

**DOES SHAREHOLDER COMPOSITION AFFECT STOCK RETURNS?
Evidence from Corporate Earnings Announcements**

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Abstract

A frequently voiced concern is that increased trading due to institutional investors leads managers to be overly concerned with measures of short term corporate performance such as quarterly earnings. This study examines the relationship between the identity and trading behavior of a firm's institutional investors and stock price behavior around quarterly earnings announcements. We characterize institutional shareholders by the type of institution, their investment style, whether they follow momentum trading strategies, and by their portfolio turnover. We find there is considerable heterogeneity in institutional investors' response to new information. When firms report earnings below analysts' expectations, the stock price response is more negative for firms with higher levels of ownership by momentum or aggressive growth investors, and is consistent with the idea that the price decline is related to a sell-off by these investors. We also find an economically larger impact on trading volume and stock price volatility on days around earnings announcements, which are higher for firms with more ownership by momentum and growth investors, and lower for firms with more ownership by income and low turnover investors. Our findings show that it is not only ownership by individuals versus institutional investors but more importantly the composition of institutional shareholders that effects stock price behavior around the release of corporate information.

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I. Introduction

Institutional ownership of U.S. equities increased dramatically during the past two decades. Accompanying this rise, there has been an increased effort by researchers to understand whether there is a link between a firm's ownership structure and its stock price behavior. In other words, does the identity of a firm's shareholders matter?

In a perfect market setting, fluctuations in stock prices should be driven solely by news about fundamental economic factors. Shareholder identity and their trading practices should have no impact on stock prices. Empirical evidence, however, suggests this is not the case. For example, Demsetz and Lehn (1985) find a link between ownership structure and measures of firm value. Another branch of literature demonstrates the heterogeneity in shareholder valuations.¹

In this paper, we take a different approach to directly assess the impact of the identity and trading behavior of a firm's institutional investors by examining stock price behavior around quarterly earnings announcements. We examine quarterly earnings announcements between 1992 and 1997 for a sample of 203 firms for which data on characteristics of the firm's institutional shareholders were made available by Georgeson & Co. This dataset allows us to focus not only on the proportion of stock owned by individuals versus institutional investors, but also on the characteristics of the institutional owners. We find there is considerable heterogeneity in institutional investors' response to new information. Cross-sectional differences in abnormal security returns, increased trading volume and increased volatility in response to unexpected earnings are each related to characteristics of the firm's institutional owners.

¹ For example, Bagwell (1992) shows empirically the importance of shareholder heterogeneity by documenting that firms face upward sloping supply curves when they repurchase shares in a Dutch auction. Bradley et al (1988) find that the premium paid in tender offers increase in the fraction of target shares purchased.

We focus on corporate earnings news because this is central to the debate about the impact of institutional investors. A frequently voiced concern is that the short term horizon of institutional investors coupled with their significant equity positions may force managers to be overly concerned with measures of short term corporate performance such as quarterly earnings. Managers frequently express the fear that they will be rashly judged on the basis of one quarter's earnings.² Anecdotally, there are numerous instances where a small shortfall in reported versus expected earnings leads to a substantial price decline, and institutional investors are often blamed for "overreacting" to earnings news. Bernard, Thomas and Abarbanell (1992) describe the disparity between the size of the earnings shortfall and the magnitude of the market value lost; significant declines in value occur even in cases where a firm announces record earnings for the quarter.

This view of institutional investors suggests they act as "traders" rather than "owners". They have short expected holding periods and focus on predicting near-term price movements instead of long term prospects. Their excessive focus on short term earnings leads managers to fear that earnings disappointments will trigger large-scale selling and result in temporary undervaluation of the stock. This short term focus can lead to the myopic investment behavior described in Stein (1988). In other words, managers choose investments which sacrifice long term value in order to meet short term goals. The empirical evidence for institutions as "traders" is mixed. McConnell & Wahal (1999) find that spending on R&D and fixed assets is actually greater for firms with higher levels of institutional ownership. Bushee (1998) finds that the likelihood that a firm will cut R&D in order to meet a shortfall in expected earnings is lower for firms with higher institutional ownership. However, recognizing the potential heterogeneity

among institutional investors, he also finds that the likelihood of cutting R&D to meet an earnings forecast is greater for firms with higher levels of what he terms momentum and high turnover institutional ownership.

A second contrasting view of institutional investors as “owners” is that given their large stakes and sophistication, institutions can monitor and discipline managers, ensuring that they choose investment levels to maximize long run value rather than to meet short term goals. Institutional investors monitor either by intervening directly in companies affairs, or through information acquisition. There is modest empirical support for this view. Opler and Sokobin (1997) find that firms targeted by the Council of Institutional Investors for shareholder activism show improved profitability in subsequent quarters.

