, Cambridge University.

1. Introduction

A literature has evolved that addresses the question of whether sophisticated investors, such as institutional traders and short sellers, can select stocks that earn abnormal returns.¹ In particular, a number of studies have considered this question in the context of company earnings announcements.² One reason for analysing trading by sophisticated investors around earnings announcements is that measures of stock selection ability in the short period around earnings announcements are relatively insensitive to the risk adjustment model. One further benefit is that, where the analysis is able to distinguish between pre- and post-announcement trading, it can provide insights as to whether the traders' skill lay in their ability to exploit private³ or public information. Finally, analysis of trading by sophisticated investors around earnings announcements can provide insight into the question whether their trading enhances price discovery.

In general, the literature that considers trading by institutional investors and short sellers around the time of earnings announcements has produced mixed findings. For example, Ali, Durtschi, Lev and Trombley (2004) and Baker, Litov, Wachter and Wurgler (2009) use quarterly data on institutional ownership and conclude that institutions have superior information about forthcoming earnings announcements. In

¹ Grinblatt and Titman (1993), Gruber (1996), Carhart (1997), Wermers (2000), Chen, Jegadeesh and Wermers (2000), Bushee and Goodman (2007) and Puckett and Yan (2008), inter alia, examine whether institutional investors are informed. Desai, Ramesh, Thiagarajan and Balachandran (2002), Jones and Lamont (2002), Asquith, Pathak and Ritter (2005), Boehme, Danielsen and Sorescu (2006), Diether Lee and Werner (2009), and Boehmer, Jones and Zhang (2008), inter alia, analyse the performance of short sellers.

² In addition to institutional traders and short sellers, the trading activity of corporate insiders around earnings announcements has also been considered (see Ke, Huddart, and Petroni (2003)).

³ Ke and Petroni (2004) provide evidence that in their pre-Regulation FD sample period, institutions obtain valuable information regarding impending breaks in a string of consecutive earnings increases from private communications with management. Note that our sample period is post Regulation FD, which prohibits selective disclosure by firms.

contrast, Griffin, Shu and Topaloglu (2008), using daily data for a sample of Nasdaq stocks, find no evidence that institutions have superior information about forthcoming earnings announcements. Similarly, Christophe, Ferri and Angel (2004) find that short sellers have superior information about forthcoming earnings announcements, whereas Daske, Richardson, and Tuna (2005) find no evidence to support this conclusion. The impact of institutional and short traders on post-earnings announcement drift is also far from resolved. The only study that uses daily changes in institutional holdings in the days after earnings announcements, Griffin, Shu and Topaloglu (2008), does not specifically analyse the post-earnings announcement drift (PEAD), but instead focuses on the profitability of institutional trading. Other studies in this area either use changes in quarterly institutional holdings, or changes in monthly short interest, making it difficult to rule out alternative explanations such as momentum trading for their findings (see Ke and Ramalingegowda (2005) and Cao, Dhaliwal, Kolasinski and Reed (2007)).

The purpose of this paper is to provide detailed evidence on the trading activity and investment skills of institutional investors and short sellers in the few days before and after company earnings announcements. Our trading agent data, sourced from Dataexplorers Ltd., is uniquely suited for this purpose. The database provides information on trading activity and positions of both institutional owners and short sellers on a daily basis. The data also allow us to split daily changes in short interest into gross increases and gross decreases in short interest, and to split the daily net change in institutional ownership into gross increases and gross decreases in institutional ownership. Our data therefore overcomes the limitation of commonly used daily short sales data, which captures only sales by short sellers (e.g. Christophe

et al. (2004) and Daske et al. (2005)). This study is also the first to separately consider increases and decreases in institutional holdings (rather than changes in net holdings) in the context of earnings announcements.

In this study, we focus on 11,610 earnings announcements for 2,811 US stocks sampled over a 21-month period from 9 August 2006 to 8 May 2008. Since we separately examine trading behaviour in anticipation of earnings announcements and trading in reaction to earnings announcements, we are careful to account for after hours announcements in defining 'event day 0' (see Berkman and Truong, 2009).

The results of this study can be summarized as follows. First, we consider the trading activity of institutional investors and short sellers prior to earnings announcements, where we distinguish between agents that increase their positions and those that decrease their positions. We find that decreases in institutional ownership and short positions in the days before earnings announcements are larger than increases in institutional ownership and short positions, resulting in significant (net) decreases in institutional holdings and short interest in the days before earnings announcements. Thus sophisticated traders are more inclined to close out established positions than they are to open new positions in the immediate lead up to an earnings announcement.

We also find that gross decreases in institutional holdings and short positions are more informative with regard to future earnings announcement returns than gross increases in institutional holdings and short positions. This result, that most information is contained in observations where institutional owners and short sellers close positions in order to avoid losses (rather than sophisticated investors opening positions to make

profits), indicates loss aversion in the face of highly visible public announcements. Interestingly, this result is in sharp contrast to the evidence on stock picking skills of sophisticated investors in a more general setting, i.e. not conditioned on the pre-announcement period. For example, Cohen et al. (2007) find that increases in shorting demand lead to significant negative average abnormal returns in the following month, but decreases in shorting demand play a more minor role. Chen, Jegadeesh and Wermers (2000) find that mutual funds display stock-picking talents in both their sales and purchases.

Further analysis of pre-earnings announcement trading reveals that the earnings announcement return (the abnormal return on day 0) is positively related to the level of institutional ownership six days before the announcement, and negatively related to the level of short interest six days before the announcement. Where changes in institutional ownership and short interest in the five days before the earnings announcement are considered, a similar result is obtained. Our results suggest that the abnormal earnings announcement return that can be generated using information on institutional and short trading is substantial. After controlling for other variables such as firm size and market-to-book ratio, we find a 5 percent difference in abnormal return on the earnings announcement day of stocks we classify as winners (sharp decrease in outstanding short positions combined with a sharp increase in institutional ownership) versus stocks we identify as losers (sharp decrease in institutional ownership combined with a sharp increase in short positions). Despite the fact that our sample is post-Regulation FD, this return is about ten times higher than the abnormal return reported in earlier research.

Second, we consider the trading activity of institutional owners and short sellers after the earnings information is made public. The results show that increases in institutional ownership and short positions in the few days after earnings announcements are larger than decreases in institutional ownership and short positions. This is especially true for short sellers, who are also found to trade much more aggressively in the direction of the earnings surprise than institutional investors.

Our results also suggest that abnormal returns from a PEAD-strategy can be more than doubled if information on changes in institutional ownership in the days immediately after earnings announcements is utilised. That is, the tendency of prices to trend up (down) in the sixty days following above (below) expectations earnings announcements is significantly stronger if institutions increase (decrease) their holdings on the two days after the earnings announcement. In contrast, we find no evidence that abnormal returns from a PEAD-strategy can be enhanced if information on changes in short interest in the days immediately after earnings announcements is utilised. Further evidence indicates that stocks take less time to adjust to the information released in the earnings announcement if short sellers trade in the direction of the earnings surprise, but not when institutional investors trade in the direction of the earnings surprise. Taken together, this evidence suggests that aggressive short selling activity in reaction to the earnings release enhances price discovery and reduces the opportunity for short sellers to profit from PEAD-based strategies. On the other hand, the more muted reaction of institutional traders in reaction to earnings releases has no significant impact on the earnings response coefficient, and does not fully eliminate their profit opportunities from PEAD-based trading strategies.

Further analysis reveals that stocks with higher institutional ownership before the earnings announcement, have a lower PEAD. This result suggests that earnings information is more efficiently priced for stocks with higher institutional ownership, consistent with Bartov, Radhakrishnan and Krinsky (2000). Using PEAD as measure of price efficiency, we find no evidence to suggest that high short interest has similar beneficial effects. Our results do however indicate that high pre-announcement short interest is an effective predictor of negative post-earnings announcement returns (day +2 through day + 61).

Overall, our results show that short sellers and institutional investors are informed traders whose presence in the market enhances price efficiency. Given the considerable debate about the costs and benefits of increased institutional ownership and short selling, this result has important implications for regulators and policy makers.

The remainder of this study is organized as follows. In Section 2, the literature on the trading activity of short sellers and institutions around earnings announcements is surveyed. Section 3 introduces the data, clarifies the construction of each variable and provides some summary metrics. Section 4 considers the trading activity of institutions and short sellers around earnings announcements, while Section 5 focuses solely on the pre-announcement period and Section 6, the post-announcement period. Finally, Section 7 presents some concluding comments.

2. Literature Review

This section reviews the literature on the trading activity of institutional investors and short sellers in the pre-announcement period, and the literature on trading by institutional investors and short sellers in the post-announcement period.

2.1 Institutional trading before earnings announcements

Ali, Durtschi, Lev and Trombley (2004) use quarterly data from CDA/Spectrum to measure the changes in institutional holdings prior to earnings announcement for 162,964 firm-quarter observations over the period 1985 to 1999. Baker, Litov, Wachter and Wurgler (2009) examine the trading of mutual funds prior to earnings announcements over the period 1980 to 2005, and also use CDA/Spectrum data. The results of both studies suggest that changes in institutional ownership are positively related to the abnormal returns of the subsequent quarterly earnings announcement.⁴ The abnormal return from a strategy that goes long stocks in which institutional investors increased their holdings in the previous quarter, and short stocks in which institutional investors decreased their holdings would have generated an abnormal return of around 0.1 percent to 0.4 percent in the 3 days around the earnings announcement.⁵

These results support the idea that institutional investors have stock picking skills.

However, the long time period between portfolio changes and the subsequent earnings

⁴ Ke and Petroni (2004) find that transient institutions (i.e. institutions that actively trade with short term profit horizons) are able to predict breaks in consecutive quarterly earnings increases. Yan and Zhang (2007), also using quarterly institutional holdings, show that short term institutions possess superior information about future earnings.

⁵ As the changes in institutional ownership are from SEC filings, which are made late in the following calendar quarter, it is not possible to profitably exploit this trading strategy.

announcement date (possibly up to 6 months) make it difficult to distinguish between general stock picking skills, and the ability to profitably speculate on the information revealed at the upcoming earnings release. Further, any informed trading that occurs within a calendar quarter will not be detected.⁶

Griffin, Shu and Topaloglu (2008) study the information content of institutional trading in the days immediately preceding earnings announcements. They use daily data for a sample of Nasdaq stocks for the period from 1997 to 2002, and find no evidence that institutional trading in the days before earnings announcements helps to predict earnings announcement returns.

2.2. Short selling before earnings announcements

Short sellers are also frequently assumed to be in possession of private information.⁷ Christophe, Ferri and Angel (2004) examine short sales transactions prior to earnings announcements for a sample of 913 Nasdaq stocks, during the last quarter in 2000. They find that short selling in the five days prior to earnings announcements is significantly linked to earnings announcement returns (the return on day 0 and day 1). The authors point out that the Nasdaq stock market dropped more than 40% in their sample period (the last quarter of 2000), but provide evidence that short sellers were not simply successful because of the declining market.

⁶ Several theoretical papers predict that speculative trading with regard to earnings news should sharply increase in the lead up to earnings announcements (e.g., Kim and Verrechia (1991) and He and Wang (1995)). Trading just ahead of earnings announcements reduces holding costs and risk, because the positions are only held for short periods of time (until just after the earnings are announced).

⁷ Since short sellers do not have the use of sale proceeds, Diamond and Verrechia (1987) argue against trading for liquidity reasons, which suggests short sellers are typically informed.

Daske, Richardson, and Tuna (2005) also use daily short sales transactions. They focus on 4,193 NYSE securities from April 2004 to February 2005, and find no evidence that short sales transactions are concentrated around bad news events, including earnings announcements. The authors have two possible explanations for the striking difference between their result that short sales do not predict negative abnormal returns, and the results in Christophe, Ferri and Angel (2004). First, the strong growth in short selling activity might have diluted the impact of truly informed traders. Second, recent regulatory requirements such as Regulation FD might have reduced the extent to which private information is reflected in prices before public announcements.

2.3 Institutional trading in reaction to earnings announcements

Bartov, Radhakrishnan and Krinsky (2000) show that the proportion of shares held by institutional investors is negatively related to PEAD. They interpret their results as indicating that institutional investors improve the degree to which earnings information is efficiently priced.

Using transient institutional investors' quarter-end stock holdings, Ke and Ramalingegowda (2005) show that ownership of actively trading institutional investors during the earnings announcement quarter changes in the same direction as unexpected earnings. This result suggests institutional investors take advantage of PEAD. However, since the change in institutional holdings is measured over a 3-month period, it is difficult to rule out alternative explanations. For example, the results are also consistent with momentum trading by institutions, and with

institutions taking positions in the direction of the earnings surprise before the earnings announcement.

In an attempt to obtain a measure of daily institutional trades, Campbell, Ramadorai, and Schwartz (2009) estimate daily institutional trading from quarterly changes in institutional holdings and daily trades of different sizes. They show that their estimate of trading by institutional investors in the days before earnings announcements is positively correlated with the IBES earnings surprise, and with the cumulative abnormal return from the day after the earnings announcement to 60 days after the announcement. However, as the authors observe, the success of their model to obtain an estimate of daily institutional trading is modest as it only explains up to 15 percent of the variance of quarterly changes in institutional ownership.

