

Are Institutions Momentum Traders?

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Comments Welcome

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Abstract

This paper examines institutional trading in momentum portfolios. The key result is that institutions engage in *momentum trading* over the subsequent 3 quarters, buying winners and selling losers, in response to past returns but not past earnings news. Momentum trading is strengthened, however, when returns are accompanied by earnings news of the same sign. While past high returns predict future institutional buying, past institutional buying does not predict future stock returns. Among institutions, investment advisors (e.g. mutual funds and brokerage firms) are the most active momentum traders; banks and insurance companies the least active. Additional tests indicate that institutional momentum trading is concentrated among high volume winners and losers and among low B/M winners and high B/M losers.

1. Introduction

At intermediate horizons, stocks exhibit momentum. Past winners, stocks earning positive returns over the previous three to twelve months or stocks experiencing positive earnings surprises, outperform past losers over the next three to twelve months.¹ Behavioral theories (see Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1998), and Hong and Stein (1999)) suggest momentum is caused by investor underreaction or continuing overreaction to fundamental news. Alternatively, momentum profits could be compensation for some unspecified fundamental risk (see Fama (1998)). Much of the recent work on momentum has focused on the risk versus mispricing debate.²

In this paper, we evaluate the predictions of risk and behavioral explanations by examining the nature of institutional investor trading in stocks exhibiting momentum. First, we ask whether institutional investors are momentum traders by examining their trading patterns over a two-year period surrounding the portfolio formation date. Secondly, we examine how institutions trade in response to past returns (price momentum) versus past earnings news (earnings momentum). The latter issue is motivated by the possibility that momentum traders (and hence stock prices) could respond differently to public news and private news (see Hong and Stein (1999)).³ We focus on institutional investors because they are considered more sophisticated than individual investors and hence are more likely to employ momentum strategies in stock selection.

A large literature exists studying the relationship between institutional trading and contemporaneous and future stock returns (see Lakonishok, Shleifer, and Vishny (1992), Grinblatt, Titman and Wermers (1995), Wermers (1999), Nofsinger and Sias (1999), Cohen, Gompers, and Vuolteenaho (2001), Grinblatt and Keloharju (2000a, b), and Ali,

¹ See Jegadeesh and Titman (1993), Foster, Olsen, and Shevlin (1984), and Bernard and Thomas (1989).

² See Lee and Swaminathan (2000), Grundy and Martin (2000), Jegadeesh and Titman (2001), Chordia and Shivkumar (2001).

³ Earnings news represents public news while stock returns represent both public and private news. Hong and Stein (1999) argue initial underreaction to public news may not turn into ultimate overreaction since investor know the initial price movements are due to the arrival of public news.

Durtschi, Lev, and Trombley (2001)). These papers document a positive contemporaneous correlation between stock returns and institutional buying. This is typically interpreted as evidence of *institutional herding* (for example, see Nofsinger and Sias (1999)).

There is less work that explores the link between past returns, earnings news, and future changes in institutional ownership. Gompers and Metrick (2001) find that controlling for size, current levels of institutional ownership are *negatively* correlated with past twelve month stock returns and conclude that large institutions *are not* momentum traders. Nofsinger and Sias (1999), on the other hand, use univariate tests to provide evidence of a small but statistically significant increase (decrease) in institutional holdings over the next twelve months for price momentum winners (losers). Our paper is related to these studies but has important differences that can help clarify the role of institutional trading with regard to momentum strategies.

First, although like Gompers and Metrick (2001) we examine levels of institutional ownership, our primary focus is on *changes* in institutional holdings. Examining changes as opposed to levels arguably provides a sharper setting in which to examine the extent to which institutions alter their trading behavior in response to price momentum. Secondly, while Nofsinger and Sias (1999) examine *annual* changes in institutional holdings due to data limitations, we examine *quarterly* changes. This allows for more power in detecting institutional momentum trading, since institutions are more likely to employ such strategies in the short term. Thirdly, unlike in either study, we also examine the relation between institutional holdings and direct measures of earnings news (earnings momentum), which allows us to draw conclusions on the relative importance of both types of momentum (price and earnings) on institutional trading behavior in a multivariate setting. Finally, as discussed below, our analysis allows us to evaluate the trading strategies of different types of institutional investors as opposed to examining the trading behavior of the whole group.

The institutional holding data we use in this study comes from the CDA-Spectrum 13F Filings database starting the fourth quarter of 1982 and ending the second quarter of 1996. This database contains quarterly holdings of qualifying institutional investors filed with the Securities Exchange Commission (SEC).⁴ We use this data to examine the trading patterns of institutions every quarter over a two-year period surrounding each portfolio formation date.

Our results are as follows. Institutions engage in *momentum trading*, buying past winners and selling past losers. The univariate analysis shows that earnings momentum trading is less pronounced than price momentum trading, and it is mostly complete by the end of the current quarter. Furthermore, our multivariate analysis shows that after controlling for firm size and other firm characteristics, the positive relation between earnings momentum and future changes in institutional ownership disappears, while that between price momentum remains positive and strongly significant. In other words, institutions engage in trend-chasing or positive feedback trading in response to past price momentum but not earnings momentum. Prior studies suggest that while price momentum lasts up to four quarters after the portfolio formation date, price reaction to earnings momentum (post-earnings announcement drift) becomes significantly weaker after two quarters (see Chan, Jegadeesh, and Lakonishok (1996)). Our findings are consistent with these results.

The Gompers and Metrick (2001) finding of negative correlation between past returns and current *level* of institutional holdings, while accurate, is not the complete story. This is because this correlation turns positive when next quarter's institutional holdings are substituted in place of current quarter's holdings. In other words, while winners (conditionally) do have lower holdings than losers at the beginning of the quarter, by the end of the quarter this correlation is reversed due to an increase in holdings of winners and a decrease in holdings of losers.

We confirm the contemporaneous positive correlation reported in prior research between institutional buying and stock returns. Additional tests indicate that institutional

⁴ We explain the data in more detail in Section 2.

momentum trading is concentrated among high volume winners and losers and among low B/M winners and high B/M losers. Finally, multivariate tests show that controlling for past returns, past institutional trading does not predict future returns. Among institutions, we find those classified as investment companies and independent investment advisors (Spectrum data institution types 3 & 4), which we group together and refer to as *investment advisors*, are the most active momentum traders. Banks and insurance companies, on the other hand, tend to be more passive. These results reveal significant heterogeneity in the trading behavior of different types of institutions. Studying such heterogeneity is likely to be a fruitful area for future research.

In summary, there are two key findings in this paper: (a) institutions are momentum traders and (b) institutions engage in momentum trading in response to past price momentum but not earnings momentum. The first result is generally consistent with the behavioral theories based on underreaction or continuing overreaction. The latter result suggests institutions tend to underreact (or continue to overreact) more to past price movements than to earnings surprises. This may be because price movements over an extended period of time do not attract the same attention as big earnings surprises that occur at fixed dates. This could lead to different institutions trading at different times in response to past price momentum while they trade at the same time in response to earnings news (see Hong and Stein (1999)). We leave the exact reasons for such differential response to future research.

Our results also have implications for rational explanations that suggest that momentum profits are due to different risk characteristics associated with winner and loser stocks (e.g. Fama (1998), Conrad and Kaul (1998), and Chordia and Shivkumar (2001)). If institutions are indeed momentum traders, and by implication individuals engage in contrarian trading behavior, then we need to understand why institutions and individuals respond so differently to the same risk characteristics. The rest of the paper proceeds as follows. Section 2 discusses the data and the portfolio formation methodology. Section 3 presents portfolio level results. Section 4 presents multivariate Fama-MacBeth cross-sectional regression results and Section 5 concludes.

2. Data and Design

2.1 Institutional Investor Holdings

Our sample consists of all firms listed on NYSE and AMEX between the fourth quarter of 1982 and the second quarter of 1996 with data available in CRSP for at least one year prior to the portfolio formation date. We exclude NASDAQ firms because most of them tend to be smaller (and thus more difficult to trade in momentum strategies) than the firms in NYSE/AMEX during most of our sample period. We also exclude any firm that is a prime, a closed-end fund, a real-estate investment trust (REIT), an American Depository Receipt (ADR), a foreign company, or whose stock price as of the portfolio formation date is less than a dollar.

We match these firms with those on the CDA-Spectrum 13F Filings Database, which we use to compile institutional ownership data. This database contains the quarterly holdings of qualifying institutional investors that are filed with the Securities and Exchange Commission (SEC). Positions greater than 10,000 shares or \$200,000 are disclosed to the SEC, and CDA-Spectrum compiles the filings. We sum the institutional holdings of each stock at the end of each quarter, and divide the sum by the number of shares outstanding at the end of the quarter to obtain the percentage of shares held by institutions. The number of shares outstanding is obtained from the Center for Research in Security Prices (CRSP) database, since this database reports shares outstanding rounded to the nearest thousand instead of the nearest million as in Spectrum. The combined sample has on average 1500 firms per quarter.

We use Spectrum's institutional classifications to form three groups of institutions. First, we combine the holdings of *banks* and *insurance companies* (Spectrum type codes 1 and 2, respectively), since preliminary work showed there were no discernable differences in the trading patterns of these two types. The next grouping combines Spectrum type codes 3 and 4, which are *investment companies* and *independent investment advisors*, respectively. As Gompers and Metrik (2001) note, categorizations into types 3 and 4 are not always precise, and in preliminary results we found that the trading patterns of the two groups were similar. We label the combined group *Investment advisors*. Finally, we

also report results for *All Institutions*, which include our first two groups and also a small number of institutions Spectrum labels as *Other*.

2.2 Price Momentum and Earnings Momentum

As is now customary in the momentum literature, we use the prior six-month stock return (with a one-week gap between the portfolio formation date and the end of the six-month portfolio formation period) as a measure of *price momentum*. Momentum measures based on past 3, 9, or 12-month returns provide qualitatively similar results. At the beginning of each quarter, we rank all available stocks based on past six-month returns and divide them into ten portfolios with roughly equal number of firms in each. *RI* is the loser portfolio and *RI0* is the winner portfolio.

We use two measures of earnings momentum: (1) quarterly earnings surprises referred to as *standardized unexpected earnings* (SUE) and (2) the *cumulative abnormal return* (CAR) around quarterly earnings announcement dates. Our earnings data are from the Compustat quarterly database. The advantage of CAR over SUE is that the CAR does not rely on any particular parametric model of expected earnings. As such it does not suffer from model misspecification. On the other hand, it is subject to short-term volatility in the market and could reflect any overreaction to earnings news.

Following Foster, Olsen, and Shevlin (1984), we use a seasonal random walk model of quarterly earnings to measure earnings surprises. The expected earnings for quarter q according to the quarterly seasonal random walk model can be written as follows:

$$E(e_{iq}) = \mu_i + e_{i,q-4} \quad (1)$$

where e_{iq} is the quarterly earnings of stock i in quarter q and μ_i is the drift (expected change) in quarterly earnings. The standardized unexpected earnings, SUE, of stock i for quarter q can be written as follows:

$$SUE_{iq} = \frac{e_{iq} - e_{iq-4} - \mathbf{m}_{iq}}{\mathbf{S}_{iq}} \quad (2)$$

where μ_{iq} and σ_{iq} are respectively the mean and the standard deviation of earnings changes over the eight quarters prior to quarter q .