In our analysis, we consider that institutions are not homogeneous in their trading behavior and investment objectives. This heterogeneity among investors has implications for the behavior of securities prices. In most theoretical models, investors trade in response to new information because they interpret this information differently or because they have divergent prior expectations.³ It is also likely that traders are diversely informed and differ in the precision of their private information. Karpoff (1986) shows that investors also trade based on unique liquidity or speculative desires. The analysis in this paper shows that these differences are important not just in understanding differences in individual versus institutional investors, but also in understanding heterogeneity across institutions themselves.

In addition to differences in liquidity needs and speculative behavior, institutional investors may differ in terms of restrictions on permitted investments, and in terms of the types of information acquired, costs of acquiring information, and information processing abilities.

² For example, see "Stop Whining About Wall Street," Fortune Magazine, 2/2/98, Froot, Perold and Stein (1992).

³ Kim and Verrecchia (1991).

Most empirical research to date focuses on the distinction between institutional and individual investors, and to a lesser extent on differences in types of institutions such as banks, insurance companies, mutual funds, and pension and other investment advisors.⁴ Several recent studies have examined the characteristics of equity portfolios of various types of institutional investors as defined by Spectrum, and find substantial variation across these types. For example, Del Guercio (1996) argues that because of differences in fiduciary standards, banks tilt their portfolios toward large capitalization high quality stocks.

Even within the classifications of manager types, however, there is likely to be significant variation in trading behavior. A further limitation to the Spectrum manager type classifications is that each manager includes all client accounts in a single 13(f) filing. For example, many investment managers file one statement for both the mutual funds they manage and for their private clients; banks manage both trust and pension accounts which can have very different investment guidelines. Finally, it is not obvious how each manager type will respond to earnings news. For example, income oriented banks may be less responsive to negative earnings if these managers are less pressured to invest based on short-term performance. On the other hand, they may be more likely to respond by selling if the stock no longer meets their investment guidelines. Therefore, working with a database of investor characteristics supplied by Georgeson & Co., we also consider classifications based on an analysis of individual managers' portfolio decisions. These classifications include whether the manager exhibits momentum investing behavior, their investment style (growth, aggressive growth, value or income), and their historical portfolio turnover.

⁴ Denis and Strickland (1999), Nofsinger and Sias (1999) and Sias and Starks (1997) examine price impacts of aggregate institutional ownership. Bennett, Sias and Starks (1999), Del Guercio (1996) and Gompers and Metrick (1998) contrast portfolio holdings of different investor types defined by Spectrum.

When a large proportion of the firm's stock is owned by investors who follow momentum investing strategies, managers may be concerned that bad earnings news could cause large scale selling and a temporary undervaluation of the stock. Several previous studies including Grinblatt, Titman and Wermers (1995), Wermers (1999) and Badrinath and Wahal (1999) show that certain investor types such as mutual funds actively invest using momentum strategies⁵. Lakonishok, Shleifer and Vishny (1992) find less evidence of this behavior among pension funds. Rather than focusing on whether certain classes of investors follow momentum strategies, we use Georgeson's database to identify individual managers that exhibit this behavior. We then examine whether the proportion of stock (if any) owned by this type of investor contributes to the firm's stock price behavior around earnings announcements. Unexpected good (bad) news about earnings is expected to lead to buying (selling) by these investors, increasing the magnitude of the stock price response, trading volume and volatility at the announcement.

We also observe substantial variation in investment styles for each manager type, using classifications of aggressive growth, growth, income, value or balanced investors (the classification methodology is described in Section II). A primary investment style is determined for each manager based on characteristics of securities in their portfolio. Because of data limitations, other empirical research has generally not considered the impact of institutional investors' investment styles on security price movements, with the notable exception of Bushee (1998) and Abarbanell, Bushee and Raedy (1998), who report significant heterogeneity in investment styles among manager types⁶. When firms miss or exceed earnings targets, investors

⁵ Nofsinger and Sias (1999) demonstrate the price impact of institutions following these strategies at the daily level. These studies focus on price momentum strategies. Georgeson's classification of momentum investors is based on revisions of analysts' forecasted earnings for stocks held, purchased and sold by the manager. Details of investor classifications are provided in Section II of this paper.

⁶ These studies use factor analysis and cluster analysis to sort managers into four groups based on their revealed preference for large versus small cap stocks and for "growth" versus value stocks. Bushee (1998) examines whether institutional investors create or reduce incentives for managers to cut research and development spending to meet

may revise expectations of future growth and therefore their valuation of the stock. We expect that when a larger proportion of stock is owned by aggressive growth or growth investors, the magnitude of the response to earnings news will be increased. To the extent value investors actually increase (decrease) their holdings in response to bad (good) news, this may attenuate these effects.

Finally, we consider the effect of investors' portfolio turnover. Our turnover measures are based on the average holding period for stocks in each manager's portfolio. When a greater proportion of the firm's stock is held by high turnover investors, we expect higher volume and volatility and perhaps a greater stock price response to earnings news.