Griffin, Shu and Topaloglu (2008) use daily data to study whether institutional investors are skilful at trading based on public information revealed at the earnings announcement. For a sample of Nasdaq stocks in the period 1997-2002, they show that changes in institutional ownership in the two days after earnings announcements are positively related to stock returns over the next three months. Their result is robust to inclusion of the earnings announcement return, and the authors conclude that institutional net buying is ‘somewhat informative of longer-term future price moves’ (p. 31) after controlling for the post-announcement drift. In contrast to Griffin, Shu and Topaloglu (2008), we focus on the question whether PEAD is stronger if institutions trade in the direction of the earnings surprise, rather than on the general trading ability of institutional investors on the days after the earnings announcement.

2.4 Short selling in reaction to earnings announcements

Using monthly short interest data, Cao, Dhaliwal, Kolasinski and Reed (2007) study Nasdaq firms active during the 1995 to 2006 period, and find that short sellers establish and hold positions in response to earnings announcements, but find no evidence that short selling reduces PEAD. Cao, Dhaliwal, Kolasinski and Reed (2007) do not test if short sellers are successful at exploiting PEAD. Using data from one of the largest U.S. securities lenders, Reed (2007) finds that stocks have larger price reactions to earnings announcements when short selling is costly.

Zheng (2009) considers the intra-daily response of short sellers to earnings surprises using Reg-SHO data for the NYSE sampled over an 28 month period beginning January, 2005. Zheng (2009) finds that short sales increase immediately after an earnings surprise, irrespective as to the nature of the announcement itself. Thus, the author argues that short sellers trade against stocks that have over-reacted to a positive earnings surprise in the expectation of a price correction, and trade with stocks that have under-reacted to bad news, in the expectation of a price continuation. No evidence is found of the traders activities accelerating the speed of the price adjustment.

3. Data Selection, Variable Construction and Descriptive Statistics

3.1 Data Selection

Our sample selection starts with all US stocks covered in I/B/E/S over the period August 9, 2006 to May 8, 2008. After merging with Compustat and CRSP, and restricting our sample to domestic common stocks (stock code 10 and 11), a sample of 3,858 stocks is identified. To remove thinly traded stocks, 953 small firms with a market capitalization below US\$200m at the start of our sample period are excluded, leaving 2,905 stocks.⁸ The Dataexplorers database has daily information on 2,827 of these stocks. Merging the Dataexplorers data back to I/B/E/S gives us a sample of 14,989 earnings announcements.

Since we separately examine trading behaviour in anticipation of earnings announcements, and trading in reaction to earnings announcements, it is essential to accurately record the precise time of the earnings announcements.⁹ As such, we obtain the earnings announcement time from earnings.com, which reports the actual time of the announcement, or includes an indication of whether earnings are announced before the market open or after the market close.

Finally, since we want to analyse trading activity and price changes over comparable time intervals that span the entire trading day, we discard i) all earnings announcements that take place during the trading day¹⁰, and ii) all earnings announcements for which we could not obtain the earnings announcement time. After applying these filters, we arrive at our final sample of 11,610 earnings announcements

⁸ The fifth percentile NYSE size breakpoint in August 2006 is US\$187m.

⁹ Berkman and Truong (2009) show that event study results around Compustat or I/B/E/S event day 0 can be profoundly affected by the misclassification of after-hours announcements. Christophe Ferri and Angel (2004) also correct event day 0 for after-hours announcements.

¹⁰ According to Earnings.com, 451 of all announcements (3 percent) were made during the trading day. Berkman and Truong (2009) show that the percentage of earnings announcements during trading hours is relatively high among earnings announcements for which Earnings.com does not report a time. Using the Factiva database, they show that in the period 2000-2004, about 7 percent of all earnings announcements occurred during trading hours.

from 2,811 different firms. Thus, for all our observations, day 0 is the first trading day after an earnings announcement occurred during the previous overnight period or weekend.

3.2 Variable Construction

For each of the 2,811 firms in our sample, we obtain daily stock price and returns data from the Center for Research in Securities Prices (CRSP). Accounting data are taken from the Compustat annual industrial files of income statements and balance sheets. Data on quarterly earnings and analyst forecasts are taken from the detailed I/B/E/S split adjusted file. These data are used to construct our variables as follows.

The CRSP data is used to estimate a number of different return variables. Earnings announcement period excess returns ($EARET$) are measured as actual return on the first day after the earnings announcement (day 0), minus the equally-weighted return for all NYSE/AMEX/NASDAQ firms in the same size-decile, on the same day (see Bartov, Radhakrishnan and Krinsky, 2000, and Battalio and Mendenhall, 2005).¹¹

The post-earnings announcement period excess returns ($Post_EARET^{2-61}$) is the firm's buy-and-hold return over the sixty-day period starting on day +2 after the earnings announcement (day 2 through day 61), minus the equally-weighted buy-and-hold return for all NYSE/AMEX/NASDAQ firms in the same size-decile, over the same period (see Berkman and Truong, 2009).

¹¹ Note that event day 0 is the first trading day after the earnings announcement on which the closing price reflects the new earnings information. We also refer to this day as the earnings announcement day. Thus, for earnings announcements that take place after the close, the earnings announcement day in our parlance is really the first trading day after the earnings announcement.

Following Berkman, Dimitrov, Jain, Tice and Koch (2008), several variables are used to control for risk and other previously documented patterns in stock returns at the time of earnings announcements. Specifically, controls for market capitalization, the market-to-book ratio, institutional ownership, differences of opinion, the abnormal return over the last 12 months, and the previous quarter's earnings surprise are included.

The market value of common stock (MV) is given by price multiplied by number of shares outstanding as reported on Compustat at the start of the current fiscal quarter (Compustat Quarterly Data #14*Data #15). Market-to-book (MB) is defined as market value of common stock (Compustat Quarterly Data #14*Data #15) divided by book value of common stock (Compustat Quarterly Data #59) at the end of the prior fiscal quarter. We set MB to missing if it is less than 0.01 or greater than 100.

The proxy for differences of opinion is the average daily turnover ($TURN$) prior to an earnings announcement. Daily turnover equals number of shares traded divided by number of shares outstanding as reported on the CRSP daily tapes. $TURN$ is defined as the average daily turnover over the 45-day period ending 10 days prior to the earnings announcement date. For NASDAQ-traded stocks, we divide the CRSP reported number of shares traded by two to adjust for the double counting of dealer trades.¹² To capture the effects of price momentum (MOM), we calculate each firm's excess buy-and-hold return (relative to the equally-weighted buy-and-hold return for all NYSE/AMEX/NASDAQ firms in the same size-decile) over the 12 calendar

¹² Our results are similar when we examine NYSE and AMEX stocks separately from NASDAQ stocks. We have repeated all tests using return volatility and analyst dispersion as measures of differences of opinion and find similar results.

months prior to the month of the earnings announcement. In our analysis of the post-earnings announcement drift, we include the average percentage bid ask spread over the 45-day period ending 10 days prior to the earnings announcement to proxy for transaction costs (see Bartov et al. (2000)). The average percentage bid ask spread (*BAS*) is from the daily CRSP data (see Chung and Zhang (2009)). The earnings surprise (*SUE*) is measured as the actual earnings per share minus the most recent analyst forecast before the earnings announcement, scaled by the stock price eleven days before the earnings announcement.

3.2.1 Dataexplorers Data

The most important variables in this study are those that capture information on the trading activity of institutional owners and short sellers. This information is drawn from the Dataexplorers database, which provides aggregated inventory information for over 22,000 funds who lend through over 100 wholesale stock lending market participants across 33 countries.¹³ Dataexplorers provide daily security-level information on the quantity of shares available for lending, as well as volume (and price) information for loan transactions. The former provides daily information on the level of institutional ownership and is measured as the total number of shares held by all beneficial owners divided by the total number of shares outstanding. The latter provides daily information on the level of short interest and is measured as the total number of shares lent, divided by the number of shares outstanding.

¹³ See www.dataexplorers.co.uk. Further details of the Dataexplorers database can be found in Saffi and Sigurdsson (2007).

In the analysis that follows, we proxy the level of institutional ownership before the earnings announcement (*INSTO*) as the total number of shares held by all beneficial owners 6 days before the earnings announcement, divided by the total number of shares outstanding. In a similar fashion, the level of short interest before the earnings announcement (*SHORT*) is defined as the total number of shares lent 6 days before the earnings announcement, divided by the number of shares outstanding.

The change in institutional ownership in the pre-announcement period is measured as the sum of the daily changes in institutional ownership in the five days before the earnings announcement ($\Delta INSTO_{t,q}^{PRE}$). Similarly, the change in short interest in the pre-announcement period is defined as the sum of the daily changes in short interest in the 5 days before the earnings announcement ($\Delta SHORT_{t,q}^{PRE}$).¹⁴ To control for market-wide abnormal buying or selling activity of institutional investors and short sellers, we specify market adjusted versions of $\Delta INSTO_{t,q}^{PRE}$ and $\Delta SHORT_{t,q}^{PRE}$, which are calculated by subtracting the relevant average change for the equally weighted portfolio of all stocks in our sample on the same day. Unreported tests using the raw data produce similar results to those reported.

To provide additional insights into the analysis of changes in holdings, we also define variables that capture gross increases and gross decreases in market adjusted institutional holdings and short positions over the 5 days preceding the earnings announcement separately. The market-adjusted gross increase (decrease) in

¹⁴ The number of beneficial owners reporting to the database changes on occasion, which introduces noise in the measurement variables. Fortunately, the database provides detailed information on the changes in the inventory that are the result of changes in the number of reporting institutions. This means that it is possible to account for changes caused by changes in the reporting pool from which data is sampled. The same applies to our measure of changes in short interest.

institutional ownership ($\Delta INSTO_{t,q}^{FFB+}$ or $\Delta INSTO_{t,q}^{FFB-}$), is, defined as the actual gross increase (or decrease) in institutional ownership, scaled by shares outstanding, minus the average gross increase (or decrease) in institutional ownership, scaled by shares outstanding, for the equally weighted portfolio of all stocks in our sample on the same day. Similarly, the market-adjusted gross increase (or decrease) in short interest ($\Delta SHORT_{t,q}^{FFB+}$ or $\Delta SHORT_{t,q}^{FFB-}$), is defined as the actual gross increase (or decrease) in short interest minus the average gross increase (or decrease) in short interest for the equally weighted portfolio of all stocks in our sample on the same day.¹⁵

3.3 Descriptive Statistics

Descriptive statistics for the main variables used in this study are presented in Panel A of Table 1. The mean (median) level of institutional ownership is reported in column 1 as $INSTO = 21.52$ (21.59) percent. This is somewhat lower than has been reported in the literature (for example, Nagel (2005) reports an average level of institutional ownership of 34 percent), which is to be expected given that the data excludes those institutions that do not make their shares available for lending as well as a relatively small number of custodians that do not report their holdings to Dataexplorers.

The mean (median) level of short interest is $SHORT = 6.75$ (4.70) percent, which is similar to the short interest reported in Diether, Lee and Werner (2009). Prior to any analysis, it is necessary to consider the extent to which this data proxies for the level

¹⁵ In the following we present gross decreases in institutional ownership ($\Delta INSTO_{t,q}^{FFB-}$) and gross decreases in short interest ($\Delta SHORT_{t,q}^{FFB-}$) as positive numbers. For example, a positive number for $\Delta INSTO_{t,q}^{FFB-}$ indicates a higher than normal level of sales by institutional investors.

of short selling. We compare publicly available short interest data¹⁶ with short interest in the Dataexplorers database 3 trading days before the 15th of the month preceding each earnings announcement. The correlation between short interest in the Dataexplorers database and the publicly available information is 0.91.¹⁷ Similarly, the correlation between the monthly change in official short interest and the analogous monthly change in short interest according to Dataexplorers is 0.496.

There are a number of reasons why these correlations between the publicly available short interest data and the Dataexplorers database are less than perfect. Firstly, not all custodians report to Dataexplorers.¹⁸ Second, the Dataexplorers database does not solely capture lending for the purposes of short selling. Similarly, the publicly available data also does not solely capture lending for the purposes of short selling.¹⁹ To the extent that the Dataexplorers database includes some non-short selling related lending, we argue that our results are likely to underestimate the trading skills of short traders.

Table 1 also reports the market-adjusted change in institutional ownership and market-adjusted change in short interest as of the earnings announcement date (day 0).

Both variables are significantly positive $\Delta INSTO_{t,q}^{adj} = 0.011$ percent and

¹⁶ The publicly available data come from the NYSE and NASDAQ, who provide monthly short selling reports during the sample period.

¹⁷ This correlation is similar to Dataexplorers internal validation. They document that the correlation between the publicly reported level of short interest in the US market and the Dataexplorers estimate is almost 0.90.

¹⁸ By their own estimates, the Dataexplorers database covers approximately 70 percent of trading in the stock lending market.

¹⁹ Dataexplorers data includes lending for short selling as well as borrowing for dividend arbitrage (typically to extract tax benefits through deals with foreign parties) and for settlement reasons (where a fund is unable to buy or sell a stock immediately, it must borrow the security). Furthermore, the publicly available data includes lending for short selling as well as lending for rehypothecation (where a prime broker borrows a fund's long position to cover another fund's short position) and exclusive trading (asset managers agree to lend a portfolio exclusively to a single counterparty).