Cumulative abnormal returns with respect to the NYSE/AMEX value-weighted market index are computed from day -2 to $+1$ around the quarterly earnings announcement date:

$$CAR_{iq} = \sum_{t=-2}^{+1} (r_{it} - r_{mt}) \quad (3)$$

where r_{it} and r_{mt} are the returns on date t of stock i and the market index m respectively. We form 10 earnings momentum portfolios each quarter based on SUE and CAR. *E1* refers to SUE momentum losers and *E10* refers to SUE momentum winners. *C1* refers to CAR momentum losers and *C10* refers to CAR momentum winners. For each price momentum, SUE momentum, or CAR momentum portfolio, we compute the cross-sectional average quarterly institutional holdings and changes in holdings starting four quarters prior to the portfolio formation date and ending at least four quarters after the portfolio formation date. The changes in holdings from one quarter to the next are computed for each stock and then averaged across all stocks. The time series means of cross-sectional averages and associated t-statistics are reported in the tables. Levels and changes are computed for all three institutional investor groups discussed in Section 3.1.

3. Levels and Changes in Institutional Holdings of Momentum Portfolios

How do institutions trade in winners and losers? Are there differences in the way they trade in price momentum portfolios and earnings momentum portfolios? We address these questions by tracking levels and changes in institutional investor holdings of momentum portfolios starting four quarters prior to the portfolio formation date and ending four quarters after the portfolio formation date. Tracking the holdings in event time around the portfolio formation date is the most intuitive way to examine the trading

patterns of institutions. Changes in holdings are a direct measure of the trading that takes place. An increase in holdings signifies institutional *buying* and a decrease in holdings signifies institutional *selling*. We report the levels and changes when necessary for all three groups of institutions defined in Section 2.1:

- Banks and Insurance Companies.
- Investment advisors.
- All Institutions.

3.1 Level of Institutional Holdings

Table 1 tracks the average portfolio holdings of the three groups of institutions. The holdings reported in the table are time-series averages of cross-sectional means. The numbers in parentheses are Hansen-Hodrick-Newey-West autocorrelation corrected t-statistics with four lags of autocorrelation correction.⁵ Panel A of Table 1 presents institutional holdings for price momentum portfolios. Panel B presents results for SUE momentum portfolios and Panel C presents results for CAR momentum portfolios. The results in Table 1 are also plotted in Figure 1, which provides a more intuitive visual representation of the results in Table 1. Recall that SUE and CAR are alternate measures of earnings momentum.

We first focus on the results for price momentum portfolios in Panel A. Institutions (we focus on all institutions) decrease their holdings of losers, *RI*, from about 26% in quarter -4 to about 24% by quarter $+2$. Most of the decrease takes place from quarter -4 to quarter 0, i.e., over the four quarters prior to the portfolio formation date. By the end of quarter $+4$, the holdings are back to about 25%. On the other hand, institutions increase their holdings of winners, *RI0*, from 27.5% in quarter -4 to about 30% by quarter 0 to about 33% by quarter $+4$. In other words, there is a more permanent increase in the institutional holdings of winners while the decrease in the holdings of losers seems

⁵ In Table 1 and subsequent portfolio holdings tables, we present all results without size-adjusting the holdings to remove any size effects. We do this so that the results are intuitive and easy to read. In our multivariate cross-sectional regressions in Table 4, we control for size and other firm characteristics. In addition, we have also computed size-adjusted holdings and the results are similar.

temporary. Indeed, in quarter -4 , the difference in holdings between winners and losers ($R10 - R1$) is only 1.5%. By quarter $+4$, this difference has increased to 8.4%. The results suggest institutions are momentum traders, buying winners and selling losers during the four quarters after the portfolio formation date. In the long run, there is a shift in institutional preferences towards winners, $R10$.

Among all institutions, *investment advisors* exhibit the strongest momentum-trading behavior. The relative holdings ($R10-R1$) of investment advisors increase from 0.1% in quarter -4 to 5.4% by quarter $+4$. This is a significant increase in holdings. In contrast, *banks & insurance companies* increase their holdings only by 1.6% from 1.0% in quarter -4 to 2.6% in quarter $+4$, and most of this change comes from their selling losers, $R1$. These results suggest that banks and insurance companies are not as active in employing momentum strategies in their stock selection techniques.

Panels B and C of Table 1 present results for earnings momentum strategies. There are significant differences in the way institutions respond to earnings momentum as opposed to price momentum—the earnings momentum results are less pronounced. There are also differences in their trading depending on how earnings momentum is characterized (SUE versus CAR momentum portfolios). First notice that there is hardly any change in the institutional holdings of the loser portfolio, $E1$, prior to the portfolio formation date. For instance, in Panel B, the institutional holdings of the loser portfolio are 34.9% in quarter -4 , and 34.6% in quarter 0. The holdings of the winner portfolio, $E10$, increase by 4.3% from quarter -4 to quarter $+4$ but 2.9% of the increase occurs during the four quarters prior to the portfolio formation date. The increase after the portfolio formation date is only 1.4%. By contrast, the increase for $R10$ after the portfolio formation date is a full 3%. The overall increase in $E10$ holdings of 4.3% from quarter -4 to quarter $+4$ is also somewhat smaller than that for the price momentum winner portfolio, $R10$, which is 5.6%. The relative holdings, $E10-E1$, increase by only 2.7% from quarter -4 to quarter $+4$, a much smaller increase compared to the increase of 5.3% for price momentum portfolios.

Institutional trading in CAR momentum portfolios exhibits similar patterns with one important difference. Unlike SUE winners (E10), the larger amount of the increase in holdings of CAR winners (C10) happens from quarter 0 to quarter +4 as opposed to prior to the portfolio formation date. In other words, institutions buy stocks experiencing high CARs during the current quarter and then continue to buy them over the next several quarters. However, like for SUE winners, the magnitude of the overall increase in the CAR winner portfolio from quarter -4 to quarter +4 is smaller (4.1%) than that for price momentum winners (5.6%). The relative holdings, C10-C1, increase by only 2.1% from quarter -4 to +4, a much smaller increase compared to that for price momentum portfolios (but similar to SUE portfolios). Like SUE losers, there is hardly any selling of CAR losers by institutions. In Panels B and C, as in Panel A, we find that investment advisors are more active traders than banks and insurance companies.

These results suggest that institutions do not engage in as strong a momentum trading in response to earnings momentum as they do in response to price momentum. Stated another way, institutions seem to engage in *trend-chasing* or *positive feedback trading* more in response to past price movements than to past earnings movements. The multivariate regression results in Section 4, which control for past price momentum in examining the influence of SUE and CAR on future institutional trading, provide stronger evidence in support of this conclusion.

3.2 Changes in Institutional Holdings

Table 2 reports the quarterly change in institutional holdings for the momentum portfolios. The change is measured for each firm and then averaged across all firms in a portfolio. Figure 2 provides the same information graphically. The changes reported in Table 2 allow us to formally test whether the changes discussed in Section 3.1 are statistically significant. The autocorrelation-corrected t-statistics are presented in parentheses. As before, Panel A reports changes in holdings for price momentum portfolios, Panel B presents results for SUE momentum portfolios and Panel C presents results for CAR momentum portfolios.

Institutions begin selling price momentum losers, R1, two quarters prior to the portfolio formation date and continue selling up to the second quarter after the portfolio date. The selling reaches a peak of 1% in the most recent quarter prior to the portfolio formation date. The declines are statistically significant only in quarters -1, 0, and +1. Institutions begin buying winners, R10, four quarters prior to the portfolio formation date and continue buying up to four quarters after the portfolio formation date. Every quarter's increase in holdings is statistically significant. The peak buying (equal to a total of about 2% of the outstanding stock of winners) takes place over the two quarters just prior to the portfolio formation date. Institutions collectively buy an additional 2% of winners and sell 0.7% of losers during the four quarters after the portfolio formation date. After two quarters the momentum trading tapers off. This is direct evidence of momentum trading and is consistent with models of underreaction and continuing overreaction. As expected, investment advisors do the bulk of the momentum trading.

The results for earnings momentum strategies are significantly different, especially for losers. There is hardly any decrease in institutional investor holdings of losers (E1 and C1) before or after the portfolio formation date. This is in spite of the fact that the level of institutional holdings, on average, is comparable across all loser portfolios, R1, E1, and C1 (see Table 1). The dearth of selling in earnings momentum losers compared to price momentum losers is dramatically illustrated in Figure 2. This result raises some interesting questions. What is different about earnings momentum losers? Why do institutions in aggregate show no inclination to reduce their holdings of these stocks? Perhaps, institutions believe the negative earnings news is temporary and refuse to decrease their holdings.

Institutions do buy earnings momentum winners but there are significant differences in the way they trade in SUE momentum winners and CAR momentum winners. In the case of SUE winners, E10, most of the buying is complete by quarter 0. There is very little buying after quarter 0. In other words, positive feedback trading in SUE winners beyond the current quarter is not very pronounced. The results are different for CAR winners. Institutions continue to buy CAR winners several quarters after the portfolio formation

date (see Figure 2), engaging in momentum trading. It is unclear, however, whether CAR is a more precise way to measure earnings surprises, or whether the apparent CAR momentum trading is actually due to price momentum trading. The regression analysis we employ in a subsequent section is better able to distinguish between price momentum and CAR momentum.

The relative change in holdings (R10-R1), (E10-E1), and (C10-C1) (see also Figure 3) incorporates the changes in holdings for both the winner and loser portfolios. As can be seen, the differences in positive feedback trading between price and earnings momentum trading are noticeable. For example, the change in holdings from quarter 0 to quarter 2 for (R10-R1) is 2.1%, while it is only 0.1% and 0.8% for (E10-E1) and (C10-C1), respectively. The temporary nature of the institutional trading in momentum portfolios can also be seen, as the increases in holdings after quarter +2 are much smaller. Overall, the results show that institutions do engage in momentum trading, and are consistent with either the underreaction or the continuing overreaction explanations of stock momentum.

3.3 Price Momentum and Trading Volume

Lee and Swaminathan (2000) find that trading volume affects the level and persistence of price momentum. They use trading volume to divide winners and losers into *early stage* and *late stage* winners and losers. Thus, *low volume winners* and *high volume losers* are early stage momentum stocks that exhibit return continuation while *high volume winners* and *low volume losers* are late-stage stocks that tend to reverse. They show that *early-stage momentum strategies* that are long in low volume winners and short high volume losers outperform simple price momentum strategies by 6% to 7% per annum. In contrast *late-stage momentum strategies* that are long high volume winners and short low volume losers underperform simple momentum strategies by 5% to 6%. They suggest that high trading volume is a proxy for glamour and that low volume reflects neglect.