Our primary findings can be summarized as follows. When firms report lower than forecasted earnings, the stock price response to the announcement is significantly more negative for firms with a higher proportion of momentum or aggressive growth investors. Our results are consistent with the idea that the price decline is related to a sell-off by these investors as we also observe a decline in holdings of these investors between quarterly dates surrounding the announcement. However, we do not find that these investors cause an "overreaction" to earnings news; there is no evidence of price reversals in the days following the announcement. Although a large volume of shares changes hands, our results do not show that these investors destabilize prices, causing them to move away from fundamental values.

The importance of the composition of institutional holders becomes more striking when we look at the volume of trade around announcement dates. If institutions follow a broad diversity of investing styles, they may to some extent offset each other with respect to the impact on returns but will still generate greater volume and volatility. We find that volume is

short-term earnings goals. Abarbanell, Bushee and Raedy (1998) examine the influence of institutional investors on price movements around spin-offs.

significantly higher when firms have a higher proportion of ownership by momentum investors, aggressive growth or growth investors, high turnover investors, or mutual funds/investment managers, and lower as the proportion of ownership by low turnover investors increases. Finally, as documented by Chari, Jagannathan and Ofer (1988), we also observe large increases in the variance of stock returns in days surrounding the earnings announcement. However, when firms report lower than forecasted earnings, the increase in variance is greatest for firms with a higher proportion of momentum and growth investors.

Overall, we find that the identity of a firm's institutional investors is important in explaining price behavior in days surrounding the release of corporate information. The remainder of this paper is organized as follows. Section II describes the ownership structure of the sample firms, and provides an analysis of the investor classifications based on momentum, investment style, and turnover. Section III relates the stock price response to earnings information to characteristics of the firms' investors. Section IV further examines the trading volume response, while Section V provides an analysis of the increased stock return variance on days surrounding the announcement. Section VI summarizes our results and conclusions.

II. Data and sample description

Our sample consists of 203 firms for which data on characteristics of the firm's institutional shareholders were made available by Georgeson & Co. We examine all quarterly earnings announcements between the fourth quarter of 1992 and the fourth quarter of 1997 for which data are available on CRSP, Compustat and IBES. This produces a sample of 3163 quarterly observations for the 203 firms.

Panel A of Table 1 provides descriptive statistics for the sample firms. The firms are generally large, with a median market value of equity equal to \$2.1 billion and median total assets of \$3.3 billion. Analyst coverage is also generally extensive, with a median of 8 analysts covering the firm. 129 firms are Fortune 500 companies.

Panel B describes characteristics of the institutional owners. The Securities Act Amendments of 1975 require that institutional investors with investment discretion over portfolios exceeding \$100 million in equity securities file 13(f) statements reporting their holdings to the S.E.C. on a quarterly basis.⁷ Data on quarterly holdings of institutions is obtained from Spectrum. The total number of shares outstanding for each firm is obtained from CRSP. We delete observations where the reported total institutional holdings is greater than 100% of the shares outstanding.

Total 13(f) institutional ownership is high (on average near 60%), which we expect based on the size of the firms in our sample.⁸ Although spread over a large number of institutions (on average 236 institutions per firm), there are some significant concentrations. The 5 largest institutions own on average 20.9% of the stock, and nearly 40% is held by the top 20 institutions. Spectrum also classifies investment managers by type: banks, insurance companies, “investment advisors” and others.⁹ The largest ownership of these firms is by investment advisors, followed by banks and insurance companies.

⁷ Each institution is required to file only one 13(f). As a result, the holdings of several funds are aggregated and reported under the principal fund manager. For example, Fidelity Management and Research aggregates all Fidelity equity holdings into one 13(f) filing.

⁸ Wahal and McConnell (1997) find average institutional holdings of 39.5% for a sample of 2,500 firms. Gompers and Metrick (1998) find that institutional holdings increase with firm size; they report institutional ownership in 1996 of 54.96% for the largest quintile of CRSP stocks.

⁹ We refer to “investment advisors” as managers classified by Spectrum either as investment companies and their managers (Spectrum type #3), or independent investment advisors (Spectrum type #4). Spectrum Type 3 includes most large mutual fund companies, but type 4 includes many managers having mutual funds as a substantial portion of their business. Since these managers file one statement for both the mutual funds they manage and for their private clients, our analysis combines these classifications.

As described above, heterogeneity in trading behavior of institutions may not adequately be captured by examining total institutional holdings or the Spectrum classifications of manager type. Therefore, we use Georgeson's analysis of the portfolios of institutional shareholders to further characterize the 13(f) institutions. The Spectrum data is merged with data on individual manager characteristics provided by Georgeson. There are nearly 2700 managers in the Spectrum database during our sample period. For each manager, Georgeson analyzes characteristics of the stocks purchased, sold and held for their portfolio. Based on this analysis, managers are categorized based on their investment style, whether they exhibit momentum trading behavior, and their portfolio turnover.