$\Delta SHORT_{t,q}^{day0} = 0.048$ percent which indicates that there was a net increase in the positions of both institutional investors and short sellers on the first trading day after the earnings announcement.²⁰

We also consider gross increases and decreases separately ($\Delta INSTO_{t,q}^{day0+}$, $\Delta INSTO_{t,q}^{day0-}$, $\Delta SHORT_{t,q}^{day0+}$, $\Delta SHORT_{t,q}^{day0-}$). Table 1, indicates that all of the mean market-adjusted inflows and market-adjusted outflows are significantly greater than zero. This indicates significant abnormal trading activity by institutional investors and short sellers on the first trading day after the earnings announcement. While the changes in institutional holdings are reasonably symmetric, the same cannot be said for short selling. The increases in short interest ($\Delta SHORT_{t,q}^{day0+} = 0.11$ percent) are significantly higher than the decreases in short interest ($\Delta SHORT_{t,q}^{day0-} = 0.05$ percent), suggesting short sellers are far more aggressive in initiating positions immediately after the earnings announcement.

The average abnormal stock return on the earnings announcement day is positive ($EARET = 0.18$ percent), which is consistent with prior work that documents an earnings announcement premium in the days around the announcement.²¹ The average abnormal buy-and-hold return over the 60 days after the earnings announcement, $Post_EARET^{2-61} = -1.9$ percent, and the average earnings surprise is $SUE = -0.001$ percent. Finally, the average market capitalization of our sample stocks is $MV = US\$6,541.89m$, and the median market capitalization is $US\$1,379.82m$.

²⁰ Measured over the whole sample period, the average daily unadjusted change in institutional ownership for our sample stocks is -0.003 percent, and the average daily change in short interest for our sample stocks is 0.002 percent.

²¹ For example, see Ball and Kothari (1991) and Berkman and Truong (2009).

In Panel B of Table 1, the Spearman correlations are reported for each pair of variables, where correlations that are significant at the one percent level are in bold. While these bivariate correlations should be interpreted with caution, several interesting patterns emerge. First significant positive correlation is evident between institutional ownership and short interest (0.36), which is consistent with the idea that stocks with low institutional ownership might be short sale constrained (see for example, D'Avolio (2002)). This result might also explain the high positive correlation (0.14) between the change in short interest and the change in institutional ownership on the earnings announcement date. Not surprisingly, we find that stocks with a higher level of institutional ownership, and a higher level of short interest, have significantly higher inflows and outflows, and we find that all inflow and outflow measures are significantly positively correlated.

The level of institutional ownership is positively correlated with the earnings announcement abnormal return and the earnings surprise. This result is consistent with prior research suggesting that institutional investors have superior stock picking skills (see Baker, Litov, Wachter and Wurgler, 2009, and Ali, Durtschi, Lev and Trombley, 2004). Note, however, that institutional ownership is not significantly correlated with the return in the 60-day period after the earnings announcement. In contrast to these results, we find that short interest is not related to the earnings announcement returns, but is significantly negatively correlated with the earnings surprise and the 60-day post announcement return. Further, consistent with Nagel (2005), we find a positive relation between institutional ownership and firm size. On

the other hand, short interest is negatively correlated with firm size (see Arnold, Butler, Crack and Zhang (2005)).

There is a significantly negative relation between the change in short interest on the earnings announcement day and the earnings announcement return and earnings surprise. This relation suggests substantial adjustments to short positions in response to earnings news. The negative relation between increases in short positions in response to earnings surprises is larger in absolute value than decreases in short interest in response to earnings surprises. There is no evidence that suggests the net adjustment of the positions of institutional investors on the first day after the earnings release is related to the earnings surprise.

It is interesting to note the positive correlation between the earnings announcement returns and the 60-day post announcement return, and the earnings surprise and the 60-day post-announcement return. Both results are consistent with the existence of post-earnings announcement drift in our sample.

4. Changes in Institutional Holdings and Short Interest around Earnings Announcements

The aim of this study is to empirically investigate the trading behaviour of institutional owners and short sellers around earnings announcements. As a first step in this analysis, the average daily change in market-adjusted institutional ownership on the days before and after earnings announcements across all stocks in the sample is considered. Panel A of Table 2, column (1), presents this data over a 41 day window,

where averages that are significant at the one percent level are in bold.²² Analogous data for short positions is presented in Panel B of Table 2, column (4). To aid in the ease of interpretation, Figure 1 presents a plot of this information.

The average daily market-adjusted gross increase and the average daily market-adjusted gross decrease in institutional ownership are also individually calculated from day -20 to day +20. Panel A of Table 2, columns (2) and (3), present this data and a plot of these figures may be found in Panel A of Figure 2. Analogous data for short positions are presented in Panel B of Table 2, columns (5) and (6), and a plot in Panel B of Figure 2.

The information on the change in positions provides clear evidence of significant changes in trading behaviour in the days leading up to, and the days after the earnings announcement. More specifically, in the eight days leading up to the announcement, the market adjusted increases in institutional ownership in column (2) are significantly below the average increase across all stocks in our sample. Further, the market adjusted decreases in institutional ownership in column (3) are significantly above the market average for the last 3 days prior to the announcement day. Thus, in the days leading up to earnings announcements, institutional owners tend to close their positions at a greater rate and open them at a slower rate, compared to the market average. Thus, the net daily changes in institutional ownership in column (1) display significant net decreases in institutional ownership in the four days prior to the announcement.

²² Significance tests throughout this study are based on 2-way cluster-robust standard errors and therefore account for cross-sectional and time-series dependence (Petersen, 2009, and Gow, Ormazabal and Taylor, 2009).

Panel B reveals that short sellers are significantly less likely to increase their positions (column (5)) from day = -8 to day = -4. On the other hand, short sellers are significantly less likely to decrease their positions on only the sixth day prior to the announcement (column (6)). These results suggest that short sellers behave in a somewhat similar manner to institutional owners, inasmuch as both tend to close out their positions prior to the earnings announcement. The main difference appears to be that short sellers do not exhibit any abnormal trading activity in the few days immediately prior to the announcement. Where the net changes are considered, only the net decrease in short positions on day $t = -5$ is significant. Thus, the evidence of abnormal trading activity before earnings announcements is far less compelling for short sellers in comparison to institutional owners.

On the first two days after the earnings announcement (day 0 and 1), the average increase in institutional holdings is larger than the average decrease, leading to a significant net increase in institutional holdings these two days. After day +1 however, net changes in institutional ownership are never significantly different from zero. For short selling, increases and decreases in short interest are both significant from day 0 through day 4, but the increases dominate the decreases only on day 0 and 1. After day 1, there are no significant daily net changes in short selling.

Overall, Table 2 and Figures 1 and 2 suggest: i) a significant tendency by institutional investors to reduce their holdings prior to earnings announcements, ii) a tendency by both institutional investors and short sellers to close positions and establish new positions on the earnings announcement day, and iii) on the earnings announcement

day and the next day, the number of new short and long positions established dominate the number of short and long positions that were closed.²³

The preceding analysis focuses on the trading activity of institutional owners and short sellers in the days around earnings announcements. To investigate the extent to which this trading activity is related to the earnings surprise, the sample of earnings announcements is split into three groups based on the surprise content of the announcement (*SUE*). Thus, by comparing the actual earnings per share to the most recent forecast preceding the announcement (scaled by the share price 11 days before the earnings announcement), each event is classified into one of three equal-sized groups: favourable news (SUE^+), neutral news (SUE^0) and bad news (SUE^-). The average cumulative changes in market-adjusted institutional ownership and short interest for each of the three different announcement types are presented in Table 3 (starting at zero on day -21). To aid in interpretation, this information is also presented in Panels A and B of Figure 3.

The decrease in institutional ownership in the days immediately preceding the earnings announcement (as previously discussed) is evident in Panel A of Figure 3. This change in institutional ownership is clearly unrelated to the earnings surprise. After the earnings release, however a very distinct pattern emerges which indicates that institutions tend to buy (sell) stocks with positive (negative) surprises (columns (1) and (3) in Table 3. The difference in cumulative institutional ownership for the group of stocks with negative and positive earnings surprises is significant from day +10 onwards (column (4)). Where the difference in earnings forecast and the actual

²³ The observed drop in institutional holdings before earnings announcements, followed by an increase in institutional holdings after earnings announcements, mirrors the pattern in retail holdings documented in Kaniel, Liu, Saar and Titman (2008).

earnings is small (SUE^0), the data shows an incremental increase in institutional holdings after the earnings announcement.

Where cumulative changes in short interest are considered (Panel B of Figure 3), the preannouncement period shows a decrease in holdings as the event approaches, irrespective of the earnings surprise. The difference in the cumulative change in short interest for positive and negative earnings announcements is not significant in the period leading up to the earnings announcement (column (8) in Table 3). Immediately after the earnings release however, there is a sharp increase in short interest for stocks that fail to meet analyst forecasts, and a slight decrease in the short interest of stocks that exceed the most recent analyst forecast. It is interesting to note that these results contrast somewhat to Zheng (2009), who finds evidence of short selling increasing after all earnings surprises. The difference in cumulative short interest between the group of stocks with positive earnings surprises and those with negative earnings surprises is significant at the 1 percent level from day 0 onwards (column 8 in Table 3). The large positive change in short interest on day 0 in reaction to negative earnings surprises stands in sharp contrast to the more gradual change in institutional ownership in reaction to the same earnings news.

5. Are Institutional Investors and Short Sellers Informed?

The evidence presented in Section 4, reveals that both institutional investors and short sellers adjust their trading activity around the time of earnings announcements and the changes in their positions after the earnings announcement are clearly linked to the nature of the news release. In an attempt to establish if these traders are informed, we

now focus on whether the trading activity of sophisticated investors in the days leading up to an earnings announcement has predictive power in terms of the stock price reaction to the earnings news.

5.1 Portfolio Based Analysis of Earnings Announcement Returns

As a first attempt at providing insights into the question of whether institutions and short sellers are informed regarding the forthcoming earnings announcement, we estimate excess earnings announcement period returns for portfolios of stocks. These portfolios are formed using four variables from the Dataexplorers database that are potentially informative with regard to earnings announcement returns. First, we use the sum of the changes in institutional ownership in the 5 days before the earnings announcement ($\Delta INSTO_{t,q}^{FTE}$). For stocks with an increase (decrease) in $\Delta INSTO_{t,q}^{FTE}$, we expect a positive (negative) earnings announcement return.²⁴ Second, the sum of the changes in short interest in the 5 days before the earnings announcement, $\Delta SHORT_{t,q}^{FTE}$, is considered. For stocks with an increase (decrease) in $\Delta SHORT_{t,q}^{FTE}$, we expect a negative (positive) earnings announcement return. We also use the level of institutional holdings, and the level of short interest, 6 days before the earnings announcement ($SHORT$ and $INSTO$, respectively). If institutional investors and short sellers have superior private information, we expect a positive (negative) relation between $INSTO$ ($SHORT$) and the earnings announcement return.

Table 4 presents the abnormal earnings announcement returns (on day 0) for the quintile portfolios partitioned according to the four variables described above. We

²⁴ Christophe, Ferri and Angel (2004) and Daske, Richardson and Tuna (2005) use 5-day pre-announcement windows. We present the results for different windows in the robustness tests.

also compare the average earnings announcement return of the stocks in the lowest quintile portfolio with the average earnings announcement return of the stocks in the highest quintile portfolio.

The results in Table 4 indicate that the change in institutional holdings in the 5 days prior to earnings announcements is informative. Stocks with the largest decrease in institutional ownership experience a significant 0.895 percent decrease in price on the first day of trading after the earnings announcement (day 0). Stocks with the largest increase in institutional ownership experience a 0.588 percent increase on the first day of trading after the earnings announcement. The average return difference between these two groups is 1.483 percent and is highly significant.²⁵

Where the change in short interest in the 5 days before the earnings announcement is considered, there is less evidence of predictive power. Consistent with expectations, stocks that experience a large drop in short interest tend to have a positive return on the day after the earnings release, but this increase is not significantly different from the average change in stock price for the quintile of stocks with the largest increase in short interest.

The pre-announcement level of institutional ownership and short interest are both found to be informative with regard to the earnings announcement return. For the former, the quintile of stocks with the largest institutional ownership outperforms the

²⁵ A related working paper by Kaniel, Liu, Saar and Titman (2008) focuses on the activity of individual traders around earnings announcements for NYSE stocks. The authors find a positive relationship between individuals' trading activity and the abnormal return in the post event period. Direct comparison of their results is difficult however, as the authors do not adjust event day 0 for after hours announcements. Further, their abnormal individual trading measure uses information that is not known at the time of the announcements

quintile of stocks with the lowest institutional ownership by 0.441 percent, which is significant at the 1 percent level. For the latter, the quintile of stocks with the highest short interest underperforms the quintile of stocks with the lowest short interest by 0.418 percent, which is again significant.

Overall, this analysis of the level and changes in institutional ownership and short interest in the days before earnings announcements produces results that are consistent with the idea that institutional traders and short traders are informed traders with regard to the forthcoming earnings announcement.

5.2 Regression Based Analysis of Earnings Announcement Returns

While estimating portfolio returns provides a useful framework for testing whether institutional investors and short sellers are informed, it does suffer a disadvantage in that it does not provide any controls for other factors that are known to affect earnings announcement returns. To overcome this problem, a regression based framework is employed that controls for several of these factors:

$$EARET_{i,q} = b_0 + b_1 \text{Log}(MV_{i,q}) + b_2 MB_{i,q} + b_3 \text{TURN}_{i,q} + b_4 \text{MOM}_{i,q} + b_5 \text{SUE}_{t-1, i,q} + b_6 \text{INSTO}_{i,q} + b_7 \text{SHORT}_{i,q} + b_8 \Delta \text{INSTO}_{i,q}^{FF} + b_9 \Delta \text{SHORT}_{i,q}^{FF} + \varepsilon_{i,q} \quad (1)$$

where i is firm i and q is quarter q . The estimated output is provided in Panel A of Table 5, where 2-way cluster-robust t -statistics are presented (Petersen, 2009, and Gow, Ormazabal and Taylor, 2009).