In this section, we examine the trading behavior of institutions in early- and late-stage price momentum-trading volume portfolios. Our main objective is to examine whether institutions are more active in early-stage strategies or late-stage strategies. In other

words, do institutions buy low volume winners more than high volume winners and sell high volume losers more than low volume losers?

In order to achieve this, we form price momentum-trading volume portfolios as in Lee and Swaminathan (2000). We form ten price momentum portfolios based on past six-month returns. We independently form three trading volume portfolios based on the average daily turnover (shares traded/shares outstanding) over the past six months. The combination gives us 30 portfolios. Among these thirty, we focus our attention on the four extreme momentum-extreme trading volume portfolios: low volume winners (R10V1), high volume winners (R10V3), low volume losers (R1V1) and high volume losers (R1V3).

Panel A of Table 3 presents changes in institutional investor holdings for the early-stage and late-stage price momentum-trading volume portfolios. Figure 4 plots the change in holdings for low and high volume losers and low and high volume winners. The results provide interesting insights into institutional trading. Among losers, institutions sell high volume losers in greater quantities than they do low volume losers. While the decline in institutional holdings (for all institutions) for high volume losers is 5.4% from quarters -2 to $+2$, there is no decline in institutional investor holdings of low volume losers. Thus, institutions seem to do the right thing in selling high volume losers over low volume losers. The continued selling over the next two quarters is clear evidence of underreaction on the part of institutions. After the second quarter, the selling tapers off.

How do the institutions trade in winners? The results in Lee and Swaminathan (2000) suggests low volume winners outperform high volume winners in the long-run, but not by much in the first twelve months after portfolio formation. In other words, both low volume winners and high volume winners perform roughly the same in the first year after portfolio formation. Nevertheless, it is interesting to see which of these portfolios institutions prefer.

The results in Panel A (and Figure 4) show that institutions buy high volume winners more than they do low volume winners during the four quarters prior to the portfolio formation date. There is roughly a 3% difference in the buying activity. Most of the buying of high volume winners takes place in quarters -1 and 0 in particular. After the portfolio formation date, however, the buying of low volume winners matches or slightly exceeds that of the high volume winners. Overall, our results suggest institutional momentum trading is concentrated among high volume winners and losers. They tend to avoid both low volume winners (at least initially) and low volume losers. Not surprisingly the relative change in holdings of early-stage momentum strategies (R10V1-R1V3) exceeds that of the late stage momentum strategies (R10V3-R1V1).

3.3 Price Momentum and Book-to-Market Ratios

Do institutions distinguish among value and glamour stocks in implementing momentum strategies? We examine this issue more directly by forming portfolios based on price momentum and book-to-market ratios (see Asness (1997) on the interaction between value and momentum strategies). Here, we form five portfolios based on past six-month returns and five portfolios independently based on B/M ratios for a total of 25 price-momentum-B/M portfolios. We form only five portfolios for six-month returns so we can have a finer cut on B/M ratios while keeping reasonable portfolio sizes. Our attention focuses on the extreme portfolios: R5Bm5 (value winners), R5Bm1 (glamour winners), R1Bm5 (value losers), and R1Bm1 (glamour losers). Early-stage momentum strategies involve longing value winners and shorting glamour losers while late-stage momentum strategies involve longing glamour winners and shorting value losers. We want to determine if institutions show a preference for value winners over glamour winners and sell glamour losers more than they do value losers.

The results presented in Panel B of Table 3 (and Figure 5) indicate that institutional momentum trading is concentrated among low B/M (glamour) winners and high B/M (value) losers. Institutional holdings of value losers decrease by 1.2% (the overall decrease is highly significant) from quarter -2 to $+2$ while those of glamour losers decrease by only 0.4%. At the same time, institutional holdings of glamour winners

increase by about 3.7% from quarter -2 to +2 while those of value winners increase by only 2.7%. All in all, institutions seem to like glamour winners and dislike value losers which suggests that, in general, they prefer late-stage momentum strategies to early-stage momentum strategies. Indeed, the cumulative change in holdings of early-stage strategies (R5Bm5-R1Bm1) between quarters -4 to 0 is only 0.3% while the change over the same period for late-stage strategies is a much larger 5.1%. Not surprisingly, investment advisors undertake much of this trading. However, there is not much difference in their trading across the two strategies after the portfolio formation period, i.e., from quarters 1 through 4.

4. Cross-sectional Regressions Involving Momentum and Institutional Trading

4.1 Momentum and Changes in Holdings

The univariate tests in Tables 1 and 2 reveal that institutions engage in momentum trading with respect to past returns but not as much with respect to past earnings news. In this section, we use regression tests to examine the interaction between price momentum and earnings momentum in predicting future institutional trading. The regression tests allow us to control for various firm characteristics such as size, B/M ratios and trading volume in addition to other measures of momentum in evaluating the relation between a given measure of momentum and current or future change in institutional holdings. We also use the regression tests to evaluate whether past changes in institutional holdings have the ability to predict future stock returns after controlling for past momentum.

The general form of Fama-MacBeth cross-sectional regression we estimate is as follows:

$$Y_{it+1} = a + b R6_{it} + c SUE_{it} + d CAR_{it} + e SUE_{it} * R6_{it}(+) + f SUE_{it} * R6_{it}(-) + g CAR_{it} * R6_{it}(+) + h CAR_{it} * R6_{it}(-) + i LnTOVR_{it} + j LnSZE_{it} + k LnBM_{it} + l DH_{it} + m R6_{it} * DH_{it} + n SUE_{it} * DH_{it} + o CAR_{it} * DH_{it} + e_{it+1} \quad (4)$$

Y_{it+1} Represents the dependent variable, which could be change in holdings over the next quarter, next two quarters, return over the next month, next 3 months, or next 6 months.

$R6_{it}$	Prior six-month stock return.
$R6_{it}(+)$	Positive prior six-month stock return defined as $\text{Max}(R6,0)$.
$R6_{it}(-)$	Negative prior six-month stock return defined as $\text{Min}(R6,0)$
SUE_{it}	Most recent quarterly earnings surprise.
CAR_{it}	Cumulative abnormal return around the most recent quarterly earnings announcement.
$SUE_{it} * R6_{it}(+)$	An interaction term which evaluates the sensitivity of Y to past positive returns when accompanied by good or bad SUE earnings news.
$SUE_{it} * R6_{it}(-)$	An interaction term which evaluates the sensitivity of Y to past negative returns when accompanied by good or bad SUE earnings news.
$CAR_{it} * R6_{it}(+)$	An interaction term which evaluates the sensitivity of Y to past positive returns when accompanied by good or bad CAR earnings news.
$CAR_{it} * R6_{it}(-)$	An interaction term which evaluates the sensitivity of Y to past negative returns when accompanied by good or bad CAR earnings news.
LnTOVR_{it}	Natural logarithm of last six-month average daily turnover.
LnSZE_{it}	Natural logarithm of market value of equity just prior to the portfolio formation date.
LnBM_{it}	Natural logarithm of book-to-market ratio of the stock. Book value is from the most recent fiscal year ending at least three months prior to the portfolio formation date.
DH_{it}	Change in institutional investor holdings over the last quarter, last two quarters, or from quarter -3 to -1 .
$R6_{it} * DH_{it}$	An interaction term that examines the sensitivity of Y to past changes in holdings when accompanied by high or low returns.
$SUE_{it} * DH_{it}$	An interaction term that examines the sensitivity of Y to past changes in holdings when accompanied by good or bad earnings news as defined by SUE.

$CAR_{it} * DH_{it}$ An interaction term that examines the sensitivity of Y to past changes in holdings when accompanied by good or bad earnings news as defined by CAR.

The regression is estimated every quarter. Table 4 reports time-series averages of cross-sectional regression coefficients. The numbers in parentheses are Newey-West-Hansen-Hodrick autocorrelation corrected t-statistics (based on 4 quarterly lags). Panel A of Table 4 reports regressions in which future returns are the dependent variables. Panel B reports regressions in which current or future changes in institutional investor holdings are dependent variables. Columns 2 through 5 in Panel A report results for regressions involving the change in holdings (as one of the independent variables) from quarter -3 to -1 , $DH(-3,-1)$. Columns 6 and 7 present results for the change in holdings from -2 to 0 , $DH(-2,0)$. Columns 8 and 9 present results for the change in holdings from -1 to 0 , $DH(-1,0)$.

Since quarterly holdings data reported to the SEC are publicly available only with a lag, the holdings data for the current quarter (quarter 0) would not be publicly available as of the portfolio formation date. As a result, from the prediction perspective, only regressions using data from quarter -1 or earlier are valid. The other regressions would suffer from a peek-ahead bias. Nevertheless, we estimate these regressions to examine the information content of the most current changes in holdings for future returns. We report results using the holdings of all institutions. We have also estimated all our regressions (not reported in the paper) using the holdings only of investment advisors and the results are similar.

The second column in Panel A reports results for a truncated regression in which future six-month returns, $R(t+1,t+6)$, are regressed on past six month returns, $R6$, SUE , CAR , change in holdings from quarter -3 to -1 , $DH(-3,-1)$, and interaction terms involving change in holdings and price momentum. We can think of this regression as a base case. The results confirm that all three measures of momentum predict future returns (see Chan, Jegadeesh, and Lakonishok (1996)). Changes in holdings, $DH(-3,-1)$, do not

predict future stock returns after controlling for past price and earnings momentum.⁶ The interaction term is also insignificant suggesting that the predictive power of price momentum is not affected by institutional buying or selling.

Column 3 reports results for the full regression (in equation (4)) involving future six-month returns. The key results involve the interaction terms. The slope coefficients on the interaction terms involving $R6(+)$ are positive suggesting that high past returns predict high future returns when accompanied by good earnings news but low future returns when accompanied by bad earnings news. The slope coefficients involving $R6(-)$ are negative suggesting that low past returns predict low future returns when accompanied by bad earnings news but high future returns when accompanied by good earnings news. The interaction terms involving SUE are statistically significant but those involving CAR are not. The inclusion of the interaction terms results in the coefficients involving SUE or CAR by themselves being insignificant. Coefficients corresponding to the change in holdings, $DH(-3,-1)$, continue to remain insignificant. Additional results suggest high turnover stocks earn low returns and high B/M stocks earn high returns. Size has a positive sign but is insignificant suggesting that in our sample there is no size premium. Columns 4 through 9 provide a number of robustness checks on the basic results above by using future returns measured over shorter horizons of 1 month or 3 months and by using changes in holdings measured over quarters -2 to 0 or -1 to 0 . The basic results remain the same (not surprisingly momentum is weaker at shorter horizons of 1 to 3 months). Past changes in holdings do not predict future returns, as all of the coefficients on DH are insignificant.

Panel B reports regressions in which the dependent variable is current or future changes in institutional holdings. These regressions formally test the hypothesis that institutions are momentum traders. The regression setting allows us to evaluate the marginal response of institutional trading to price momentum and earnings momentum after controlling for

⁶ In unreported results we regress future six-month returns only on $DH(-3,-1)$ and find that the coefficient on the change in holdings is positive and significant ($t = +2.13$). Since institutions contemporaneously respond to stock returns, and since price momentum exists, such a model suffers from an omitted variable

various firm characteristics. The interaction terms help us evaluate the sensitivity of institutional trading to the interaction between price momentum and earnings momentum.