To determine investment style, each stock in the manager's portfolio is classified as aggressive growth, growth, income or value, based on the dividend yield, growth in EPS and sales, and leading P/E.¹⁰ For the manager's portfolio, the percentage of stock (by market value) in each category is computed, and compared to all other managers' portfolios. Managers which are overweighted (relative to all other managers) in a particular category are classified as having that investment style (or classified as "balanced" if there is no overweighting). This analysis is done for the prior six quarters; the database of styles is updated once per year. Using these classifications, we compute the percentage of the firm's stock held by managers of each investment style. For example, Panel D of Table 1 shows that a large proportion of the sample firms' stock is held by growth or income investors (median ownership by these groups is 24.5% and 12.6%, respectively).

¹⁰ Georgeson further breaks down investment styles within these categories, and also defines secondary investment styles (if any) for each manager; we use only the broader style categories in our analysis. Previous research classifies investment styles based on past returns rather than an analysis of managers' portfolio holdings (Brown and Goetzmann (1997)). An advantage to these alternative methods is that they minimize the impact of window dressing (Lakonishok, Shleifer, Thaler and Vishny (1991)). However, Georgeson's classifications are based on portfolio holdings over six quarters, minimizing the potential impact of window dressing.

We also examine ownership by managers which have been identified as “momentum” investors. Momentum investors are determined by examining the stocks held, purchased and sold by each manager over six consecutive quarters. For each stock, the net number of analyst earnings estimate changes – positive versus negative – is expressed as a percentage of the number analysts following the stock. When both the market value weighted measure for the manager's portfolio exceeds the market average, and this measure is higher for stocks purchased than for those sold, the manager is classified as a momentum investor. In other words, these investors show the greatest tendency to buy (sell) stocks with positive (negative) analyst revisions. From Panel E, the median ownership by momentum investors is only 5.6%. However, individual stocks clearly can attract high levels of momentum ownership (maximum 53.1%).

Lastly, we consider the portfolio turnover of each manager. Turnover is defined based on the average holding period for stocks in the manager's portfolio. For all managers on Spectrum in our sample period, the average (median) portfolio turnover is 1.6 (2.2) years. This is sharp contrast to the institutional portfolio turnover averages reported in McConnell and Wahal (1997). They find that institutions in the upper quintile of portfolio turnover have an average holding period of five years. The difference in portfolio turnover for the two samples is likely the result of Georgeson calculating portfolio turnover on a shares traded basis while McConnell and Wahal (1997) employ a price weighted portfolio turnover measure. We divide managers roughly in thirds and classify them as high (average holding period less than 1.5 years), medium (1.5 to 3 years) or low (greater than 3 years) turnover. Panel F shows the median percentage of stock held by investors in the highest turnover category is 8.7%, though ownership by high turnover investors reaches a maximum of 62.5% for an individual stock.

It is also important to sort out the relationship between the Spectrum manager types and our classifications of investment styles, momentum and turnover. For example, we might expect that mutual funds/investment advisors tend to be high turnover investors. Therefore, Table 2 provides an analysis of characteristics at the level of managers rather than firms, showing the differences in managers across the investment style classifications. Panel A shows a large proportion of managers are classified as growth investors; of the 2244 managers owning shares in our sample firms at some time during the sample period, 10.4% are classified as aggressive growth and 46.9% as growth. This is especially true among investment advisors. Insurance companies appear more diverse in their styles, though there is still a high proportion of growth investors. There is clearly a higher percentage of income investors among banks, consistent with Del Guercio (1996) who finds that banks invest more heavily in “prudent” stocks with higher earnings and dividends.

Table 2 (Panel C) also shows a relationship between the momentum classification and an aggressive growth style. Non-momentum investors are less likely to be aggressive growth and more likely to be income investors. Finally, high turnover investors (Panel D) are more likely to be aggressive growth or value investors, and less likely to be income investors. We also sort the sample managers by manager type rather than investment style (not reported) and find again there is a correspondence between income investors and banks. There is also a higher proportion of investment advisors among momentum investors and the higher turnover group.

This analysis to some extent helps us understand differences in trading styles across managers. Most importantly for our analysis, it demonstrates the substantial heterogeneity in trading behavior of these institutions even within the manager type classifications studied in previous papers. We do not observe high correlations across our classifications of manager type,

investment style, momentum and turnover; for example, momentum investors are frequently but not always aggressive growth investors. Since these classifications appear to capture independent information, we separately consider the importance of each type of heterogeneity in our subsequent analysis.