Consistent with earlier research, we find that smaller firms have larger earnings announcement returns, and that the earnings announcement return is positively related to the previous quarters' earnings surprise. There is no evidence that the market-to-book ratio, turnover, or the abnormal return over the previous 12 months, are related to earnings announcement returns. Consistent with the portfolio results in Table 4, the regression results show that changes in institutional holdings are highly informative, as are the level of institutional holdings. In contrast to the portfolio-based results in table 4, the regression results show there is predictive information in changes in short interest, but the level of short interest is not significant.

A more robust test of the data specifies independent variables in equation (1) that are transformed into decile ranks, scaled to range from -0.5 to 0.5. The advantages of using rank deciles are that the analysis: i) is not sensitive to outliers; ii) accounts for non-linear relations, iii) facilitates comparison and interpretation of the coefficients. The rank regression results are also presented in Panel A of Table 5 and are consistent with the analysis using unadjusted variables. The results suggest that going from the decile of stocks with the lowest institutional holdings to the decile of stocks with the highest institutional holdings, increases earnings announcement returns by 0.903 percent. Similarly, *ceteris paribus*, the decile of stocks with the most positive change in institutional holdings in the five days before the earnings release outperforms the decile of stocks with the largest negative change institutional holdings over the five days preceding the earnings release, by 1.641 percent on the earnings announcement date. Finally, the decile of stocks with the largest decrease in short interest outperforms the decile of stocks with the largest increase in short interest by 0.746 percent on the earnings announcement date.

To separately examine the informativeness of gross increases and gross decreases in short interest and institutional ownership in the pre-announcement period, a modified form of Equation (1) is specified:

$$\begin{aligned}
 EARET_{i,q} = & b_0 + b_1 \log(MV_{i,q}) + b_2 MB_{i,q} + b_3 TURN_{i,q} + b_4 MOM_{i,q} + b_5 SUE_{t-1, i,q} + \\
 & b_6 INSTO_{i,q} + b_7 SHORT_{i,q} + b_8 \Delta INSTO_{i,q}^{pre,+} + b_9 \Delta INSTO_{i,q}^{pre,-} + \\
 & b_{10} \Delta SHORT_{i,q}^{pre,+} + b_{11} \Delta SHORT_{i,q}^{pre,-} + \varepsilon_{i,q}
 \end{aligned} \tag{2}$$

This equation is estimated using the raw data and the data transformed into decile ranks. The results for each version of Equation (2) are presented in Panel B of Table 5 and show that gross decreases in institutional ownership in the 5 days before the earnings announcement are very informative, in contrast to gross increases in institutional holdings. Similarly, pre-announcement gross decreases in short positions contain significant information regarding the earnings announcement return, but gross increases in short positions do not. The analysis using rank decile numbers produces results that are qualitatively unchanged. These findings provide evidence that sophisticated investors display loss-aversion in the days before earnings announcements. They display a tendency to close long and short positions prior to announcements that would otherwise have produced losses, whereas there is no evidence that sophisticated investors open long and short positions prior to earnings announcements in order to profit from their superior information.

Overall, the results in Table 5 indicate that sophisticated investors trade successfully in the pre-announcement period to exploit superior information regarding the

forthcoming earnings announcement. Importantly, these skills are more likely to be displayed when they close short and long positions, which is suggestive of loss aversion in the face of highly visible public announcements.

In Table 6, the results of several robustness tests are presented. The base case model is Equation (1), which is estimated using the variables transformed into rank deciles and the results are reproduced from Table 5. In each of the subsequent robustness regression equations reported in Table 6, one aspect of the analysis is changed. The first model is estimated with an earnings announcement return that is measured over a 3-day window from day 0 to +2 ($EARET^{0-2}$). The results are similar to the base case, suggesting that the abnormal returns of a strategy aimed at exploiting pre-announcement information are mainly realized on the earnings announcement date. The second model measures the change in institutional ownership and short interest on the day before the earnings announcement only (1-day Δ). The results suggest that using the information contained in trades in the four days prior to day -1 adds predictive power, as the coefficient for the change in institutional holdings on day -1 is lower than the base case, and the coefficient for the change in short interest is no longer significant. The third robustness model estimated shows the main results are robust when earnings announcement returns are winzorized at the 1% level and 99% level of the earnings announcement return distribution (*Winzorized*). In order to exclude short selling activities by arbitrageurs trading on the index and convertible strategies, the fourth model is estimated for a sample that excludes firms that have convertible bonds as well as firms that are part of the S&P500 index (*S&P500 Excluded*). The estimated results are qualitatively unchanged from the base model, suggesting the results are robust to this change in sample. The fifth model presented in

Table 6 excludes 3,811 observations where the ratio of publicly available short interest information to the short interest captured in the Dataexplorers database is below 0.5 or above 2.0, where the ratio is measured on the closest common date preceding the earnings announcement (*Correction*). The estimated results show that differences between the publicly available short interest and short interest in Dataexplorers do not have a strong impact on the results. In the next column, an alternative approach to ranking the data is considered. For this sixth robustness model, the dollar value of the changes in institutional holdings and the dollar value of the change in short positions in the five days before the earnings announcement are used to form the decile groups (*Value*). The results are similar to the base case (which uses changes in institutional holdings and short positions as percentage of the shares outstanding). In the final column, the results of a seventh model are presented. In this model, WINNER is a dummy variable that is equal to 1 if a stock is in the top decile in terms of change in institutional holdings and in the bottom decile in terms of change in short interest, and LOSER is a dummy variable that is equal to 1 if a stock is in the bottom decile in terms of change in institutional holdings and in the top decile in terms of change in short interest (*W/L*). The results show significant outperformance for the WINNER stocks and significant underperformance for the stocks classified as LOSER. The abnormal return difference between both groups on the earnings announcement day is a highly significant 5.004 percent.

6. An Investigation of Post-Earnings Announcement Drift, Institutional Trading and Short Selling

Post-Earnings Announcement Drift is a puzzling and potentially exploitable capital market anomaly (see Bernard and Thomas, 1990). Two key questions in the current context are whether institutional traders and short sellers have a superior ability to exploit post-earnings announcement drift, and whether their positions affect the extent to which stocks show post-earnings announcement drift.

To test if institutional investors and short sellers have a superior ability to exploit post-earnings announcement drift, we follow the commonly used method and first regress post-earnings announcement returns, measured over a 60-day window starting on the second day after the earnings announcement, on the earnings surprise, i.e.:

$$\text{Post-} EARET_{i,q}^{2-61} = \beta_0 + \beta_1 SUE_{i,q} + \varepsilon_{i,q} \quad (3)$$

In this paper, we consider a number of extensions to this basic testing framework. The first extension is to include interaction variables that allow the slope of the SUE-return relation to vary with $\Delta INSTO^{post}$, the change in institutional holdings on the first two trading days after the earnings announcement (day 0 and day 1), and $\Delta SHORT^{post}$, the change in short interest on the first two trading days after the earnings announcement.²⁶ To test the hypothesis that increases in institutional holdings (decreases in short interest) increase the slope of the SUE-return relation if the earnings surprise is positive, and decreases in institutional holdings (increases in short interest) increase the slope of the SUE-return relation if the earnings surprise is negative, we allow the coefficients for the interaction variables to differ depending on

²⁶ We use a 2-day window based on the finding in Table 2 that abnormal changes in institutional holdings and short interest are significantly different from zero on the first two days after earnings announcements. We present the results for different windows in the robustness tests.

the sign of the earnings surprise. Defining POS as a dummy variable that assumes a value of 1 if the earnings surprise is zero or larger (and zero otherwise), and NEG as a dummy variable that equals 1 if the earnings surprise is negative (and zero otherwise), we estimate the following model:

$$\begin{aligned}
 Post - \overline{RARRT}_{i,q}^{2-64} = & \beta_0 + \beta_1 SUE_{i,q} + \beta_2 SUE_{i,q} * \Delta INSTO_{i,q}^{post} * POS + \beta_3 \\
 & SUE_{i,q} * \Delta INSTO_{i,q}^{post} * NEG + \beta_4 SUE_{i,q} * \Delta SHORT_{i,q}^{post} * POS + \beta_5 \\
 & SUE_{i,q} * \Delta SHORT_{i,q}^{post} * NEG + \varepsilon_{i,q} \quad (4)
 \end{aligned}$$

Consistent with most of the PEAD literature, we transform $SUE_{i,q}$, $\Delta INSTO^{post}$, and $\Delta SHORT^{post}$ to scores ranging in value from -0.5 to 0.5, based on their decile rank within each calendar quarter.

The results for equation (3) are presented in the first column of Table 7. The results show that the post- announcement return is significantly positively correlated with the earnings surprise. The difference in the 60-day post-announcement return between the highest earnings surprise decile and the lowest earnings surprise decile, is 2.442 percent. The results for Equation (4) are presented in the second column of Table 7. The coefficient for the $SUE * \Delta INSTO^{post} * POS$ variable is positive and significant, whereas the coefficient for the $SUE * \Delta INSTO^{post} * NEG$ variable is negative and significant. The estimated coefficients indicate that a trader shorting the stocks in decile 1 (lowest earnings surprise decile) when there is also a strong decrease in institutional ownership and taking a long position in stocks in decile 10 (highest earnings surprise decile) when there is also a strong increase in institutional ownership, can boost the return from trading on the post-earnings announcement drift

to 5.9 percent.²⁷ In contrast, there is no evidence that short sellers are successfully targeting stocks that underreact to earnings news.

To provide further insights into these results, we consider a number of modifications and extensions to the model. The first modification is to replace POS and NEG in equation (4) with SIGN, which is an indicator variable that assumes a value of +1 (-1) if the earnings surprise is zero or larger (negative). This more parsimonious specification is justified based on the results of a test which finds that we cannot reject the hypotheses that the absolute value of the coefficient for the interaction variable $SUE*\Delta INSTO^{post}*POS$ is the same as the absolute value of the coefficient for $SUE*\Delta INSTO^{post}*NEG$ (p-value is 0.84), and the absolute value of the coefficient for the interaction variable $SUE*\Delta SHORT^{post}*POS$ is the same as the absolute value of the coefficient for $SUE*\Delta SHORT^{post}*NEG$ (p-value is 0.54).²⁸ The results for this model are presented in column 3 of Table 7. The estimated coefficient for the SIGN variable is positive and significant for institutional trading and insignificant for short selling. Thus, these results are consistent with the previous analysis and suggest that there is no loss of information in this more parsimonious model. As such, we shall retain the SIGN version of our variable in subsequent testing.

A further extension of the PEAD model is to include additional control variables previously used in the literature (surprise interacted with size, bid ask spread,

²⁷ The predicted return from shorting stocks when $SUE = -0.5$ and $\Delta INSTO^{post} = -0.5$ equals 3.403 percent: $-1*(-0.365 - 0.5*2.473 + 0 - 0.5*-0.5*-7.206)$, and the predicted return from buying stocks when $SUE=0.5$ and $\Delta INSTO^{post}=0.5$ equals 2.512 percent: $(-0.365 + 0.5*2.473 + 6.562*0.5*0.5 + 0)$.

²⁸ We have also tested a model where we separately include gross increases and gross decreases in institutional holdings and short positions interacted with the earnings surprise. We cannot reject the hypothesis that the absolute value of the slope coefficients based on gross increases in institutional holdings (short interest) equals the absolute value of the slope coefficients based on gross decreases in institutional holdings (short interest).

institutional ownership and short interest). In this case, the model to be tested takes the form:

$$\begin{aligned}
 P_{i,t} - E_{i,t} = & \beta_0 + \beta_1 SUE_{i,t} + \beta_2 SUE_{i,t} * \Delta INSTO_{i,t}^{post} * SIGN + \beta_3 \\
 & SUE_{i,t} * \Delta SHORT_{i,t}^{post} * SIGN + SUE_{i,t} * INSTO_{i,t} + \beta_5 SUE_{i,t} * SHORT_{i,t} + \beta_6 \\
 & SUE_{i,t} * MV_{i,t} + \beta_7 SUE_{i,t} * BAS_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{5}$$

where SUE , $\Delta INSTO^{post}$, $\Delta SHORT^{post}$, $INSTO$, $SHORT$, MV and BAS are as previously defined and are all transformed to scores from -0.5 to 0.5 based on their decile rank within each calendar quarter.

The results are presented in the fourth column of Table 7. The coefficients and significance levels of the previously discussed variables are unaltered. Consistent with Bartov et al. (2000), the coefficient for the earnings surprise interacted with the level of institutional ownership is negative and significant. This result indicates that, ceteris paribus, stocks with a higher level of institutional ownership have smaller PEAD, suggesting that prices of these stocks take less time to adjust to the information released in the earnings announcement. Also consistent with Bartov et al. (2000), there is no evidence that PEAD is related to firm size or transaction costs.