Columns 2 & 3 of Panel B present results for regressions when the change in holdings over the next quarter, $DH_{0,+1}$, is the dependent variable. Column 2 reports results from a basic regression without any interaction terms. The slope coefficients corresponding to past returns, R6, SUE, and CAR are all positive, consistent with the results in Tables 1 and 2 that institutions engage in momentum trading. Only the coefficient for R6 is statistically significant, however, and the t-statistic is an impressive 10.24. This suggests that institutions primarily engage in price momentum trading and do not respond in a significant way to earnings momentum on its own beyond the current quarter. The coefficient on past change in holdings, $DH_{3,-1}$, is negative in sign and statistically significant indicating mean reversion in institutional buying. The negative sign on $R6 \cdot DH_{3,-1}$ suggests that if past positive (negative) returns are accompanied by institutional buying (selling), then institutions buy less in the future. The relation is not statistically significant, however. Column 4 replicates the findings in column 2 using change in holdings over the next two quarters, $DH_{0,+2}$ and the results are similar.

Column 3 presents results for the full regression containing all of the interaction terms. Recall that the dependent variable is change in holdings over the next quarter, $DH_{0,+1}$. The results are similar to those in the basic regression for the stand-alone terms. The interaction terms provide additional insights into how institutions respond to the interaction between price momentum and earnings momentum. The coefficient on the interaction term, $SUE \cdot R6(+)$, is positive and insignificant and the coefficient on the interaction term, $SUE \cdot R6(-)$, is negative and highly significant. The results in column 5 replicate column 3 findings using change in holdings over the next two quarters. The coefficient corresponding to $SUE \cdot R6(+)$ is now statistically significant, and otherwise the results are similar. The fact that that $SUE \cdot R6(+)$ becomes highly significant ($t = 2.68$) in the regression using $DH_{0,+2}$ as the dependant variable, while it is

bias. Thus, it is important to control for momentum when examining the relation between institutional trading behavior and future stock returns.

insignificant ($t = 0.30$) in the regression using $DH_{0,+1}$, suggests that institutions react more sluggishly to positive earnings surprises than they to negative surprises. The overall results imply that momentum trading in response to past returns is strengthened when past returns are accompanied by earnings news of the same sign. In other words, institutions buy more when high returns are accompanied by good earnings news and sell more when low returns are accompanied by bad earnings news.

Column 6 regresses the change in holdings from quarter -2 to 0 , $DH_{-2,0}$, on past returns, earnings surprises, and the interaction terms. The results confirm the positive contemporaneous correlation between returns and changes in holdings reported in the prior literature (see Wermers (1999), Nofsinger and Sias (1999) and Cohen, Gompers, and Vuolteenaho (2001)). Controlling for price momentum, there is no evidence of a contemporaneous relationship between changes in holdings and earnings news. The results also suggest that institutions like to buy stocks with low market capitalization. The regressions reported in columns 7 and 8 use changes in holdings from quarter -1 to 0 , $DH_{-1,0}$, as the dependent variable. In the latter regression, the positive coefficient on $SUE * R6(+)$ becomes significant, suggesting once again that institutions do respond to positive earnings news but in a more sluggish fashion compared to negative earnings news.

4.2 Momentum and Level of Institutional Holdings

Gompers and Metrick (2001) report a negative correlation between institutional holdings and past twelve-month returns. On first look, our finding of a positive correlation between past returns and future changes in holdings is inconsistent with Gompers and Metrick. There is, however, a key difference. Gompers and Metrick (2001) regress the level of institutional holdings at the end of quarter 0 on past returns. We regress changes in holdings from quarter 0 to quarter $+1$ on past returns. We explain the differences with the regression results in Table 5. Table 5 regresses the level of holdings at the end of quarter 0, at the end of quarter 1, and the corresponding change between 0 and 1 on past returns, past market capitalization, turnover, and book-to-market ratios.

The regression involving holdings in quarter 0 confirms the negative relationship (although weaker) between past returns and current holdings (controlling for firm size and other characteristics) reported in Gompers and Metrick (2001). However, when we replace current holdings with (see column 3 of Table 5) holdings at the end of quarter +1, the coefficient corresponding to past returns turns positive and insignificant. Finally, when we use the changes from quarter 0 to quarter +1 (as in Table 4), the coefficient corresponding to past returns is highly significant with a t-stat of 13.41. What these results suggest is that while (controlling for size) winners may have lower institutional holdings than losers at the end of the current quarter 0, the holdings change significantly over the next quarter (winners increasing and losers decreasing) to eliminate this differential. Thus, while the Gompers and Metrick (2001) result is accurate, it provides only a partial picture of the institutional trading in winners and losers. The regressions involving changes in holdings provide a more complete picture of the institutional trading behavior in response to past returns.

5. Conclusions

We set out to find how institutions trade in response to momentum and whether they respond differently to price momentum and earnings momentum. Our key findings are that (a) institutions are momentum traders and (b) they engage in momentum trading in response to past returns but not as much in response to past earnings news. In addition, we found that the interaction between price momentum and earnings momentum has a significant effect on the way institutions trade in response to past price momentum. Momentum trading is stronger when past returns are accompanied by earnings news of the same sign. Additional tests showed that trading volume and book-to-market ratios affect the level and persistence of momentum and that past institutional buying does not predict future returns.

What are the implications of these results for behavioral models of momentum and rational explanations? The results are broadly consistent with behavioral theories based on underreaction or continuing overreaction (see Barberis, Shleifer, and Vishny (1998) (BSV), Daniel, Hirshleifer, and Subrahmanyam (1998) (DHS), and Hong and Stein

(1999) (HS)). Our results, however, cannot distinguish between underreaction (BSV and HS) and overreaction (DHS) theories. That would require an estimate of the intrinsic value of the stock. The evidence that institutions buy winners and sell losers (see Figure 2) over a four to six quarter period around the portfolio formation date is clearly consistent with the aforementioned behavioral theories, as is the temporary nature of this trading activity. The buying or selling ends by the third or fourth quarter after the portfolio formation date and does not persist beyond that.

Rational explanations (see Fama (1998), Conrad and Kaul (1998), Chordia and Shivkumar (2001)) suggest momentum profits can be explained by differences in risk across winners and losers. According to these explanations, winners are either conditionally or unconditionally more risky than losers. The implication of our findings for these explanations is not clear since none of these explanations rely on investor heterogeneity. At a minimum, rational explanations would have to explain the significant differences in the trading by institutions and individuals. Institutions buy winners and sell losers engaging in momentum trading. In contrast, the results imply that individuals sell winners and buy losers and seem to engage in contrarian behavior even though contrarian behavior is not profitable at these horizons.

If winner stocks are indeed riskier than losers, then rational explanations would need to explain why institutions rebalance their portfolios from less risky stocks to more risky stocks temporarily over a period of four to six quarters. The other side of the coin is why individuals move from more risky stocks to less risky stocks. If time-varying risk is at the heart of the observed momentum patterns, then what causes individuals and institutions to respond so differently to such time-varying risk? What our results suggest is that simple representative agent asset pricing models may not be able to provide a satisfactory explanation of these findings. What is needed is a rational model that can explain the heterogeneity in investor behavior and set out the nature of the fundamental risk behind momentum portfolios. We leave the development of such models for future research.

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Table 1

Institutional Holdings of Momentum Portfolios

This table presents institutional investor holdings of momentum portfolios. Panel A presents holdings for price momentum portfolios. Panel B presents holdings for earnings momentum portfolios based on standardized unexpected earnings (SUE), a measure of quarterly earnings surprise. The SUEs are estimated based on quarterly seasonal random walk model for quarterly earnings. Panel C presents holdings for earnings momentum portfolios based on cumulative abnormal returns (CAR) around quarterly earnings announcement dates. The CAR is sum of daily excess returns with respect to the NYSE/AMEX value-weighted market index from day -2 to day +1 around the earnings announcement date. The institutional holdings are available quarterly from 1980 to 1996. The holdings data are from the CDA-Spectrum database. The earnings and return data are from Compustat and CRSP respectively and involve only NYSE/AMEX stocks. The price momentum portfolios are based on stock returns over the previous six months (with a one-week gap between the return measurement period and the portfolio formation date). SUE and CAR portfolios are based on the most recent quarter's SUE or CAR prior to the portfolio formation date. At the end of each quarter, all eligible stocks are ranked by their past price momentum, SUE, or CAR and grouped into ten portfolios. *R1* represents price momentum losers and *R10* represents price momentum winners. *E1* represents earnings momentum losers and *E10* represents earnings momentum winners. *C1* represents CAR momentum losers and *C10* represents CAR momentum winners. *All* represents all institutions, and the rest are self-explanatory. The table presents the *level* of institutional holdings starting four quarters prior and ending 4 quarters after the portfolio formation date. Quarter 0 represents the quarter ending as of the portfolio formation date. The numbers in parentheses represent Hansen-Hodrick-Newey-West autocorrelation corrected t-statistics. We use four lags of autocorrelation correction.

Panel A: Institutional Holdings of Price Momentum Portfolios								
Portfolio	Institution Type	Quarterly Holdings in Percent						
		-4	-2	-1	0	1	2	4
R1	All	26.0	26.2	25.5	24.4	23.9	23.9	24.6
	Banks & Ins.Cos.	8.5	8.4	8.2	7.9	7.7	7.6	7.7
	Investment Advisors	15.5	15.8	15.3	14.4	14.1	14.2	14.9
R10	All	27.5	28.3	29.1	30.1	31.0	31.9	33.1
	Banks & Ins.Cos.	9.5	9.6	9.6	9.5	9.7	9.9	10.3
	Investment Advisors	15.6	16.3	17.2	18.3	19.1	19.6	20.2
R10-R1	All	1.5 (1.05)	2.1 (1.44)	3.6 (2.76)	5.7 (4.83)	7.1 (5.94)	8.0 (6.29)	8.4 (5.84)
	Banks & Ins.Cos.	1.0 (1.57)	1.2 (1.86)	1.4 (2.22)	1.7 (2.83)	2.0 (3.34)	2.3 (3.50)	2.6 (3.86)
	Investment Advisors	0.1 (0.20)	0.6 (0.83)	2.0 (3.39)	3.9 (6.94)	5.0 (8.14)	5.4 (8.51)	5.4 (7.40)
Panel B: Institutional Holdings of SUE Momentum Portfolios								
E1	All	34.9	34.9	34.7	34.6	34.9	35.3	36.5
	Banks & Ins.Cos.	12.7	12.6	12.5	12.3	12.3	12.3	12.4
	Investment Advisors	18.9	18.9	18.8	18.7	19.1	19.5	20.4
E10	All	33.9	35.3	36.1	36.8	37.2	37.6	38.2
	Banks & Ins.Cos.	12.6	12.7	12.8	12.9	13.0	13.0	13.1
	Investment Advisors	18.0	19.3	20.0	20.6	20.9	21.2	21.6
E10-E1	All	-1.0 (-1.04)	0.5 (0.49)	1.4 (1.55)	2.2 (2.90)	2.4 (3.53)	2.3 (3.50)	1.7 (2.52)
	Banks & Ins.Cos.	-0.1 (-0.30)	0.1 (0.20)	0.3 (0.68)	0.5 (1.50)	0.7 (2.16)	0.7 (2.22)	0.6 (1.99)
	Investment Advisors	-0.9 (-2.01)	0.4 (0.91)	1.2 (2.63)	1.9 (4.27)	1.9 (4.46)	1.7 (4.48)	1.2 (3.67)
Panel C: Institutional Holdings of CAR Momentum Portfolios								
C1	All	27.9	28.4	28.6	28.3	28.4	28.8	29.9
	Banks & Ins.Cos.	9.4	9.5	9.5	9.4	9.3	9.3	9.5
	Investment Advisors	16.2	16.6	16.7	16.6	16.7	17.1	17.9
C10	All	28.0	28.8	29.1	29.8	30.4	31.0	32.1
	Banks & Ins.Cos.	9.5	9.5	9.4	9.4	9.6	9.7	9.9
	Investment Advisors	16.0	16.9	17.3	17.9	18.4	18.8	19.6
C10-C1	All	0.1 (0.18)	0.4 (1.21)	0.6 (1.78)	1.4 (4.32)	1.9 (5.27)	2.2 (6.06)	2.2 (4.98)
	Banks & Ins.Cos.	0.1 (0.36)	-0.1 (-0.36)	-0.1 (-0.54)	0.0 (0.07)	0.2 (1.61)	0.4 (3.24)	0.4 (2.64)
	Investment Advisors	-0.2 (-0.93)	0.3 (1.48)	0.5 (2.16)	1.4 (4.39)	1.7 (4.56)	1.8 (5.03)	1.7 (3.87)