III. Stock price reactions to earnings announcement.

A significant amount of empirical research examines the stock price response to unexpected earnings.¹¹ These studies show that cross sectional differences in securities price responses is significantly related to unexpected earnings and other control variables, although the correlation between earnings and stock returns is generally low. We examine the stock price response over a two day window starting at the day prior to the earnings announcement (days -1 to 0), and relate this return to variables shown to be important in previous studies as well as to our variables describing the firm's ownership structure.

The earnings forecast error is defined as the difference between reported earnings per share and the mean analyst forecast appearing on IBES prior to the announcement, deflated by the stock price 10 days prior to the announcement. Earnings announcement dates are obtained from Compustat. Abnormal returns are market model residuals using common stock returns from the period 250 to 60 days prior to the announcement.¹² Test statistics are calculated as in Mikkelson and Partch (1986).

We first report the two day cumulative abnormal returns (CAR) in Table 3. Returns are reported separately for negative and positive forecast errors, since the impact of the ownership

¹¹ Lev (1989) summarizes the findings of much of this work.

¹² We also estimate market model parameters for the period 60 to 9 days prior to the announcement so that the estimation period does not include the prior quarter's earnings announcement. None of the results in this paper are noticeably affected by this change.

structure variables may not be symmetric. We define positive forecast errors as cases where reported earnings exceed the IBES consensus forecast by more than \$0.02 per share, since analyst “whisper” numbers are often above their stated forecast. There is a strong significant negative response when firms miss their earnings forecast (mean CAR -0.83%), and a significant positive response (mean CAR 1.17%) when reported earnings exceed analyst forecasts. This is despite the fact that the sample consists of generally large firms, for which earnings announcements have been suggested to contain less information.

We further divide the sample by several ownership characteristics, based on whether ownership by that type of institution is greater than the sample median ownership. When firms miss their forecasted earnings, the mean cumulated abnormal return is 0.35% lower when total ownership by all 13(f) institutions is greater than the sample median; the difference in the mean returns (though not the median) is significant at the 5% level. For positive forecast errors, mean returns are similar for both ownership groups. This asymmetry suggests the effect of ownership structure is particularly important when firms report lower than expected earnings.

For the other ownership characteristics, the most noticeable differences appear for the subsamples separated by the level of ownership by growth investors. For negative forecast errors, both mean and median returns are more negative for firms with higher ownership by growth investors. This is consistent with the idea that the earnings news causes investors to reduce future expected growth rate and thus their valuation of the firm. Firms with higher ownership by growth investors are more adversely affected by bad earnings news. In contrast, higher ownership by growth investors does not lead to a more positive response to good news.

The analysis of two-day returns is useful in that it demonstrates the magnitude of the mean and median stock price responses. In general, based on differences in medians we do not

observe a strong relationship between these returns and characteristics of the institutional owners. Interpretation is difficult, however, because these bivariate comparisons do not control for other factors affecting the abnormal returns. To address this possibility, we expand our analysis of the two-day cumulative abnormal returns using multivariate regressions. The results of this analysis are presented in Table 4.

The regressions include all observations for our sample firms for quarters with data available on CRSP, Compustat, IBES and Spectrum. We exclude observations with the largest (99th percentile) absolute forecast errors - this slightly improves our reported R^2 s.¹³ Our results are not sensitive to our cutoff for trimming the sample. We also examine regressions (not reported) where the dependent variable is the cumulative abnormal return over a 3 day window (-1 to +1) and find similar results.

Each regression controls for the magnitude of unexpected earnings (forecast error) and the P/E ratio based on the stock price 30 days prior to the announcement. We expect abnormal returns to be increasing in the size of the forecast error (the degree to which reported earnings exceed the forecast). For negative forecast errors, the forecast error is positive and significant for all regressions. For positive forecast errors, there is a larger positive and significant effect. The price/earnings ratio is included to allow for the possibility that high P/E stocks are more sensitive to a change in reported earnings. The P/E variable is positive and significant only at the 10% level for the positive forecast errors.

The regressions also include variables to control for characteristics of the stock which are related to or were actually used in defining the investor classifications these variables

¹³ Freeman and Tse (1992) suggest that the magnitude of the stock price response to unexpected earnings is not linearly increasing in the magnitude of forecast error. Stock price revisions based on unexpected earnings reflect a change in investors' beliefs about the present value of expected future dividends. If small earnings surprises are valued as permanent shifts, they may lead to a significant price response. If large absolute earnings surprises have a

include firm size (measured by the market value of equity), the market to book ratio based on the stock price 30 days prior to the announcement, sales growth over the prior three years, dividend yield and the market adjusted stock return for the three months prior to the announcement. The market adjusted stock return is used to measure prior stock price momentum. All results are similar if we instead control for prior momentum using the net upward versus downward analyst revisions (deflated by the number of analyst estimates) over the prior 90 day period. These control variables allow us to test whether the ownership structure, rather than the firm characteristics themselves, are related to the stock price response.