In the final model in Table 7, we include $\Delta INSTO^{post}$, $\Delta SHORT^{post}$, $INSTO$, $SHORT$, MV and BAS as separate variables (again transformed to range from -0.5 to 0.5). The coefficients and significance levels of the previously discussed variables are similar to the results in column 4. Of the additional variables in column 5, only $SHORT$ is

significant. The coefficient for SHORT indicates that stocks in the decile with the highest short interest 6 days before the earnings announcement have an abnormal return over the 60-day post announcement period that is 2.7 percent lower than stocks in the decile with the lowest short interest 6 days before the earnings announcement.

Overall, the results presented in Table 7 suggest that institutional traders successfully target stocks that underreact to earnings news. We also find that institutional ownership is important for price discovery in reaction to new earnings information. A high level of institutional ownership is associated with a significantly lower PEAD, indicating that prices of these stocks take less time to adjust to the information released in the earnings announcement. In addition we present evidence that short sellers are successful at selecting stocks that have negative abnormal returns in the post-announcement period. Short sellers, however, do not display superior skills in exploiting PEAD.

To provide evidence on the robustness of these results, we present the estimation output for a number of alternative versions of the base model, model 4 in Table 7.²⁹ In each of the robustness regression equations reported in Table 8, one aspect of the analysis is changed. In our first robustness test we replace the post-earnings announcement return by the earnings announcement return, measured as the abnormal buy-and-hold return over day 0 and 1. This change in focus to earnings response coefficients (ERCs) in the first robustness tests is based on the following considerations. To the extent that the post-earnings announcement return-earnings surprise relation is weaker in the presence of high institutional ownership (see model

²⁹ The results for the variables of interest are robust to inclusion of $\Delta INSTO^{post}$, $\Delta SHORT^{post}$, $INSTO$, $SHORT$, MV and BAS as separate variables. Of these additional variables only SHORT is consistently significant and negative.

4 in Table 7), we would also expect to find that the earnings announcement period return-earnings surprise relation is stronger in the presence of high institutional ownership. Further, if institutional trading in the direction of the earnings surprise enhances PEAD, then ERCs are unlikely to be significantly impacted by this institutional trading on day 0 and 1. Finally, if short trading in the direction of the earnings surprise does not enhance PEAD, it could be because ERCs are increased in reaction to short trading on day 0 and 1.

To test these propositions, we replace the dependent variable $\text{Post} - \text{EARET}^{2-61}$ with the announcement period return, ie. EARET^{0-1} . The results of this model are presented in the second column of Table 8 (the first column of Table 8 reproduces the results from model 4 in Table 7, which serves as the base case). In support of the first proposition, the estimated coefficient on the $\text{SUE} * \text{INSTO}$ is positive and highly significant. The second proposition is also supported as the $\text{SUE} * \Delta \text{INSTO}^{\text{post}} * \text{SIGN}$ coefficient is insignificant. Finally, the $\text{SUE} * \Delta \text{SHORT}^{\text{post}} * \text{SIGN}$ coefficient is negative and highly significant, providing support for the third proposition, suggesting that for stocks with a high level of short trading in the direction of the earnings surprise, prices adjust faster to the information released in the earnings announcement.

The second robustness model is estimated with a post announcement return that is measured over a 60-day window from day 1 to 60 (EARET^{1-60}) and post-announcement changes in institutional holdings and short interest are based on day 0 only. The results are similar to the base case, but the post-announcement change in institutional holdings is less significant, suggesting that the information contained in trades on the day after the announcement (day +1) adds predictive power. The

coefficient on the interaction variable with pre-announcement institutional holdings is also less significant. The second robustness model uses the change in institutional ownership and short interest measured over the period from day +3 to day +10, and a post announcement return that is measured over a 50-day window starting on day 11 ($EARET^{11-60}$). The post-announcement change in institutional holdings has the expected sign, but is no longer significant, suggesting trades by institutional investors in the first two days after the announcement contain the most useful information in terms of predicting the post-earnings announcement return. The third robustness model is estimated with a post announcement return that is measured over a 30-day window from day 2 to 30 ($EARET^{2-30}$). The coefficients for SUE, and the interaction variables with $\Delta INSTO$ and $INSTO$ have the expected sign, but are smaller and less significant. Consistent with the PEAD literature, this result suggests that abnormal returns from a PEAD-based strategy, gradually increase during the post-announcement period. The fourth robustness test re-estimates the base model using post-announcement returns that are winzorized at the 1% level and 99% level. The results show the base model results to be robust. The next robustness model we consider, excludes all firms that have convertible bonds as well as firms that are part of the S&P500 index. Exclusion of these firms has only a small impact on the significance and absolute value of the coefficients. The next robustness model presented in Table 8, excludes all observations where the level of short interest in the Dataexplorers database is less than 50 percent or more than 200 percent of the short interest according to the publicly available short interest on the closest date preceding the earnings announcement day. The absolute value of the interaction variables increases, but the significance level decreases as a result of the smaller sample size. The next robustness model estimated uses the value of the change in institutional

ownership and the value of the change in short positions (rather than the percentage of shares outstanding) to measure $\Delta INSTO$ and $\Delta SHORT$. This model produces results that are consistent with the base case model. Overall, we conclude that the results presented in Table 7, are robust to various changes in the measurement of post-announcement returns and changes in the measurement of post-announcement changes in institutional holdings and short interest.

7. Summary and Conclusions

The periods before and after the release of earnings information are likely to be times when informed traders are active in the market. In this paper, we investigate the trading activity in these periods of two groups of sophisticated investors, short sellers and institutional owners, in an attempt to establish whether any evidence can be found of informed trading. Through Dataexplorers Ltd., we obtain data on trading activity and positions of both institutional investors and short sellers, and we use this data to analyse trading around 11,610 earnings announcements for a wide range of US stocks listed on the NYSE, Nasdaq and AMEX over a 21-month period from 9 August 2006 to 8 May 2008.

Analysis of the trading activity of institutional and short sellers in the period prior to earnings announcements, reveals evidence of institutional investors, and to a lesser extent short sellers, reducing their holdings prior to earnings announcements. In the period immediately after the earnings announcement however, both types of traders are found to re-establish themselves in the market. In particular, short sellers are

quick to increase their short positions when the earnings figure is below market expectations.

In an attempt to establish whether institutions and short sellers are informed, an empirical analysis is undertaken of whether their trading activity in the days leading up to an earnings announcement has predictive power in terms of the stock price reaction to the news. An analysis of excess earnings announcement period returns for portfolios of stocks based on the level and changes in institutional ownership and short interest in the days before earnings announcements produces results that are consistent with the idea that institutional traders and short traders are informed traders with regard to the forthcoming earnings announcement. An alternative regression based testing framework, which includes controls for other factors that are known to affect the earnings announcement returns, reinforces this result. Interestingly, we find that most information is contained in observations where institutional owners and short sellers close positions in order to avoid losses (rather than sophisticated investors opening positions to make profits), which indicates loss aversion in the face of highly visible public announcements.

Our analysis of the trading activity of informed agents in the days after earnings announcements finds that stocks with high institutional holdings, but not high short interest, are more efficiently priced in the sense that they exhibit less PEAD. Further, we find that abnormal returns from a PEAD-strategy can be more than doubled if information on changes in institutional ownership in the days immediately after earnings announcements is utilised. That is, the tendency of prices to trend up in the sixty days following above expectations earnings announcements is significantly

stronger if institutions increase their holdings on the two days after the earnings announcement. Similarly, the tendency of prices to trend down in the sixty days following below expectations earnings announcements is significantly stronger if institutions decrease their holdings on two days after the earnings announcement. There is no evidence that abnormal returns from a PEAD-strategy can be enhanced if information on changes in short interest in the two days immediately after earnings announcements is utilised. In additional tests we show that institutional trading in the two days immediately after earnings announcements does not increase earnings response coefficients, but the more aggressive trading by short sellers does. We argue that this difference in price adjustment to earnings news might explain why information on institutional trading immediately after the earnings announcement is useful to enhance the returns from a PEAD-based strategy, whereas knowledge of short selling activity in reaction to earnings announcements is not.

References

- Ali, A., Durtschi, C., Lev, B. and Trombley, M. (2004) "Changes in institutional ownership and subsequent earnings announcement abnormal returns," *Journal of Accounting, Auditing and Finance*, 19, 221-248.
- Arnold, T., A. W. Butler, T. F. Crack, and Zhang, Y. (2005) "The information content of short interest: A natural experiment," *Journal of Business*, 78, 1307-1335.
- Asquith, P., Pathak, P.A. and Ritter, J. (2005) "Short interest, institutional ownership, and stock returns", *Journal of Financial Economics*, 78, 243-276
- Baker, M.P., Litov, L.P., Wachter, J.A. and Wurgler, J. (2009) "Can mutual fund managers pick stocks? Evidence from their trades prior to earnings announcements", *Journal of Financial and Quantitative Analysis*, Forthcoming.
- Ball, R. and Kothari, S. (1991) "Security returns around earnings announcements", *The Accounting Review*, 66, 718-738.
- Bartov, E., Radhakrishnan, S., and Krinsky, I. (2000) "Investor sophistication and patterns in stock returns after earnings announcements", *The Accounting Review*, 75, 43-63.
- Berkman, H., Dimitrov, V., Jain P., Tice, S. and Koch, P., (2008) "Sell on the News: Differences of Opinion, Short-Sales Constraints, and Returns Around Earnings Announcements" forthcoming *Journal of Financial Economics*.
- Berkman, H. and Truong, C. (2009) "Event day 0? After-hours earnings announcements", *Journal of Accounting Research*, 47, 71-103.
- Bin, K. Huddart, S. and Petroni, K. (2003) "What insiders know about future earnings and how they use it: Evidence from insider trades" *Journal of Accounting and Economics*, 35, 315-346.
- Boehme, R., Danielsen, B. and Sorescu, S.M. (2006) "Short sale constraints, differences of opinion, and overvaluation", *Journal of Financial and Quantitative Analysis*, 41, 455-487
- Boehmer, E., Jones, C.M. and Zhang, X. (2008) "Which shorts are informed?", *Journal of Finance*, 63, 491-527.
- Bushee and Goodman (2007) "Which institutional investors trade based on private information about earnings and returns?" *Journal of Accounting Research*, 45, 289-321.
- Campbell, J.Y., Ramadorai, T. and Schwartz, A. (2009) "Caught on tape: Institutional trading, stock returns, and earnings announcements", *Journal of Financial Economics*, 92, 66-91.

- Cao, B., Dhaliwal, D., Kolasinski, A. and Reed, A. (2007) “Bears and numbers: Investigating how short sellers exploit and affect earnings-based pricing anomalies” working paper available at ssrn.com/abstract=748506.
- Carhart, M.M. (1997) “On persistence in mutual fund performance”, *Journal of Finance*, 52, 57 – 82.
- Chen, H-L., Jegadeesh, N. and Wermers, R. (2000) “The value of active mutual fund management: An examination of the stockholdings and trades of fund managers”, *Journal of Financial and Quantitative Analysis*, 35, 343-368.
- Christophe, S. E., Ferri, M. G. and Angel, J. J. (2004) “Short-selling prior to earnings announcements”, *Journal of Finance*, 59, 1845 – 1875.
- Cohen, L., Diether K.B. and Malloy C. (2007) “Supply and Demand Shifts in the Shorting Market”, *Journal of Finance*, 62, 2061-2096.
- Daske, H., Richardson, S.A. and Tuna, I. (2005) “Do short sale transactions precede bad news events?” working paper available at ssrn.com/abstract=722242.
- Desai, H, Ramesh, K., Thiagarajan, S.R. and Balachandran, B.V. (2002) “An investigation of the informational role of short interest in the NASDAQ market” *Journal of Finance*, 57, 2263-2287
- Diether, K., Lee, K.H. and Werner, I.M. (2007) “It's SHO time! Short sale price tests and market quality”, *Journal of Finance*, forthcoming.
- Gow, I.D., Ormazabal, G. and Taylor, D.J. (2009) “Correcting for cross-sectional and time-series dependence in accounting research”. AAA 2009 Financial Accounting and Reporting Section (FARS) Paper, available at ssrn.com/abstract=1175614
- Griffin, J.M., Shu, T. and Topaloglu, S. (2008) “How Informed are the Smart Guys? Evidence from Short-Term Institutional Trading Prior to Major Events”, working paper available at ssrn.com/abstract=1363756.
- Grinblatt, M. and Titman, S. (1993) “Performance measurement without benchmarks: An examination of mutual fund returns”, *Journal of Business*, 66, 47 - 68.
- Gruber, M.J. (1996) “Another puzzle: The growth in actively managed mutual funds”, *Journal of Finance*, 51, 783–810.
- Jones, C. and Lamont, O. (2002) “Short sale constraints and stock returns”, *Journal of Financial Economics*, 66, 207-239.
- Kaniel, R., Liu, S., Saar, G. and Titman, S. (2008) “Individual Investor Trading and Return Patterns around Earnings Announcements” available at papers.ssrn.com/sol3/papers.cfm?abstract_id=1332041.
- Ke, B. and Petroni, K. (2004) “How informed are actively trading institutional investors? Evidence from their trading behavior before a break in a string of consecutive earnings increases”, *Journal of Accounting Research*, 42, 895-927.