Table 2
Changes in Institutional Holdings of Momentum Portfolios

This table presents changes in institutional investor holdings of momentum portfolios. Panel A presents holdings for price momentum portfolios. Panel B presents holdings for earnings momentum portfolios based on standardized unexpected earnings (SUE), a measure of quarterly earnings surprise. The momentum portfolios are formed as described in Table 1. *R1* represents price momentum losers and *R10* represents price momentum winners. *E1* represents earnings momentum losers and *E10* represents earnings momentum winners. *CI* represents CAR momentum losers and *C10* represents CAR momentum winners. *All* represents all institutions, and the rest are self-explanatory. The table presents changes starting four quarters prior to the current quarter and ending 4 quarters after the portfolio formation date. Quarter *0* represents the quarter ending as of the portfolio formation date. A column titled *-K to -L* represents change in holdings from quarter *-K* to quarter *-L* and is computed as holdings in quarter *L* minus holdings in quarter *K*. The numbers in parentheses represent Hansen-Hodrick-Newey-West autocorrelation corrected t-statistics. We use four lags of autocorrelation correction.

Panel A: Changes in Institutional Holdings of Price Momentum Portfolios									
Portfolio	Institution Type	Changes in Quarterly Holdings							
		-4 to -3	-3 to -2	-2 to -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4
R1	All	0.3 (2.35)	0.2 (1.12)	-0.6 (-3.31)	-1.0 (-5.37)	-0.6 (-3.92)	-0.2 (-1.22)	0.0 (0.24)	0.1 (1.12)
	Banks & Ins.Cos.	0.0 (-0.16)	0.0 (-0.13)	-0.2 (-2.46)	-0.3 (-3.57)	-0.2 (-3.65)	-0.1 (-1.21)	-0.1 (-1.11)	-0.1 (-0.71)
	Investment Advisors	0.2 (2.49)	0.1 (1.36)	-0.4 (-2.86)	-0.6 (-4.82)	-0.4 (-4.22)	-0.1 (-0.76)	0.1 (1.92)	0.2 (2.18)
R10	All	0.5 (5.76)	0.6 (4.98)	1.0 (5.15)	1.1 (3.63)	0.8 (4.87)	0.5 (5.91)	0.4 (2.65)	0.3 (2.64)
	Banks & Ins.Cos.	0.1 (1.31)	0.1 (1.33)	0.0 (0.78)	0.0 (0.04)	0.1 (1.34)	0.1 (1.86)	0.1 (1.38)	0.1 (1.20)
	Investment Advisors	0.3 (4.43)	0.4 (4.82)	0.8 (6.07)	0.9 (4.85)	0.7 (4.56)	0.4 (4.70)	0.2 (2.06)	0.1 (1.68)
R10-R1	All	0.2 (1.83)	0.4 (2.58)	1.6 (5.71)	2.1 (4.89)	1.4 (7.07)	0.7 (5.79)	0.3 (1.84)	0.1 (0.75)
	Banks & Ins.Cos.	0.1 (1.27)	0.1 (1.19)	0.2 (2.92)	0.3 (2.29)	0.3 (6.28)	0.2 (3.56)	0.2 (2.77)	0.1 (2.31)
	Investment Advisors	0.1 (1.65)	0.3 (3.36)	1.1 (6.78)	1.5 (6.07)	1.0 (6.91)	0.4 (5.28)	0.0 (0.28)	-0.1 (-0.56)
Panel B: Changes in Institutional Holdings of SUE Momentum Portfolios									
E1	All	0.2 (2.49)	0.0 (-0.31)	-0.1 (-0.76)	-0.1 (-0.58)	0.2 (2.01)	0.3 (2.45)	0.3 (4.24)	0.4 (4.03)
	Banks & Ins.Cos.	0.0 (0.94)	-0.1 (-1.12)	-0.1 (-1.26)	-0.1 (-1.61)	-0.1 (-1.73)	0.0 (-0.69)	0.0 (-0.45)	0.0 (0.11)
	Investment Advisors	0.1 (1.17)	0.0 (0.32)	-0.1 (-0.66)	0.0 (0.06)	0.3 (4.36)	0.3 (3.04)	0.4 (5.41)	0.4 (4.42)
E10	All	0.8 (5.59)	0.9 (6.68)	0.8 (6.52)	0.7 (5.37)	0.4 (4.08)	0.2 (1.86)	0.2 (1.73)	0.2 (1.44)
	Banks & Ins.Cos.	0.1 (1.43)	0.1 (1.37)	0.1 (1.66)	0.1 (1.69)	0.1 (1.31)	0.0 (-0.13)	-0.1 (-0.72)	0.0 (-0.05)
	Investment Advisors	0.6 (5.15)	0.6 (5.69)	0.6 (5.59)	0.5 (5.08)	0.3 (4.08)	0.2 (1.92)	0.2 (2.84)	0.1 (1.37)
E10-E1	All	0.6 (5.89)	0.9 (6.96)	0.9 (7.28)	0.8 (5.66)	0.2 (1.66)	-0.1 (-0.90)	-0.2 (-1.68)	-0.3 (-2.56)
	Banks & Ins.Cos.	0.1 (1.13)	0.2 (2.68)	0.2 (2.94)	0.2 (3.43)	0.2 (2.80)	0.0 (0.63)	0.0 (-0.67)	0.0 (-0.17)
	Investment Advisors	0.5 (7.24)	0.6 (5.77)	0.6 (7.98)	0.5 (5.84)	0.0 (0.25)	-0.1 (-1.65)	-0.2 (-2.55)	-0.3 (-3.10)

Table 2 continued on the next page.

Table 2 Continued.

Panel C: Changes in Institutional Holdings of CAR Momentum Portfolios									
Portfolio	Institution Type	Changes in Quarterly Holdings							
		-4 to -3	-3 to -2	-2 to -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4
C1	All	0.3 (2.58)	0.4 (3.31)	0.3 (1.69)	-0.1 (-0.97)	0.0 (0.30)	0.2 (1.63)	0.2 (2.18)	0.4 (2.61)
	Banks & Ins.Cos.	0.0 (0.60)	0.1 (1.52)	0.0 (0.30)	-0.1 (-0.98)	-0.1 (-1.20)	-0.1 (-1.24)	0.0 (-0.36)	0.0 (0.49)
	Investment Advisors	0.2 (1.87)	0.2 (2.47)	0.2 (2.10)	0.0 (-0.47)	0.1 (1.78)	0.3 (3.27)	0.3 (3.06)	0.3 (3.29)
C10	All	0.6 (5.92)	0.6 (4.26)	0.5 (5.78)	0.7 (7.36)	0.6 (6.45)	0.5 (5.66)	0.4 (3.56)	0.4 (5.20)
	Banks & Ins.Cos.	0.1 (1.15)	0.0 (0.52)	0.0 (0.49)	0.0 (0.38)	0.2 (1.66)	0.1 (0.84)	0.0 (0.27)	0.1 (1.27)
	Investment Advisors	0.4 (5.08)	0.4 (3.76)	0.4 (4.07)	0.6 (7.22)	0.4 (4.20)	0.4 (6.25)	0.3 (3.96)	0.2 (3.07)
C10-C1	All	0.3 (4.63)	0.2 (1.26)	0.3 (1.96)	0.9 (5.16)	0.5 (4.34)	0.3 (3.35)	0.2 (1.06)	0.0 (0.04)
	Banks & Ins.Cos.	0.0 (1.11)	-0.1 (-1.41)	0.0 (0.01)	0.1 (1.75)	0.3 (3.10)	0.2 (2.22)	0.0 (0.48)	0.0 (0.69)
	Investment Advisors	0.2 (4.05)	0.2 (4.20)	0.2 (2.06)	0.6 (6.68)	0.3 (3.94)	0.1 (2.65)	0.1 (0.94)	-0.1 (-0.68)

Table 3

Changes in Institutional Investor Holdings for Early and Late Stage Strategies Involving Price Momentum, Trading Volume, and Book-to-Market Ratios

This table presents changes in institutional investor holdings for price momentum-trading volume and price momentum-book-to-market ratio portfolios. Trading volume is defined as the average daily turnover (shares traded/shares outstanding) over the previous six months and book-to-market ratio is the ratio of book value of equity from the most recent fiscal year ending at least three months prior to the portfolio formation date and the market value of equity prior to the portfolio formation date. The numbers in parentheses are Hansen-Hodrick-Newey-West autocorrelation corrected t-statistics. V1 is low volume and V3 is high volume. Bm1 is low book-to-market (glamour stocks) and Bm5 is high book-to-market (value stocks).