Abnormal returns are increasing in firm size for the positive forecast errors. The market to book ratio is included because high market to book firms are likely to have greater growth opportunities, and bad (good) news about earnings may cause investors to decrease (increase) expectations for future growth. Low market to book firms are also likely to attract value investors. The relationship between the market to book ratio and the abnormal return is significantly negative only for the negative forecast errors. There is a positive relationship to historical sales growth only in some regressions, and no significant relationship to dividend yield. Finally, prior stock price momentum is negative and significant only for some regressions for the positive forecast errors.

The remaining explanatory variables describe the ownership structure of the firm. The level of institutional ownership is measured at the end of the calendar quarter preceding the earnings announcement. Regression 1 shows that total 13(f) institutional holdings (measured as a percentage of shares outstanding) is significantly negatively related to the announcement return at the 5% level for negative forecast errors, but is not significant for the positive errors. The

greater transitory component, much of the information in these surprises is price-irrelevant. Freeman and Tse show, however, that a linear model is well specified after eliminating large positive and negative earnings innovations.

remaining regressions include additional variables to examine the importance of the composition of the institutional holdings. Regression 2 includes a variable measuring the percentage stock held by momentum investors, as a percentage of total 13(f) institutional holdings. Total ownership is no longer significant, and the momentum ownership variable is significant at the 1% level for negative forecast errors. For the negative forecast errors, we also find returns are lower for firms with a higher proportion of aggressive growth investors, and higher as the proportion of value investors increases; these relationships are not significant for the positive forecast errors. In contrast, turnover, and manager type variables (regressions 4-5) are not significantly related to the two day return, with the exception that for positive forecast errors the return is higher as the proportion of holdings by investment advisors increases.¹⁴

The negative relationship between institutional holdings by momentum investors and aggressive growth investors and the stock price response to bad news may be driven by a sell off by these investors. Therefore, we examine more directly whether the trading behavior of different types of institutions is related to the stock price response in two ways. First, we calculate the regressions for abnormal returns using explanatory variables measuring the change rather than the level of ownership (Table 5). Second, we directly examine the probability that a particular investor type increases or decreases shareholdings in response to earnings news (Tables 6 and 7). Although we cannot observe the change in holdings in the days immediately surrounding the earnings release, we calculate the change in holdings between quarterly calendar dates surrounding the announcement.

¹⁴ We also examine regressions for the subset of observations where there has been a change in the pattern of forecast errors; a change in the security's earnings momentum from positive to negative may prompt a sell off by investors following a momentum strategy. We rerun regressions including only observations where firms miss (exceed) earnings forecast after previously exceeding (missing) the forecast for the previous 4 quarters, and find results similar to those reported.

From Table 5, for negative forecast errors the results are similar to the regressions using ownership levels. When momentum or aggressive growth investors increase (decrease) their holdings relative to other institutions, the stock price response is more positive (negative). In addition to the previous findings, there is also a similar relationship for high turnover investors. The results for positive forecast errors are more noticeably different, and consistent with the results for negative forecast errors. An increase in holdings by momentum, aggressive growth, growth, or high turnover investors are all related to higher abnormal stock returns.

These results are consistent with observed changes in investor holdings. For negative forecast errors, we calculate (but do not report) on average a 1% decline in the proportion of institutional holdings by momentum investors (and a 9% decline in the number of momentum investors). More strikingly, for the subsample of observations where momentum ownership is greater than 25% of institutional holdings before the announcement, we observe an average 5.1% decline in the proportion of institutional holdings by momentum investors. For positive forecast errors, there is on average a 0.3% increase in the proportion of holdings by momentum investors (and a 2.6% increase in number). Thus, our results suggest that selling (buying) by momentum investors is associated with a greater stock price decline (increase).¹⁵

Logistic regressions for the probability of an individual institution selling or buying in response to earnings news are reported in Table 6. The dependent variable indicates for each institution whether it decreased (or increased) shares held by more than 10%, 20% or 50% over the quarterly period containing the earnings announcements. The regressions are pooled for all firms and earnings announcements. We include a number of control variables in addition to dummy variables indicating characteristics of the institution. Each of the variables indicating the

¹⁵ For total 13(f) institutional holdings as a percentage of shares outstanding, we observe only a -0.3% decline in holdings for negative forecast errors and a 0.9% increase for positive forecast errors.

characteristics of the institutional investor is statistically significant at the 1% level in regressions for negative forecast errors. Variables which indicate momentum investors, growth investors, investment advisors and high turnover investors are each positively related to the observed decision to sell. Momentum and high turnover investors are also more likely to buy in response to good news.