- Ke, B. and Ramalingegowda, S. (2005) “Do institutional investors exploit the post-earnings announcement drift?”, *Journal of Accounting and Economics*, 39, 25-53.
- Ke, B., Huddart, S. and Petroni, K. (2003) “What insiders know about future earnings and how they use it: Evidence from insider trades”, *Journal of Accounting and Economics*, 35, 315-346.
- Lee, C.M.C. (1992) “Earnings news and small traders”, *Journal of Accounting and Economics*, 15, 265 - 302.
- Mendenhall, R.R. (2004) “Arbitrage risk and post earnings announcement drift”, *Journal of Business*, 74, 875-894.
- Nagel, S. (2005) “Short sales, institutional investors and the cross-section of stock returns”, *Journal of Financial Economics*, 78, 277-309.
- Petersen, M.A. (2009) “Estimating standard errors in finance panel data sets: Comparing approaches”, *Review of Financial Studies*, 22, 435 – 480.
- Puckett, A. and Yan, X.S. (2008) “The interim trading skills of institutional investors” working paper available at ssrn.com/abstract=1107953
- Reed, A.V. (2007) “Costly short selling and stock price adjustment to earnings announcements” paper presented at the 2007 CARE Conference and available at www.nd.edu/~carecob/April%202007%20Conference/.
- Saffi, P.A.C. and Sigurdsson, K. (2007) “Price efficiency and short selling” working paper available at ssrn.com/abstract=949027.
- Wermers, R. (2000) “Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses”, *Journal of Finance*, 55, 1655 – 1695.
- Zheng, L. (2009) “Short Sales and Post Earnings Announcement Drift” working paper available at ssrn.com/abstract=1208159.

Appendix : Variable Definitions

EARET	Actual return (in %) on the first trading day after the earnings announcement (day 0) minus the equally-weighted return for all NYSE/AMEX/NASDAQ firms in the same size-decile on the same day.
Post_EARET ²⁻⁶¹	Buy-and-hold return (in %) over the sixty-day period starting on the third trading day after the earnings announcement (day 2 through day 61) minus the equally-weighted buy-and-hold return for all NYSE/AMEX/NASDAQ firms in the same size-decile over the same period
MV	Market value of equity (price multiplied by number of shares outstanding) as reported on Compustat at the start of the current fiscal quarter (Compustat Quarterly Data #14*Data #15).
MB	Market value of common stock (Compustat Quarterly Data #14*Data #15) divided by book value of common stock (Compustat Quarterly Data #59), measured at the end of the prior fiscal quarter.
TURN	Average daily turnover, measured over the 45 day period ending 10 days prior to the earnings announcement date. Daily turnover equals number of shares traded divided by number of shares outstanding, as reported on the CRSP daily tapes. For Nasdaq-traded stocks, the reported number of shares traded on CRSP is divided by two to adjust for the double counting of dealer trades.
MOM	Price momentum . Excess buy-and-hold return (relative to NYSE/AMEX/NASDAQ firms in the same size-decile) over the twelve calendar months prior to the earnings announcement month.
BAS	Average percentage bid ask spread over the 45-day period ending 10 days prior to the earnings announcement date (from the daily CRSP data)
SUE	Earnings surprise measured as the actual earnings per share minus the most recent analyst forecast before the earnings announcement, scaled by the stock price eleven days before the earnings announcement.
INSTO	The level of institutional ownership measured as the total number of shares held by all beneficial owners 6 days before the earnings announcement, divided by shares outstanding (in %).
SHORT	Total number of shares lent 6 days before the earnings announcement, divided by the number of shares outstanding (in %).
$\Delta INSTO$	Market-adjusted change in institutional holdings, defined as actual change in INSTO minus the average change in INSTO for the equally weighted portfolio of all stocks in our sample on the same day (in %). The superscript <i>pre</i> , refers to a period from day -5 through day -1 relative to the first trading day after the earnings announcement (day 0). The superscript <i>post</i> , refers to the first two trading days after the earnings announcement (day 0 and day 1).
$\Delta SHORT$	Market-adjusted change in short interest, defined as actual change in SHORT minus the average change in SHORT for the equally weighted portfolio of all stocks in our sample on the same day (in %). The superscript <i>pre</i> , refers to a period from day -5 through day -1 relative to the first trading day after the earnings announcement (day 0). The superscript <i>post</i> , refers to the first two trading days after the earnings announcement (day 0 and day 1).
$\Delta INSTO^+$ ($\Delta INSTO^-$)	Market-adjusted gross increases (decreases) in institutional ownership, defined as actual gross increases (decreases) in institutional ownership, scaled by shares outstanding, minus the average gross increases (decreases) in institutional ownership, scaled by shares outstanding, for the equally weighted portfolio of all stocks in our sample on the same day (in %).
$\Delta SHORT^+$ ($\Delta SHORT^-$)	Market-adjusted gross increases (decreases) in short interest, defined as actual gross increases (decreases) in short interest minus the average gross increases (decreases) in short interest for the equally weighted portfolio of all stocks in our sample on the same

day (in %).

Figure 1
Net Market Adjusted Changes in Institutional Ownership and Short Interest

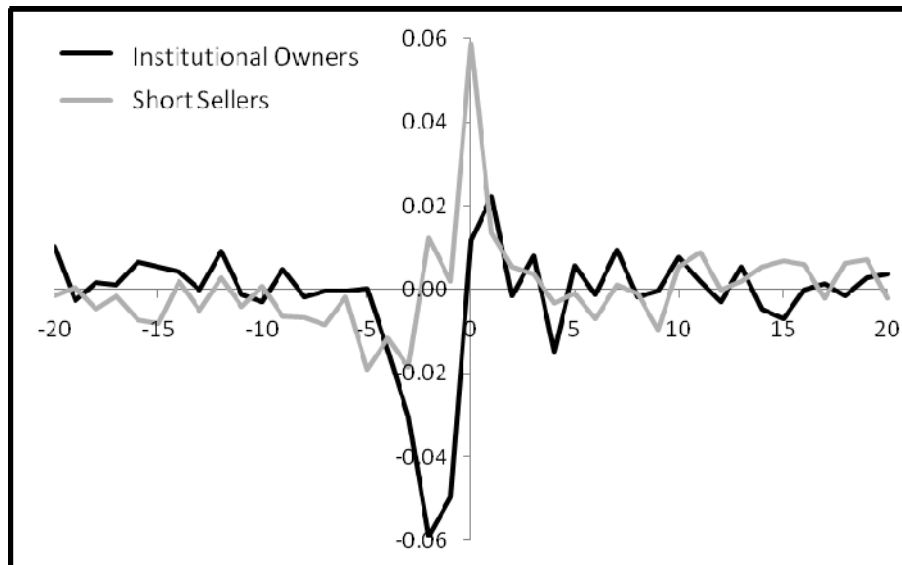
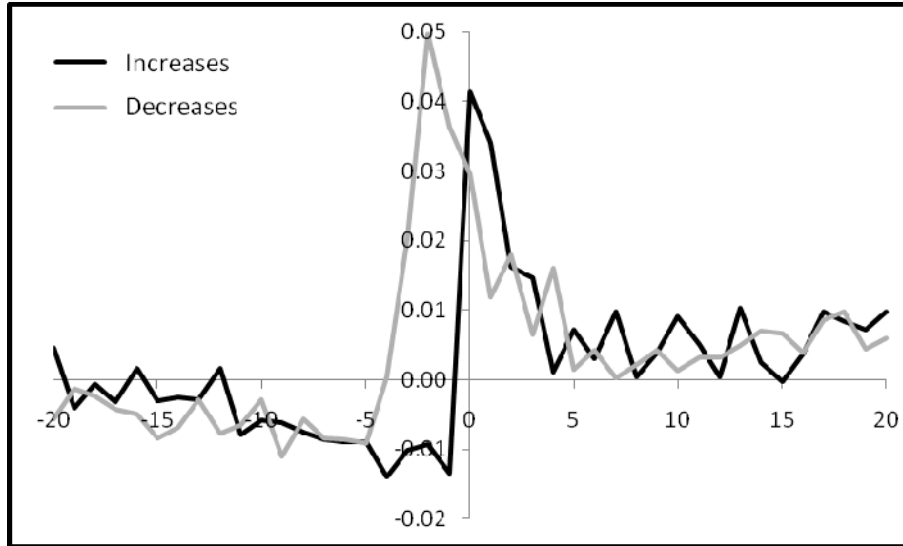


Figure 1 presents the average daily change in market-adjusted institutional ownership and the average daily change in market-adjusted short interest across all stocks (both in % of shares outstanding) over a 41 day window around the day 0, where day 0 is the first trading day after the earnings announcement.

Figure 2
Panel A – Market-adjusted Gross Increases and Decreases in Institutional Ownership



Panel B – Market-adjusted Gross Increases and Decreases in Short Interest

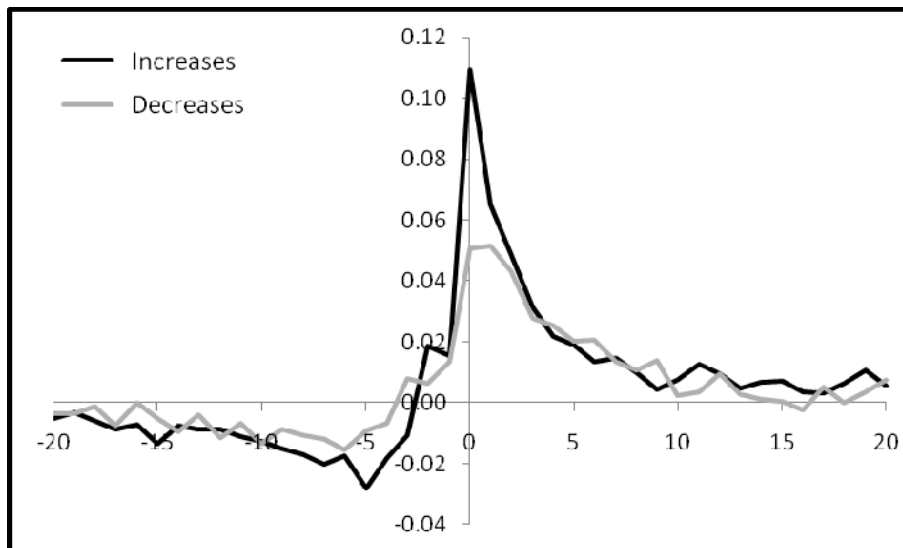
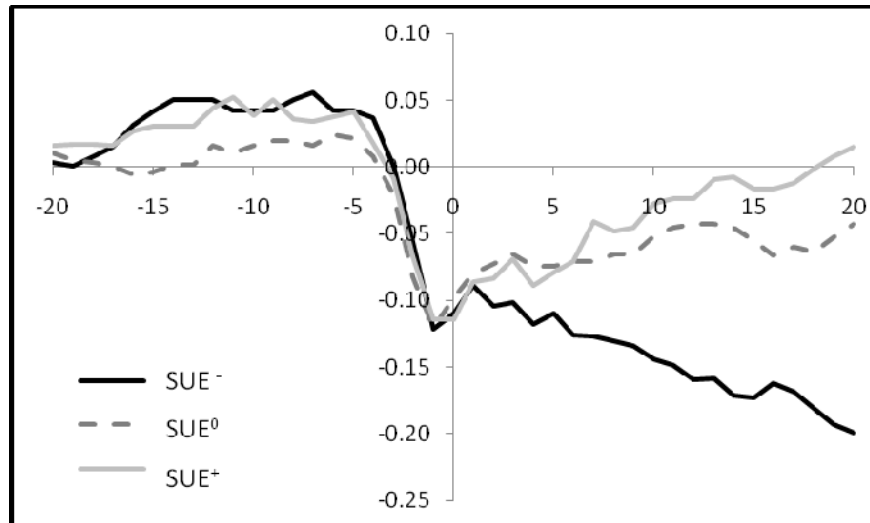


Figure 2, Panel A (Panel B) presents the average daily change in market-adjusted gross increase and gross decrease in institutional ownership (short interest) over a 41-day event window. All variables are expressed as a percentage of shares outstanding. Day 0 is the first trading day after the earnings announcement.

Figure 3
Panel A– Cumulative Market-adjusted Changes in Institutional Ownership by Type of Earnings Announcement



Panel B – Cumulative Market-adjusted Changes in Short Interest by Type of Earnings Announcement

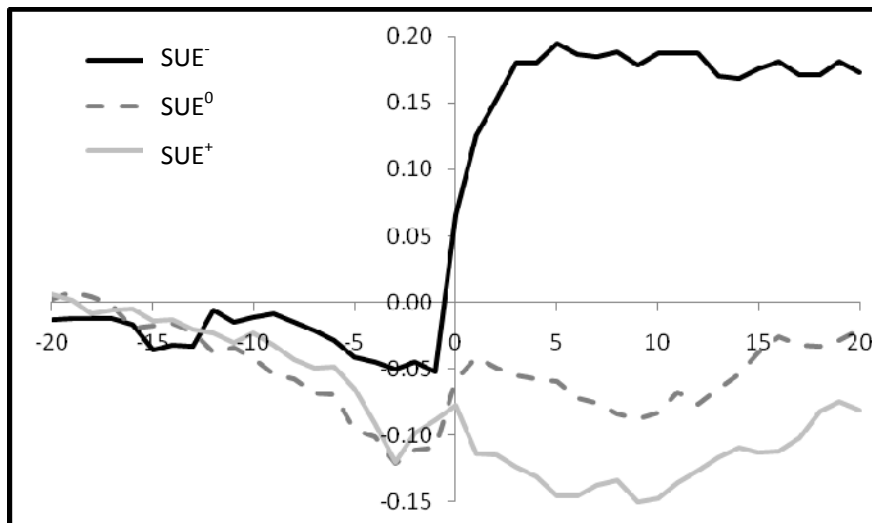


Figure 3, Panel A (Panel B) presents the cumulative daily change in market-adjusted institutional ownership (short interest) over a 41-day event window, for three groups of stocks categorized based on the surprise content of the announcement (*SUE*). *SUE* the actual earnings per share minus the most recent analyst forecast before the earnings announcement, scaled by the stock price eleven days before the earnings announcement. Each event is classified into one of three equal-sized groups: favourable news (SUE^+), neutral news (SUE^0) and bad news (SUE^-). Day 0 is the first trading day after the earnings announcement.