Panel A: Price Momentum and Trading Volume Portfolios																	
Portfolio	Institution Type	V1								V3							
		-4 to -3	-3 to -2	-2 to -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	-4 to -3	-3 to -2	-2 to -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4
R1	All	0.2	0.1	0.1	0.0	-0.1	0.0	0.2	0.2	0.4	0.1	-1.6	-2.1	-1.2	-0.5	0.0	0.1
		(1.45)	(0.95)	(0.62)	(0.70)	(-1.22)	(-0.40)	(2.12)	(1.63)	(1.64)	(0.34)	(-6.02)	(-8.54)	(-5.49)	(-2.09)	(0.14)	(0.68)
	Investment Advisors	0.2	0.1	0.1	0.1	0.0	0.0	0.2	0.1	0.2	0.0	-1.2	-1.7	-0.7	-0.2	0.1	0.3
		(4.28)	(1.61)	(0.67)	(1.23)	(-0.33)	(-0.00)	(3.16)	(1.66)	(1.44)	(0.05)	(-5.42)	(-8.22)	(-6.02)	(-1.23)	(0.67)	(2.20)
R10	All	0.2	0.3	0.4	0.3	0.6	0.5	0.4	0.3	0.6	0.8	1.4	1.3	0.6	0.4	0.3	0.1
		(2.56)	(1.94)	(2.97)	(2.72)	(4.19)	(4.47)	(3.41)	(2.90)	(5.07)	(5.04)	(4.84)	(2.34)	(2.27)	(2.66)	(1.32)	(0.57)
	Investment Advisors	0.2	0.2	0.3	0.4	0.5	0.3	0.2	0.3	0.6	0.7	1.5	1.6	0.6	0.2	0.1	-0.1
		(2.57)	(1.91)	(3.95)	(4.56)	(4.73)	(4.51)	(4.32)	(3.48)	(5.32)	(5.85)	(5.41)	(3.62)	(2.69)	(2.01)	(0.66)	(-0.65)
	All	<i>Early: Low Volume Winners Less High Volume Losers (R10V1 - R1V3)</i>								<i>Late: High Volume Winners Less Low Volume Losers (R10V3 - R1V1)</i>							
		-0.1	0.2	2.0	2.4	1.8	1.0	0.3	0.2	0.4	0.6	1.4	1.3	0.7	0.4	0.1	-0.1
		(-0.67)	(0.82)	(6.62)	(8.14)	(8.62)	(3.91)	(1.04)	(0.74)	(2.29)	(3.09)	(4.33)	(2.09)	(2.54)	(3.01)	(0.51)	(-0.47)
	Investment Advisors	-0.1	0.2	1.5	2.0	1.3	0.5	0.1	0.0	0.3	0.6	1.4	1.5	0.6	0.2	-0.1	-0.2
		(-0.45)	(1.01)	(6.37)	(9.16)	(9.01)	(4.16)	(0.93)	(-0.16)	(2.86)	(4.93)	(5.32)	(3.41)	(2.83)	(2.50)	(-0.53)	(-1.40)
Panel B: Price Momentum and Book-to-Market Ratios																	
Portfolio	Institution Type	Bm1								Bm5							
		-4 to -3	-3 to -2	-2 to -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	-4 to -3	-3 to -2	-2 to -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4
R1	All	0.7	0.8	-0.2	-0.4	0.0	0.2	0.3	0.4	0.0	0.1	-0.2	-0.5	-0.4	-0.1	0.1	0.3
		(4.24)	(6.79)	(-1.16)	(-4.26)	(-0.23)	(2.24)	(4.67)	(4.39)	(0.23)	(0.48)	(-1.20)	(-2.62)	(-2.03)	(-0.86)	(0.48)	(1.80)
	Investment Advisors	0.5	0.5	-0.2	-0.4	0.0	0.2	0.2	0.3	0.1	0.1	-0.1	-0.3	-0.2	0.0	0.2	0.3
		(3.51)	(5.57)	(-1.27)	(-3.27)	(-0.40)	(2.23)	(2.12)	(3.24)	(0.72)	(1.18)	(-0.86)	(-2.01)	(-1.16)	(0.37)	(1.70)	(2.65)
R5	All	0.9	0.9	1.2	1.4	0.7	0.4	0.3	0.3	0.3	-0.2	0.7	0.4	0.9	0.7	0.5	0.4
		(7.28)	(8.03)	(7.40)	(8.07)	(4.67)	(3.93)	(2.48)	(2.57)	(0.91)	(-0.75)	(3.62)	(1.22)	(5.40)	(3.23)	(3.27)	(1.81)
	Investment Advisors	0.7	0.8	1.1	1.2	0.5	0.2	0.0	0.1	0.1	0.0	0.5	0.6	0.8	0.6	0.4	0.3
		(7.50)	(6.21)	(6.27)	(7.19)	(3.59)	(2.77)	(0.56)	(0.76)	(1.08)	(0.09)	(3.95)	(6.19)	(6.09)	(5.25)	(3.66)	(1.86)
	All	<i>Early: Value Winners Less Glamour Losers (R5Bm5 - R1Bm1)</i>								<i>Late: Glamour Winners Less Value Losers (R5Bm1 - R1Bm5)</i>							
		-0.3	-1.0	0.8	0.8	1.0	0.5	0.2	0.0	0.9	0.8	1.5	1.9	1.0	0.5	0.2	0.0
		(-0.83)	(-3.51)	(3.33)	(2.53)	(5.93)	(2.57)	(1.49)	(0.04)	(4.70)	(4.30)	(5.08)	(6.32)	(5.83)	(3.41)	(1.02)	(-0.04)
	Investment Advisors	-0.4	-0.5	0.7	1.0	0.9	0.5	0.2	0.0	0.7	0.6	1.2	1.5	0.6	0.2	-0.2	-0.3
		(-1.90)	(-2.85)	(4.43)	(5.94)	(5.35)	(3.41)	(1.83)	(-0.03)	(5.03)	(3.51)	(4.69)	(5.89)	(4.66)	(1.26)	(-1.04)	(-1.38)

Table 4
Cross-Sectional Regressions of Future Returns on Past Changes in Institutional Investor Holdings, Returns, Earnings Surprises and other Firm Characteristics

This table presents time-series averages of slope coefficients from Fama-MacBeth cross-sectional regressions. The regressions examine the interaction between stock returns, earnings surprises, and changes in institutional investor holdings. The holdings represent aggregate institutional investor holdings, which include banks, insurance companies and investment advisors. $R6$ is returns over the past six months, $R6(+)$ = Max ($R6$, 0), $R6(-)$ = Min ($R6$, 0), SUE is *standardized unexpected earnings* which is a measure of quarterly earnings surprise, CAR is the cumulative abnormal return with respect to the NYSE/AMEX value-weighted index from day -2 to day +1 around the most recent quarterly earnings announcement date, and $DH(j, k)$ is the change in past institutional investor holdings from quarter j to quarter k . $LnTOVR$ is the natural logarithm of average daily turnover (shares traded/shares outstanding) over the past six months, $LnSize$ is the natural logarithm of market capitalization, and $LnBM$ is the natural logarithm of book-to-market ratio. $R(t+1, t+k)$ represents the future k -month stock return. The numbers in parentheses are Hansen-Hodrick-Newey-West autocorrelation corrected t-statistics.

Panel A: Dependent Variable is Future Stock Returns									
Independent Variables	Past Changes in Holdings								
	DH(-3,-1)			DH(-2, 0)		DH(-1, 0)			
	Y =	R(t+1, t+6)	R(t+1, t+3)	R(t+1)	R(t+1, t+3)	R(t+1)	R(t+1, t+3)	R(t+1)	
Intercept	0.0724 (3.69)	0.0386 (0.89)	0.0174 (0.73)	-0.0041 (-0.23)	0.0184 (0.76)	-0.0044 (-0.25)	0.0185 (0.78)	-0.0046 (-0.26)	
R6	0.4045 (2.71)	0.4099 (3.51)	0.1441 (1.83)	0.0266 (0.64)	0.1416 (1.68)	0.0306 (0.73)	0.1462 (1.79)	0.0299 (0.73)	
SUE	0.0026 (3.90)	0.0013 (1.40)	0.0011 (1.61)	0.0002 (0.70)	0.0009 (1.52)	0.0001 (0.40)	0.0010 (1.64)	0.0003 (0.85)	
CAR	0.1098 (4.09)	0.0246 (0.75)	0.0226 (0.80)	0.0353 (2.21)	0.0272 (0.97)	0.0431 (2.67)	0.0271 (0.95)	0.0371 (2.26)	
SUE*R6(+)		0.1413 (2.08)	0.0789 (1.95)	0.0568 (3.18)	0.0809 (2.13)	0.0567 (3.36)	0.0777 (2.07)	0.0533 (3.18)	
SUE*R6(-)		-0.0698 (-2.04)	-0.0479 (-2.44)	0.0001 (0.01)	-0.0570 (-3.23)	-0.0044 (-0.32)	-0.0600 (-3.14)	-0.0036 (-0.28)	
CAR*R6(+)		-0.3386 (-0.30)	-0.4585 (-0.60)	-0.0521 (-0.12)	-0.3419 (-0.46)	-0.1527 (-0.38)	-0.5795 (-0.85)	-0.1734 (-0.47)	
CAR*R6(-)		-3.4128 (-1.71)	-1.5841 (-1.44)	-0.2642 (-0.45)	-1.3170 (-1.26)	0.0942 (0.18)	-1.3403 (-1.33)	-0.0103 (-0.02)	
LnTOVR		-0.0115 (-1.96)	-0.0062 (-2.14)	-0.0039 (-1.53)	-0.0058 (-1.91)	-0.0039 (-1.48)	-0.0060 (-2.02)	-0.0041 (-1.55)	
LnSize		0.0039 (0.99)	0.0021 (0.95)	0.0009 (0.74)	0.0020 (0.95)	0.0009 (0.76)	0.0020 (0.92)	0.0009 (0.77)	
LnBM		0.0238 (3.77)	0.0128 (3.47)	0.0064 (2.45)	0.0129 (3.48)	0.0067 (2.54)	0.0127 (3.41)	0.0067 (2.54)	
DH	0.0403 (1.04)	0.0138 (0.44)	0.0263 (1.11)	-0.0127 (-1.14)	0.0089 (0.29)	-0.0006 (-0.05)	-0.0368 (-1.19)	0.0059 (0.29)	
R6*Dh	0.0598 (0.09)	1.33 (1.98)	0.0918 (0.21)	-0.0441 (-0.15)	-0.1687 (-0.35)	-0.1984 (-0.70)	-0.5452 (-0.71)	-0.4439 (-1.36)	
SUE*Dh		-0.0163 (-1.81)	-0.0042 (-0.71)	-0.0026 (-0.82)	-0.0102 (-1.61)	-0.0042 (-1.14)	-0.0141 (-1.52)	-0.0056 (-1.28)	
CAR*Dh		-0.2902 (-0.68)	-0.1419 (-0.37)	-0.1904 (-1.18)	0.1577 (0.61)	-0.1744 (-1.02)	0.9307 (2.57)	-0.0573 (-0.22)	

Table 4 Continued.