Table 7 reports the predicted probabilities of selling/buying based on these estimates. The base case is the predicted probability of selling or buying, setting all explanatory variables either at their sample means for the control variables or at zero for the investor characteristic indicator variables. For example, a momentum investor has a predicted probability of selling more than 10% in response to negative earnings news of 34.25%, which is 3.79% higher than the base case where the momentum indicator variable is equal to zero. The increased probability of selling in response to negative news is similar to that for buying in response to buying in response to positive news for momentum investors at approximately 3%. Investment advisors show a more striking difference but only for negative forecast errors, with approximately a 7% increase in the predicted probability of selling on bad news relative to the base case. Higher turnover investors by definition will be more likely to trade regardless of the news. However, they are substantially more likely to sell on bad earnings news, with a 16% greater probability than the base case. Overall, these results are consistent with the interpretation that selling or buying by certain characteristic institutions are related to the abnormal stock price responses reported in the previous tables.

We also test (not reported) whether there is a reversal in price movements in the days following the earnings announcement, and if so, whether it is significantly related to our ownership variables. For example, if momentum or aggressive growth investors destabilize

prices, we expect a significant negative relationship between the abnormal return on days (-1,0) and returns over subsequent days. However, when we regress returns for days (+1,2) through (+1,5) on the prior return and other variables, we find no evidence of a reversal in prices over these time periods. There is also no evidence of longer term “earnings drift,” consistent with recent research showing this type of post-announcement stock price behavior appears only for smaller firms with lower levels of institutional ownership than our sample firms. These findings are consistent with previous work that suggests that although trading behavior by certain investors moves prices, they do not necessarily have a destabilizing effect on prices (Wermers (1999), Nofsinger and Sias (1999)).

IV. Trading volume

This section examines the relationship between trading volume in days surrounding quarterly earnings announcements and institutional holdings. Karpoff (1986) demonstrates that information flows lead to increased volume if investor disagreement exists or market participants have divergent prior expectations. Kim, Krinsky and Lee (1997) find that trading volume in response to earnings news is greater for firms with higher institutional ownership, after controlling for the magnitude of the stock price reaction and the dispersion of analyst’s earnings forecasts. Since we cannot directly observe trading activity on the event days, we again consider the effects of ownership levels at the calendar quarter ending prior the earnings announcement.

Table 8 reports regressions explaining trading volume, where the dependent variable is the log of abnormal trading volume on days -1 and 0. Abnormal trading volume is calculated as the difference between daily turnover (volume/shares outstanding) and the median daily turnover

for that stock on days -250 to -60 .¹⁶ We again report results separately for negative and positive earnings forecast errors. Each regression controls for the two-day abnormal stock return. When firms miss earnings forecasts, as the return becomes more negative trading volume increases. For positive forecast errors, higher stock price responses are associated with increased trading volume. We also control for the dispersion of analysts' forecasts, measured as the standard deviation of forecasts from IBES. This variable is positive and significant in each case, suggesting earnings announcements may convey more useful information when the dispersion of analyst forecasts is higher. Additional control variables for stock characteristics are as previously described.

We expect cross sectionally a positive relation between the proportion of institutional ownership and trading volume reactions during the event period. The regressions in Table 8 show that in each case the percentage of stock held by all 13(f) institutions is positive and significant. However, the composition of the institutional holdings also appears to have an important effect on turnover. Trading volume is higher when a greater proportion of that stock is held by momentum investors. We observe a relationship between investment style and volume. As aggressive growth or growth ownership increases, trading volume increases. These results suggest that income investors hold stock for its dividend yield or balanced investors are less likely to trade in response to either good or bad news. The effects of the turnover classifications are also as expected; a greater proportion of high turnover investors (relative to medium turnover investors) increases trading volume, while a greater proportion of low turnover investors decreases volume. Lastly, we observe that higher institutional ownership by investment advisors is associated with higher trading volume.

¹⁶ Defining abnormal turnover based on median turnover from days -60 to -9 produces nearly identical results to those reported here. Regression results are also similar when we use log transformations of both the dependent and

We also examine (but do not report) the relationship between trading volume and changes rather than levels of ownership. The results are generally similar, except for the notable difference that the effect of total institutional holdings is no longer significant. The change in the composition of institutions, however, continues to be important. An increase (decrease) in these ownership variables corresponds to buying (selling) by that type of institution; for negative forecast errors, selling by momentum, aggressive growth or high turnover investors is associated with higher volume. In addition, buying by value investors is associated with higher volume. For positive forecast errors, buying by momentum investors and selling by value investors are associated with significantly higher volume.

Overall, the trading volume response is strongly related not just to the level of institutional ownership but to the composition of that ownership. These results demonstrate the significance of heterogeneity in institutional investors' trading behavior in response to information.

V. Variance of returns at earnings announcements

Our final tests consider the impact of institutional ownership structure on the variance of returns in the days around earnings announcements. Chari, Jagannathan and Ofer (1988) find that variability increases during earnings announcement periods relative to non-announcement periods, and that the increase is greatest for smaller firms.