Table 1
Descriptive Statistics and Correlation Matrix

This table presents a summary of the CRSP, Compustat, I/B/E/S and Dataexplorers data used in this study. The data are for 11,610 earnings announcements from 2,811 different firms and is sampled over the period August 9, 2006 to May 8, 2008. *INSTO* and *SHORT* are measured six trading days before the earnings announcement; $\Delta INSTO$, $\Delta SHORT$, $\Delta INSTO^+$, $\Delta INSTO^-$, $\Delta SHORT^+$, $\Delta SHORT^-$ are measured on the first trading day after the earnings announcement (day 0); *EARET* is the size-adjusted return on the first day after the earnings announcement (day 0), and *Post_EARET* is the size-adjusted compound return over a 60-day window starting the third trading day after the earnings announcement. Correlations significant at the 1-percent level are in bold. Variable definitions are presented in the Appendix.

Panel A Descriptive Statistics	<i>INSTO</i> (in %)	<i>SHORT</i> (in %)	$\Delta INSTO$ (in %)	$\Delta SHORT$ (in %)	$\Delta INSTO^+$ (in %)	$\Delta INSTO^-$ (in %)	$\Delta SHORT^+$ (in %)	$\Delta SHORT^-$ (in %)	<i>EARET</i> (in %)	<i>Post_EARET</i> (in %)	<i>SUE</i>	<i>MV</i> (M. \$)
MEAN	21.519	6.746	0.011	0.048	0.042	0.032	0.109	0.051	0.184	-1.898	-0.001	6,542
MEDIAN	21.596	4.692	0.001	0.011	0.054	-0.063	-0.084	-0.039	-0.045	-0.838	0.000	1,379
T-STAT	239.9	108.3	2.8	9.7	14.5	9.5	21.0	12.4	2.8	-10.7	-1.6	30.9
N	11,520	11,520	11,610	11,610	11,610	11,610	11,610	11,610	11,610	11,610	11,610	11,026
Panel B Correlation Matrix												
(1) <i>INSTO</i>	1											
(2) <i>SHORT</i>	0.364	1										
(3) $\Delta INSTO$	-0.004	0.003	1									
(4) $\Delta SHORT$	0.026	0.027	0.142	1								
(5) $\Delta INSTO^+$	0.314	0.170	0.508	0.119	1							
(6) $\Delta INSTO^-$	0.328	0.160	-0.484	-0.047	0.282	1						
(7) $\Delta SHORT^+$	0.302	0.514	0.079	0.489	0.347	0.251	1					
(8) $\Delta SHORT^-$	0.299	0.543	-0.071	-0.351	0.242	0.341	0.428	1				
(9) <i>EARET</i>	0.033	0.000	-0.017	-0.114	-0.053	-0.023	-0.099	0.039	1			
(10) <i>Post_EARET</i> ²⁻⁶⁰	-0.013	-0.049	0.032	0.005	0.003	-0.026	-0.029	-0.038	0.049	1		
(11) <i>SUE</i>	0.069	-0.031	-0.003	-0.076	0.010	0.029	-0.064	0.031	0.354	0.048	1	
(12) <i>MV</i>	0.117	-0.281	-0.037	-0.019	0.020	0.061	-0.098	-0.098	-0.004	0.010	0.019	1

Table 2
Trading Activity Around Earnings Announcements

This table presents the average market adjusted change in institutional ownership ($\Delta INSTO$) and short interest ($\Delta SHORT$) for each day in the event window. The average market adjusted gross increases (decreases) in institutional ownership, and average market-adjusted gross increase (decreases) in short interest for each day in the event window is also presented. Abnormal trading activity measures significant at the 1-percent level are in bold, where tests are based on 2-way cluster-robust standard errors. Variable definitions are presented in the Appendix.

Day	Panel A Institutional Ownership			Panel B Short Interest		
	(1) Average Change	(2) Average Increases	(3) Average Decreases	(4) Average Change	(5) Average Increases	(6) Average Decreases
-20	0.010	0.005	-0.006	-0.001	-0.005	-0.004
-19	-0.003	-0.004	-0.001	0.001	-0.003	-0.004
-18	0.002	-0.001	-0.002	-0.005	-0.006	-0.001
-17	0.001	-0.003	-0.004	-0.001	-0.009	-0.007
-16	0.007	0.002	-0.005	-0.007	-0.007	0.000
-15	0.005	-0.003	-0.008	-0.008	-0.013	-0.005
-14	0.004	-0.002	-0.007	0.002	-0.008	-0.010
-13	0.000	-0.003	-0.003	-0.005	-0.009	-0.004
-12	0.009	0.002	-0.008	0.003	-0.009	-0.012
-11	-0.001	-0.008	-0.007	-0.004	-0.011	-0.007
-10	-0.003	-0.006	-0.003	0.001	-0.013	-0.013
-9	0.005	-0.006	-0.011	-0.006	-0.015	-0.009
-8	-0.002	-0.008	-0.006	-0.007	-0.017	-0.011
-7	0.000	-0.009	-0.008	-0.008	-0.020	-0.012
-6	0.000	-0.009	-0.009	-0.002	-0.017	-0.016
-5	0.000	-0.009	-0.009	-0.019	-0.028	-0.009
-4	-0.014	-0.014	0.000	-0.012	-0.018	-0.007
-3	-0.030	-0.010	0.020	-0.018	-0.011	0.008
-2	-0.059	-0.009	0.050	0.012	0.018	0.006
-1	-0.050	-0.014	0.036	0.002	0.016	0.014
0	0.012	0.041	0.029	0.059	0.109	0.051
1	0.022	0.034	0.012	0.013	0.065	0.052
2	-0.002	0.016	0.018	0.005	0.049	0.043
3	0.008	0.015	0.006	0.004	0.031	0.028
4	-0.015	0.001	0.016	-0.003	0.022	0.025
5	0.006	0.007	0.002	-0.001	0.019	0.020
6	-0.001	0.003	0.004	-0.007	0.014	0.021
7	0.010	0.010	0.000	0.001	0.015	0.013
8	-0.002	0.000	0.002	-0.001	0.010	0.011
9	0.000	0.004	0.004	-0.010	0.004	0.014
10	0.008	0.009	0.001	0.005	0.008	0.002
11	0.002	0.005	0.003	0.009	0.012	0.003
12	-0.003	0.000	0.003	0.000	0.010	0.010
13	0.005	0.010	0.005	0.002	0.005	0.003
14	-0.005	0.002	0.007	0.006	0.007	0.001
15	-0.007	0.000	0.007	0.007	0.007	0.000
16	0.000	0.004	0.004	0.006	0.004	-0.003
17	0.001	0.010	0.008	-0.002	0.003	0.005
18	-0.001	0.008	0.010	0.006	0.006	0.000
19	0.003	0.007	0.004	0.007	0.011	0.003
20	0.004	0.010	0.006	-0.002	0.006	0.008

Table 3
Cumulative Changes in Institutional Ownership and Short Interest and Earnings Surprise

This table presents the cumulative market-adjusted change in the positions of institutional owners and short sellers across each day in the event window. The sample is categorised into three equal-sized groups based on whether the actual earnings number was below expectations (SUE^-), neutral (SUE^0), or above expectations (SUE^+). The differences in the cumulative abnormal change between stocks in the SUE^- and SUE^+ categories is also presented (DIFF). Differences significant at the 1-percent level are in bold, where tests are based on 2-way cluster-robust standard errors. Variable definitions are presented in the Appendix.

Day	Panel A: Δ Institutional Ownership				Panel B: Δ Short Interest			
	(1) SUE^-	(2) SUE^0	(3) SUE^+	(4) DIFF	(5) SUE^-	(6) SUE^0	(7) SUE^+	(8) DIFF
-20	0.004	0.011	0.016	0.012	-0.013	0.002	0.006	0.019
-19	0.000	0.005	0.017	0.017	-0.012	0.008	0.002	0.014
-18	0.008	0.003	0.017	0.010	-0.012	0.004	-0.008	0.004
-17	0.015	0.000	0.016	0.001	-0.013	-0.002	-0.006	0.007
-16	0.031	-0.005	0.027	-0.005	-0.017	-0.020	-0.005	0.012
-15	0.042	-0.004	0.031	-0.011	-0.036	-0.017	-0.014	0.022
-14	0.050	0.001	0.031	-0.019	-0.032	-0.015	-0.014	0.018
-13	0.050	0.002	0.030	-0.020	-0.033	-0.022	-0.021	0.013
-12	0.050	0.016	0.044	-0.007	-0.006	-0.038	-0.023	-0.018
-11	0.043	0.011	0.052	0.009	-0.015	-0.034	-0.030	-0.015
-10	0.042	0.016	0.039	-0.004	-0.011	-0.042	-0.023	-0.012
-9	0.042	0.019	0.050	0.008	-0.009	-0.054	-0.032	-0.024
-8	0.051	0.020	0.036	-0.014	-0.014	-0.058	-0.043	-0.028
-7	0.055	0.016	0.034	-0.022	-0.021	-0.069	-0.050	-0.029
-6	0.042	0.025	0.037	-0.005	-0.028	-0.069	-0.048	-0.020
-5	0.042	0.022	0.041	-0.001	-0.041	-0.096	-0.065	-0.024
-4	0.037	0.007	0.017	-0.019	-0.045	-0.101	-0.091	-0.046
-3	0.000	-0.021	-0.009	-0.009	-0.050	-0.121	-0.120	-0.070
-2	-0.056	-0.082	-0.068	-0.011	-0.045	-0.111	-0.099	-0.054
-1	-0.122	-0.121	-0.114	0.007	-0.052	-0.109	-0.088	-0.037
0	-0.109	-0.098	-0.114	-0.005	0.066	-0.058	-0.078	-0.144
1	-0.089	-0.080	-0.086	0.003	0.126	-0.041	-0.113	-0.239
2	-0.104	-0.072	-0.084	0.020	0.153	-0.050	-0.115	-0.268
3	-0.101	-0.066	-0.069	0.033	0.180	-0.055	-0.124	-0.304
4	-0.118	-0.075	-0.089	0.029	0.180	-0.058	-0.131	-0.311
5	-0.110	-0.075	-0.079	0.030	0.194	-0.059	-0.145	-0.340
6	-0.126	-0.071	-0.071	0.055	0.187	-0.072	-0.146	-0.333
7	-0.127	-0.071	-0.041	0.087	0.185	-0.076	-0.137	-0.322
8	-0.130	-0.065	-0.048	0.082	0.189	-0.084	-0.134	-0.323
9	-0.134	-0.065	-0.046	0.088	0.178	-0.087	-0.150	-0.328
10	-0.144	-0.052	-0.027	0.117	0.188	-0.083	-0.147	-0.335
11	-0.149	-0.045	-0.023	0.126	0.187	-0.068	-0.135	-0.322
12	-0.159	-0.043	-0.024	0.135	0.187	-0.076	-0.127	-0.314
13	-0.158	-0.043	-0.009	0.149	0.171	-0.065	-0.117	-0.287
14	-0.171	-0.046	-0.007	0.164	0.169	-0.054	-0.109	-0.278
15	-0.173	-0.056	-0.016	0.157	0.176	-0.037	-0.113	-0.289
16	-0.162	-0.066	-0.017	0.145	0.181	-0.026	-0.112	-0.293
17	-0.169	-0.060	-0.012	0.156	0.171	-0.032	-0.102	-0.273
18	-0.181	-0.064	-0.001	0.180	0.171	-0.033	-0.082	-0.253
19	-0.193	-0.053	0.008	0.201	0.181	-0.028	-0.074	-0.255
20	-0.200	-0.043	0.015	0.215	0.173	-0.020	-0.081	-0.253

Table 4
Portfolio Results

This table presents excess earnings announcement period returns for portfolios of stocks formed using four variables: $\Delta INSTO$, $\Delta SHORT$, $INSTO$, and $SHORT$. Excess earnings announcement return is the actual return on the first trading day after the earnings announcement (day 0) minus the equally-weighted return for all NYSE/AMEX/NASDAQ firms in the same size-decile on the same day. The final row presents the difference between the average earnings announcement return of the stocks in the highest quintile portfolio and the average earnings announcement return of the stocks in the lowest quintile portfolio. The t-statistics in the table are based on 2-way cluster-robust standard errors. Variable definitions are presented in the Appendix.