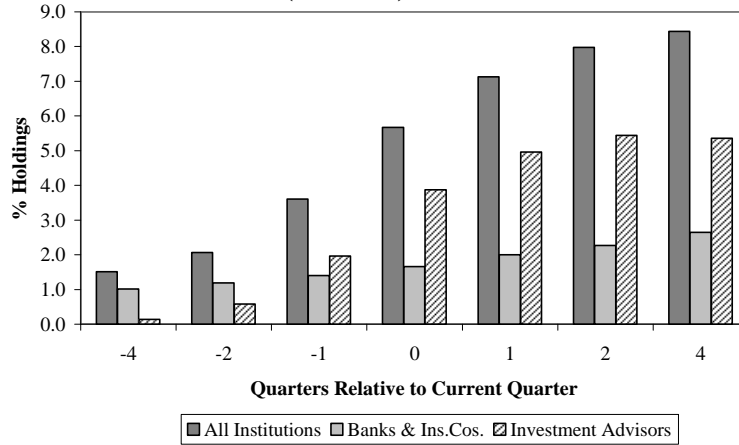
Ind. Variables	Panel B: Dependent Variable is Change in Holdings					
	Qtr 0 to +1		Qtr 0 to +2		Qtr -2 to 0	Qtr -1 to 0
Intercept	0.0034 (6.33)	0.0072 (4.60)	0.0075 (7.24)	0.0146 (4.79)	0.0143 (4.27)	0.0058 (2.94)
R6	0.0859 (10.24)	0.0976 (11.49)	0.1357 (11.70)	0.1459 (11.47)	0.2605 (10.49)	0.1539 (11.18)
SUE	0.0001 (0.55)	-0.0001 (-0.58)	-0.0001 (-0.57)	-0.0005 (-2.00)	-0.0001 (-0.60)	-0.0003 (-2.03)
CAR	0.0025 (0.75)	-0.0017 (-0.33)	0.0067 (1.59)	-0.0059 (-1.52)	0.0051 (0.62)	0.0147 (1.84)
SUE*R6(+)		0.0020 (0.30)		0.0255 (2.68)	0.0256 (1.94)	0.0146 (2.64)
SUE*R6(-)		-0.0113 (-2.37)		-0.0182 (-3.54)	-0.0218 (-3.84)	-0.0130 (-3.40)
CAR*R6(+)		0.0027 (0.02)		-0.1417 (-1.20)	-0.3370 (-1.64)	-0.2302 (-1.40)
CAR*R6(-)		0.0617 (0.20)		-0.3061 (-1.10)	0.2324 (0.55)	0.1770 (0.67)
LnTOVR		0.0003 (0.65)		0.0005 (0.63)	0.0015 (1.30)	0.0003 (0.44)
LnSize		-0.0004 (-2.93)		-0.0009 (-3.00)	-0.0010 (-3.10)	-0.0005 (-2.51)
LnBM		0.0002 (0.35)		0.0007 (0.58)	-0.0014 (-1.16)	-0.0006 (-0.92)
DH _{-3,-1}	-0.0396 (-3.09)	-0.0364 (-3.84)	-0.0429 (-2.25)	-0.0508 (-3.80)		
R6*DH _{-3,-1}	-0.1517 (-1.00)	-0.1775 (-1.34)	-0.3667 (-1.41)	-0.3100 (-1.58)		
SUE*DH _{-3,-1}		-0.0028 (-1.04)		-0.0047 (-1.20)		
CAR*DH _{-3,-1}		0.0136 (0.12)		0.1455 (0.93)		

Table 5
Cross-Sectional Regressions Involving Levels and Changes in Institutional Holdings

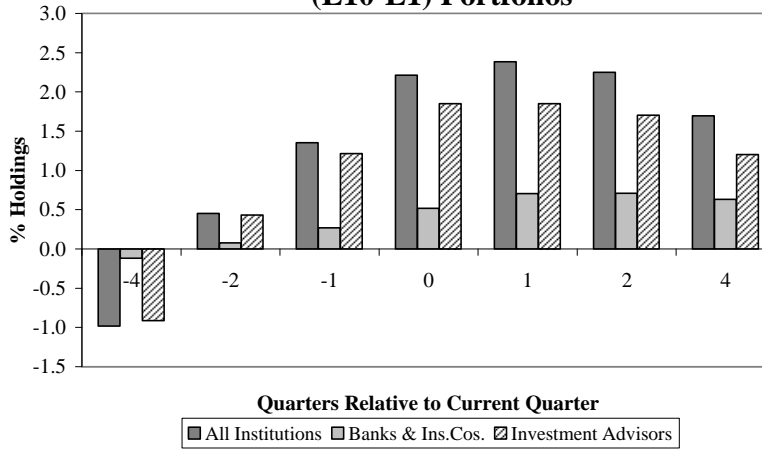
This table presents time-series averages of slope coefficients from Fama-MacBeth cross-sectional regressions involving levels and changes in institutional investor holdings. The holdings represent aggregate institutional investor holdings, which include banks, insurance companies and investment advisors. *R6* is returns over the past six months, *LnTOVR* is the natural logarithm of average daily turnover (shares traded/shares outstanding) over the past six months, *LnSize* is the natural logarithm of market capitalization, and *LnBM* is the natural logarithm of book-to-market ratio. The numbers in parentheses are Hansen-Hodrick-Newey-West autocorrelation corrected *t* statistics with four quarterly lags of autocorrelation correction.

Independent Variable	Institutional Holdings at Quarter 0	Institutional Holdings at Quarter 1	Holdings at Qtr 1 Minus Holdings at Qtr 0
Intercept	0.1305 (4.07)	0.1360 (5.01)	0.0048 (2.82)
R6	-0.0938 (-1.93)	0.0003 (0.03)	0.0935 (13.41)
Log(Turnover)	0.0658 (23.00)	0.0658 (22.14)	-0.0003 (-0.56)
Log(Size)	0.0637 (28.74)	0.0633 (28.83)	-0.0003 (-1.93)
Log (B/M)	0.0217 (7.43)	0.0216 (8.05)	-0.00002 (-0.03)

Relative Holdings of Price Momentum (R10-R1) Portfolios



Relative Holdings of SUE Momentum (E10-E1) Portfolios



Relative Holdings of CAR Momentum (C10-C1) Portfolios

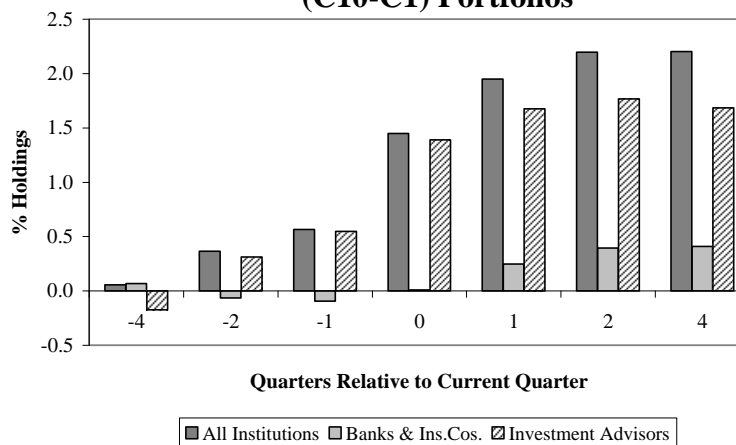
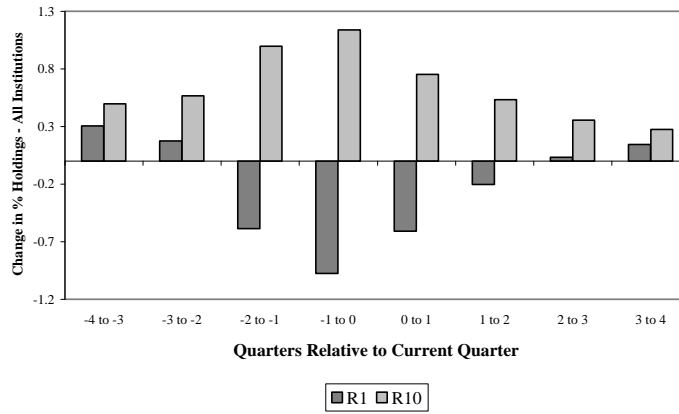
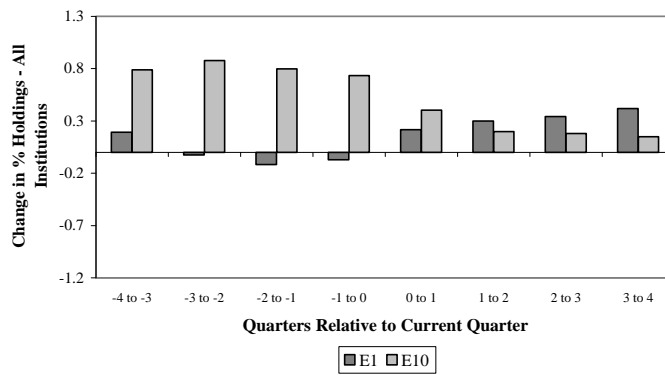


Figure 1: Relative Holdings of (Winner – Loser) Momentum Portfolios. This table graphs differences in institutional investor holdings between winner and loser momentum portfolios. The holdings are graphed for price momentum (top), SUE earnings momentum (middle) and CAR earnings momentum (bottom). Quarter 0 is the contemporaneous quarter when portfolios are formed.

Change in Holdings of Price Momentum Portfolios



Change in Holdings of SUE Momentum Portfolios



Change in Holdings of CAR Momentum Portfolios

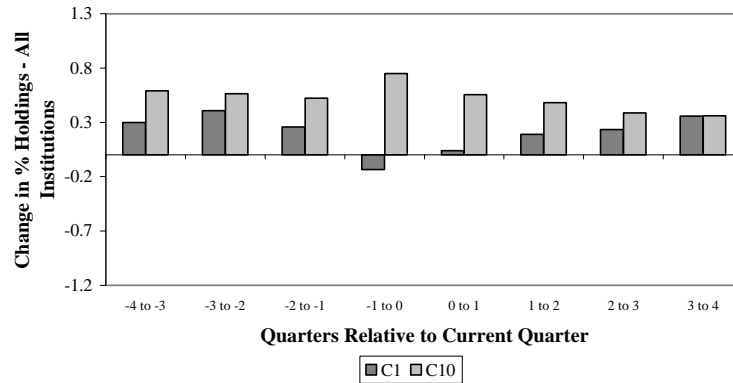
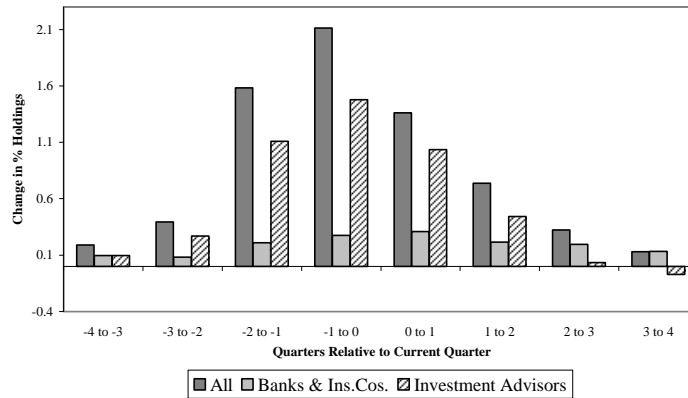
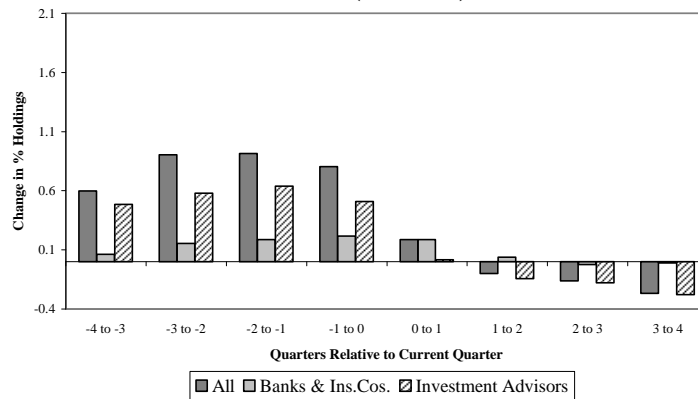


Figure 2: Change in Holdings of Momentum Portfolios. This table graphs changes in institutional investor holdings of momentum portfolios. The holdings are graphed for price momentum (top), SUE earnings momentum (middle) and CAR earnings momentum (bottom). Quarter 0 is the contemporaneous quarter when portfolios are formed. R1, E1, and C1 represent *loser* portfolios and R10, E10 and C10 represent *winner* portfolios.

Relative Change in Holdings for Price Momentum (R10-R1) Portfolios



Relative Change in Holdings for SUE Momentum (E10-E1) Portfolios



Relative Change in Holdings for CAR Momentum (C10-C1) Portfolios

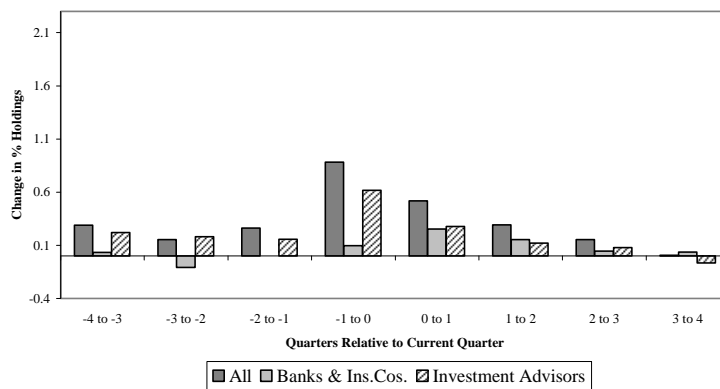
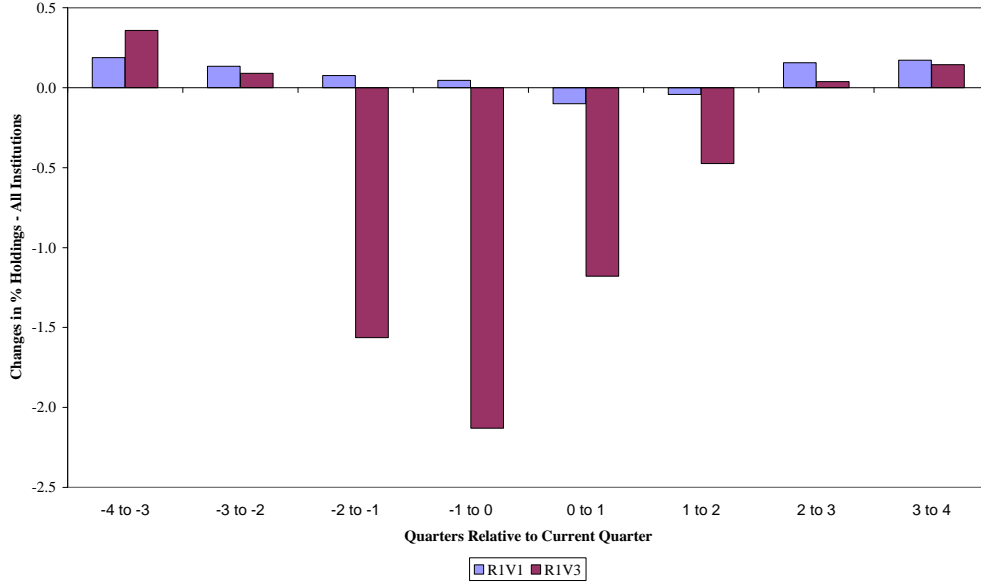


Figure 3: Relative Change in Holdings of (Winner – Loser) Momentum Portfolios. This table graphs differences in institutional investor holdings changes between winner and loser momentum portfolios. The holdings are graphed for price momentum (top), SUE earnings momentum (middle) and CAR earnings momentum (bottom). Quarter 0 is the contemporaneous quarter when portfolios are formed.

**Changes in Holdings of Institutional Investors:
Low Volume Losers (R1V1) Vs High Volume Losers (R1V3)**



**Changes in Holdings of Institutional Investors:
Low Volume Winners (R10V1) Vs High Volume Winners (R10V3)**

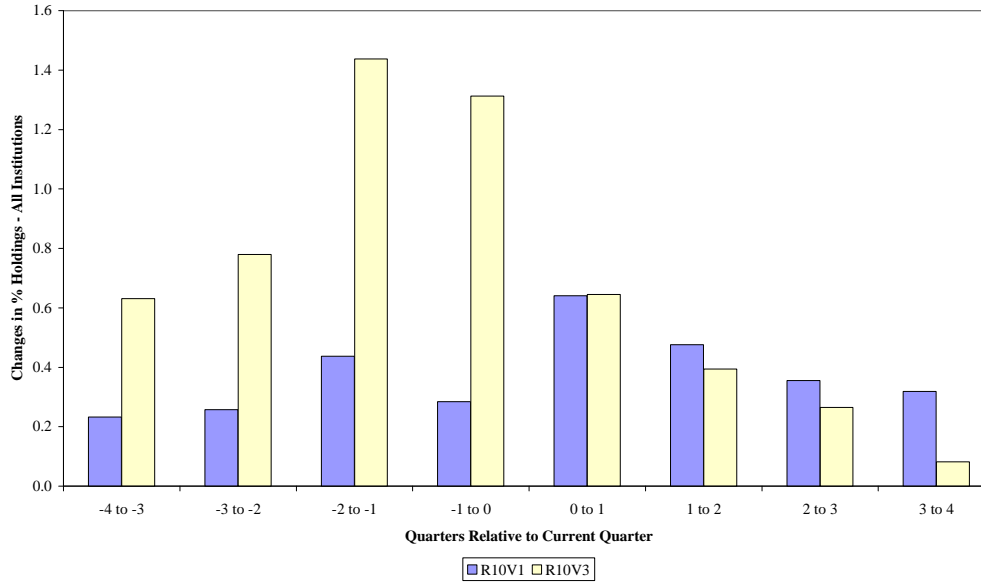
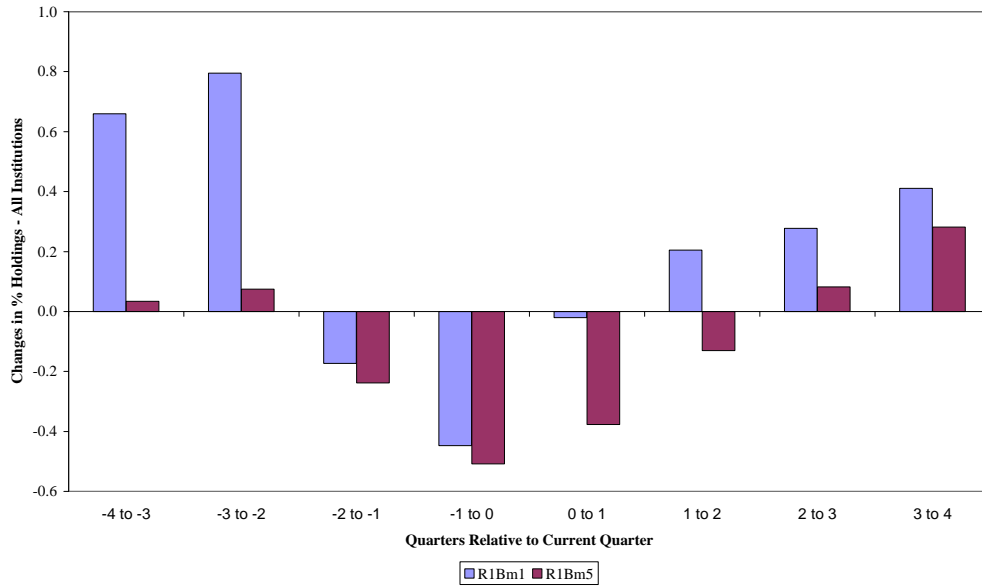


Figure 4: Changes in Holdings of Low Vs High Volume Price Momentum Winners and Losers. This table compares changes in holdings of all institutions among low volume and high volume winners and losers. Quarter t is the contemporaneous quarter when portfolios are formed.

**Changes in Holdings of Institutional Investors:
Value Losers (R1Bm5) Vs Glamour Losers (R1Bm1)**



**Changes in Holdings of Institutional Investors:
Value Winners (R5Bm5) Vs Glamour Winners (R5Bm1)**

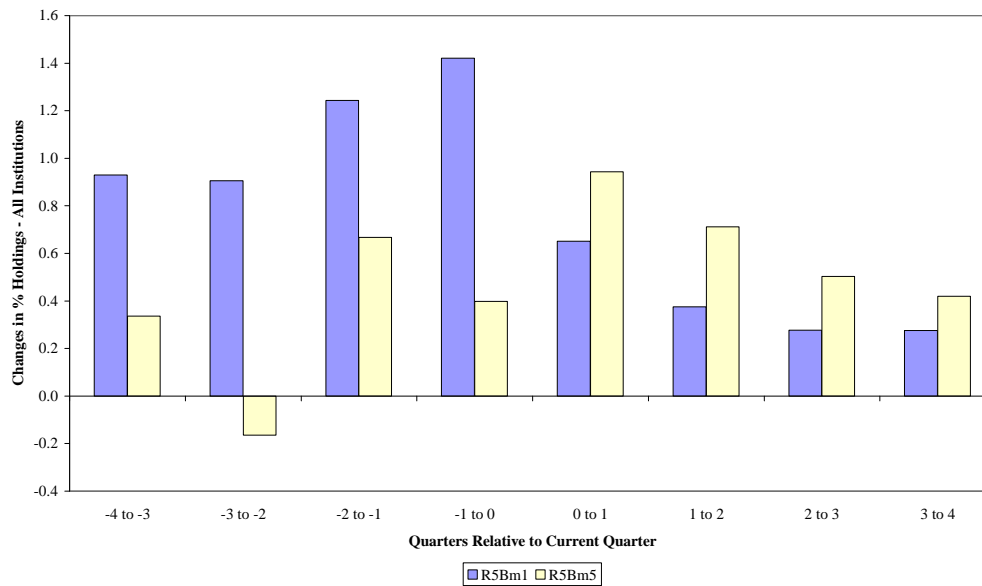


Figure 5: Changes in Holdings of Value Vs Glamour Volume Price Momentum Winners and Losers. This table compares changes in holdings of all institutions among value and glamour winners and losers. Quarter θ is the contemporaneous quarter when portfolios are formed.