	$\Delta INSTO$		$\Delta SHORT$		$INSTO$		$SHORT$	
	Return	t-statistic	Return	t-statistic	Return	t-statistic	Return	t-statistic
Low	-0.895	-3.7	0.307	2.5	-0.125	-0.8	0.260	2.1
Q2	0.452	3.4	0.464	3.6	0.139	2.3	0.033	0.2
Q3	0.386	2.5	0.016	0.1	0.409	2.3	0.368	4.8
Q4	0.370	3.5	0.101	0.5	0.160	0.8	0.397	3.9
High	0.588	6.0	0.015	0.1	0.316	5.2	-0.159	-1.3
High – Low	1.483	5.2	-0.292	-1.0	0.441	3.8	-0.418	-2.2

Table 5
Earnings Announcement Returns

Panel A of this table presents the estimated coefficients for regression equation (1). This model is estimated using unadjusted independent variables and using independent variables transformed into decile ranks, scaled to range from -0.5 to 0.5. Excess earnings announcement return is the actual return on the first trading day after the earnings announcement (day 0) minus the equally-weighted return for all NYSE/AMEX/NASDAQ firms in the same size-decile on the same day. Panel B of this table presents the estimated coefficients for regression equation (2), using both the raw and the decile ranked data. The t-statistics in parentheses in the table are based on 2-way cluster-robust standard errors. Variable definitions are presented in the Appendix.

Independent Variables	Panel A		Panel B	
	Raw	Ranked	Raw	Ranked
<i>Intercept</i>	2.752 (2.0)*	0.238 (4.9)***	2.996 (2.2)*	0.239 (5.5)***
<i>log(MV)</i>	-0.132 (-2.0)*	-0.358 (-2.1)*	-0.155 (-2.2)*	-0.387 (-2.1)*
<i>MB</i>	-0.006 (-0.2)	0.306 (1.0)	-0.005 (-0.2)	0.332 (1.0)
<i>TURN</i>	-0.054 (-0.4)	-0.268 (-1.2)	-0.033 (-0.2)	-0.288 (-1.1)
<i>MOM</i>	-0.213 (-1.1)	-0.255 (-0.9)	-0.167 (-0.9)	-0.255 (-0.9)
<i>SUE_{t-1}</i>	0.042 (2.3)*	0.597 (2.3)**	0.044 (2.5)**	0.625 (2.5)**
<i>Insto</i>	0.035 (9.9)***	0.903 (8.6)***	0.047 (6.7)***	1.163 (10.9)***
<i>Short</i>	-0.036 (-1.5)	-0.564 (-1.8)	-0.045 (-3.7)***	-1.067 (-4.5)***
<i>ΔInsto</i>	0.753 (3.4)***	1.641 (5.8)***		
<i>ΔShort</i>	-0.251 (-2.6)**	-0.746 (-3.9)***		
<i>ΔInsto⁺</i>			0.359 (1.3)	0.794 (2.1)*
<i>ΔInsto⁻</i>			-0.926 (-4.7)***	-2.061 (-7.1)***
<i>ΔShort⁺</i>			-0.197 (-1.3)	-0.746 (-1.1)
<i>ΔShort⁻</i>			0.304 (5.6)***	1.630 (6.6)***

Note : *** (**,*) = significant at 1% (5%, 10%) level.

Table 6 – Robustness Tests: Earnings Announcement Returns

The following table presents a number of robustness tests of the results presented in Table 5. The base case is the rank decile model from Panel A of Table 5. $EARET^{0-2}$ is estimated with an earnings announcement return that is measured over a 3-day window from day 0 to +2. $1\text{-day}\Delta$ measures the market-adjusted change in institutional ownership and short interest on the day before the earnings announcement only. *WinzORIZED* winzORIZES earnings announcement returns at the 1% level and 99% level of the distribution. *S&P500 Excluded* excludes firms that have convertible bonds as well as firms that are part of the S&P500 index. *Correction* excludes earnings announcements where short interest information from Dataexplorers differs substantially from publicly available information. *Value* uses the dollar value of the changes in institutional holdings and short positions to form the decile groups. *W/L* is a modified version of the Base Case in which ΔInsto and ΔShort are replaced by *WINNER*, a dummy variable that is equal to 1 if a stock is in the top decile in terms of change in institutional holdings and in the bottom decile in terms of change in short interest, and *LOSER*, a dummy variable that is equal to 1 if a stocks is in the bottom decile in terms of change in institutional holdings and in the top decile in terms of change in short interest. The t-statistics in parentheses in the table are based on 2-way cluster-robust standard errors. Variable definitions are presented in the Appendix.

Model	Base Case	$EARET^{0-2}$	$1\text{-day}\Delta$	<i>WinzORIZED</i>	<i>S&P500 Excluded</i>	<i>Correction</i>	<i>Value</i>	<i>W/L</i>
<i>Intercept</i>	0.238 (4.9)***	0.077 (1.3)	0.235 (4.9)***	0.258 (4.6)***	0.324 (4.8)***	0.181 (2.4)**	0.278 (4.1)***	0.266 (4.7)***
$\log(MV)$	-0.358 (-2.1)*	-0.284 (-1.2)	-0.342 (-1.9)*	-0.158 (-0.9)	-0.142 (-0.8)	-0.233 (-0.6)	-0.030 (-1.7)	-0.369 (-2.1)*
<i>MB</i>	0.306 (1.0)	0.356 (0.7)	0.250 (0.7)	0.572 (2.8)**	0.389 (0.8)	0.339 (1.0)	0.275 (0.9)	0.218 (0.7)
<i>TURN</i>	-0.268 (-1.2)	-0.521 (-1.2)	-0.312 (-1.4)	-0.275 (-1.6)	-0.336 (-0.9)	-0.478 (-2.3)**	-0.211 (-1.0)	-0.259 (-1.2)
<i>MOM</i>	-0.255 (-0.9)	-0.131 (-0.3)	-0.202 (-0.7)	-0.471 (-1.4)	-0.354 (-1.0)	-0.148 (-0.6)	-0.190 (-0.6)	-0.185 (-0.6)
SUE_{t-1}	0.597 (2.3)**	0.575 (1.8)*	0.612 (2.3)**	0.350 (1.4)	0.564 (2.3)**	0.730 (2.7)**	0.593 (2.3)***	0.593 (2.3)***
<i>Insto</i>	0.903 (8.6)***	0.995 (6.1)***	0.781 (5.1)***	0.992 (9.8)***	1.096 (5.9)***	0.997 (4.7)***	0.733 (5.4)***	0.688 (5.2)***
<i>Short</i>	-0.564 (-1.8)	-0.618 (-1.5)	-0.488 (-1.8)*	-0.266 (-1.1)	-0.674 (-1.5)	-0.292 (-0.7)	-0.639 (-2.0)*	-0.466 (-1.7)
ΔInsto	1.641 (5.8)***	1.888 (5.6)***	1.420 (10.4)***	0.928 (5.6)***	1.819 (5.5)***	1.994 (6.2)***	1.373 (5.3)***	
ΔShort	-0.746 (-3.9)***	-0.913 (-3.7)***	-0.050 (-0.2)	-0.801 (-4.5)***	-0.796 (-3.1)***	-1.064 (-3.7)***	-0.634 (-2.9)***	
<i>Winner</i>								1.132 (2.3)**
<i>Loser</i>								-3.872 (-2.4)**

Note : *** (**,*) = significant at 1% (5%, 10%) level.

Table 7
Post Earnings Announcement Drift

This table presents the estimation results for PEAD models discussed in section 6. The dependent variable is Post EARET²⁻⁶¹, the buy-and-hold return over the sixty-day period starting on the third trading day after the earnings announcement (day 2 through day 61) minus the equally-weighted buy-and-hold return for all NYSE/AMEX/NASDAQ firms in the same size-decile over the same period. $\Delta INSTO^{post}$ and $\Delta SHORT^{post}$ are measured over day 0 and day 1. POS is a dummy variable that assumes a value of 1 if the earnings surprise is positive (and zero otherwise), and NEG is a dummy variable that equals 1 if the earnings surprise is negative (and zero otherwise). SIGN, which is an indicator variable that assumes a value of +1 (-1) if the earnings surprise is positive (negative). All independent variables are transformed to scores from -0.5 and 0.5 based on their decile rank within each calendar quarter. The t-statistics in parentheses in the table are based on 2-way cluster-robust standard errors. Variable definitions are presented in the Appendix.

Model	1	2	3	4	5
<i>Intercept</i>	-0.354 (-0.7)	-0.365 (-0.8)	-0.349 (-0.7)	-0.404 (-0.8)	-0.387 (-0.8)
<i>SUE</i>	2.442 (2.2) **	2.473 (2.3) **	2.462 (2.3) **	2.798 (2.6) **	2.699 (2.5) **
<i>SUE*$\Delta INSTO^{post}$*POS</i>		6.562 (3.2) ***			
<i>SUE*$\Delta INSTO^{post}$*NEG</i>		-7.206 (-2.2) **			
<i>SUE*$\Delta INSTO^{post}$*SIGN</i>			6.835 (5.4) ***	6.404 (4.7) ***	4.683 (2.8) ***
<i>SUE*$\Delta SHORT^{post}$*POS</i>		-0.225 (-0.1)			
<i>SUE*$\Delta SHORT^{post}$*NEG</i>		-1.721 (-0.9)			
<i>SUE*$\Delta SHORT^{post}$*SIGN</i>			0.575 (0.3)	0.776 (0.5)	-0.151 (-0.1)
<i>SUE * INSTO</i>				-4.446 (-2.3) **	-4.608 (-2.4) **
<i>SUE* SHORT</i>				0.266 (0.2)	0.659 (0.4)
<i>SUE*MV</i>				2.876 (1.5)	2.847 (1.5)
<i>SUE*BAS</i>				-0.142 (-0.1)	-0.320 (-0.2)
$\Delta INSTO^{post}$					0.650 (0.8)
$\Delta SHORT^{post}$					0.405 (0.7)
INSTO					-0.482 (-0.7)
SHORT					-2.656 (-4.5) ***
MV					-1.009 (-0.7)
BAS					0.414 (0.4)

Table 8
Robustness Tests: Post Earnings Announcement Drift

This table presents a number of robustness tests of the results presented in Table 7. The base case is model 4 in Table 7. *ERC* uses the actual earnings announcement return on day 0 and 1 as the dependent variable. *Day0* measures the change in institutional ownership and short interest on the first trading day after the earnings announcement only (day 0), and post-announcement return is measured over the sixty-day period starting on the first trading day after the earnings announcement (day 1 through day 60). *Day3-10* measures the change in institutional ownership and short interest over the period from day +3 to day +10, and post-announcement return is measured over the fifty-day period starting on the day 11 (day 11 through day 60). *30-days* is the same as the base case, but now the post-announcement return is measured over the thirty-day period starting on the first trading day after the earnings announcement (day 1 through day 30). *WinzORIZED* winzORizes post-earnings announcement returns at the 1% level and 99% level of the distribution. *S&P500* excludes firms that have convertible bonds as well as firms that are part of the S&P500 index. *Correction* excludes observations where short interest information from Dataexplorers differs substantially from publicly available information. *Value* uses the dollar value of the changes in institutional holdings and short positions to form the decile groups. The t-statistics in parentheses in the table are based on 2-way cluster-robust standard errors.

Model	Base Case	<i>ERC</i>	<i>day0</i>	<i>day3-10</i>	<i>30-days</i>	<i>WinzORIZED</i>	<i>S&P500</i>	<i>Correction</i>	<i>Value</i>
<i>Intercept</i>	-0.404 (-0.8)	0.019 (0.20)	-0.514 (-1.1)	-0.323 (-0.7)	0.138 (1.0)	-0.437 (-0.9)	-0.179 (-0.3)	-0.659 (-1.2)	-0.399 (-0.8)
<i>SUE</i>	2.798 (2.6)***	8.555 (14.9)***	3.694 (3.5)***	1.806 (1.4)	1.910 (6.5)***	2.715 (2.6)**	3.372 (4.3)***	2.785 (2.0)*	2.735 (2.5)**
<i>SUE*ΔINSTO^{post}*SIGN</i>	6.404 (4.7)***	0.082 (0.08)	5.278 (2.0)*	0.778 (0.6)	1.336 (1.9)*	5.771 (4.6)***	6.810 (4.0)***	8.261 (3.8)***	5.213 (4.1)***
<i>SUE*ΔSHORT^{post}*SIGN</i>	0.776 (0.5)	-5.015 (-3.94)***	1.421 (1.2)	-2.206 (-1.1)	-0.357 (-0.5)	0.823 (0.5)	0.690 (0.5)	0.566 (0.3)	0.133 (0.1)
<i>SUE * INSTO</i>	-4.446 (-2.3)***	5.087 (3.59)***	-3.734 (-1.5)	-4.931 (-1.9)*	-1.707 (-1.2)	-4.511 (-2.7)**	-4.827 (-2.1)*	-4.879 (-3.6)***	-4.603 (-2.4)**
<i>SUE* SHORT</i>	0.266 (0.2)	-0.905 (-0.68)	0.697 (0.5)	0.253 (0.1)	-1.044 (-0.6)	-0.104 (-0.1)	0.336 (0.2)	0.618 (0.2)	0.321 (0.2)
<i>SUE*MV</i>	2.876 (1.5)	-8.668 (-5.97)***	2.310 (1.2)	4.039 (1.4)	-0.847 (-0.6)	2.401 (1.4)	1.063 (0.3)	3.090 (1.0)	2.919 (1.5)
<i>SUE*BAS</i>	-0.142 (-0.1)	-4.057 (-5.61)***	0.222 (0.1)	-0.974 (-0.3)	0.675 (0.3)	0.028 (0.0)	-2.206 (-0.9)	0.252 (0.1)	-0.009 (0.0)