Table 9 reports the average of the squared standardized OLS market model excess returns on days -1 through $+5$ relative to the earnings announcement. Under the null hypothesis that the same OLS market model holds in both the estimation period (days -250 to -60) and the test period and the assumption that this model's residuals are normally distributed, the standardized

independent variables, and using abnormal turnover for the three days (-1 to $+1$) surrounding the announcement.

prediction error has a t-distribution with 191 degrees of freedom. Therefore, $(189/191) * \text{the squared standardized prediction error}$ has an expected value of one.¹⁷ For the total sample (first line in panels A and B of Table 9), for both negative and positive forecast errors the volatility of excess returns increases on days close the announcement date, and then returns to more normal levels. The magnitude of the increase is greater when firms miss their earnings forecasts; there is a 236% increase in variance on the announcement date for negative forecast errors and a 172% increase for positive forecast errors. We provide t-statistics (in parentheses) for the test that the average ratio of the variance on an event date to the daily variance during the estimation period is different from one. Test statistics based on an estimation period -60 to -9 days prior to the earnings announcement are similar to those reported here.

We also divide the sample based on whether certain institutional ownership characteristics are greater or less than the sample median. Particularly when the forecast error is negative, the increase in variance is greater for firms with higher levels of institutional ownership (variance increases 299% versus 190%); the difference in mean squared standardized residuals is significant at the 10% level. However, consistent with our previous results, the change in variance is related to the composition of institutional ownership. For negative forecast errors, the date 0 increase in variance is almost twice as large (331% versus 179%) for firms with higher proportions of momentum ownership, which is significant at the 1% level. The increase is also substantially greater for firms with a higher proportion of ownership by growth (including aggressive growth) investors or investment advisors. Ownership by high turnover investors or investment advisors does not produce a significant effect. In contrast, the increased variance on day 0 does not appear to be related to the institutional ownership structure in cases of positive forecast errors (Panel B).

¹⁷ See Chari, Jagannathan and Ofer (1988) for further explanation of these calculations.

VI. *Summary and Conclusions*

Traditional finance theory assumes a world of perfect capital markets in which there are no reasons to expect the nature and motivation of a firm's investors would have any effect on the price of its stock. In perfect markets, there are no costs of transacting and all agents act as price-takers; all investors have the same information about a firm and form the same valuation of a stock. Our analysis contributes to the growing body of literature which suggests the heterogeneity of investor type and investment style has important ramifications for the behavior of asset prices. Differences in taxation, transactions costs, and divergence of information may lead investors to respond differently to information released by managers. Further study is needed as to why managers should be concerned by the identity of their shareholders, and how the firm's ownership structure can effect both security valuation and managers' decisions.

In this paper we study one facet of this question: Does the ownership composition of firms affect the market reaction to the release of earnings information? We extend the literature on institutional ownership by segmenting institutional investors by investment style, momentum trading behavior and portfolio turnover. We find that the magnitude of the price reaction, and especially the trading intensity and cross-sectional variance at earnings information release are related not just to the level of institutional ownership, but more importantly to characteristics of the institutional holders. Our findings demonstrate the significance of the heterogeneity of a firm's institutional shareholders, and show that the portfolio allocation decisions of institutions may affect the returns and trading patterns of common stocks.

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Table 1
Descriptive statistics

This table presents firm characteristics and institutional ownership descriptive statistics for the sample of 3163 observations for 203 firms with earnings announcements from 1992 through 1997. Market value of equity, market to book and PE ratios are based on the stock price 30 days prior to the earnings announcement. Other financial statement data are measured at the fiscal year end prior to the earnings announcement. Institutional ownership data is obtained from Spectrum at the calendar quarter end preceding the earnings announcement. All institutional ownership statistics are reported as a percentage of total shares outstanding. The percentage of shares owned by managers of different types are based on Spectrum. Investment advisors includes both mutual fund companies and independent investment advisors. The percentage of shares owned by managers of different investment style and portfolio turnover are based on classifications provided by Georgeson & Co. Investment style classifications are based the dividend yield, growth in EPS and sales, and leading P/E of stocks in the manager's portfolio. Momentum investors are determined by examining the net positive versus negative number of analyst earnings estimate changes (as a percentage of the number analysts following the stock) for stocks held, purchased and sold by each manager. Turnover is based on the average holding period for stocks in the manager's portfolio. Managers are classified as high (average holding period less than 1.5 years), medium (1.5 to 3 years) or low (greater than 3 years) turnover.

	Mean	Median	Minimum	Maximum
<i>A. Firm characteristics</i>				
Market value of equity (\$ billions)	6.9	2.1	0.023	174.6
Total assets	13.1	3.3	0.009	262.9
Total assets/liabilities	1.9	1.5	0.3	25.9
Operating income/revenue	0.18	0.19	-13.51	0.88
Market/book ratio	3.0	2.3	-523.5	755.4
PE ratio	59.3	57.4	-5912.5	4412.5
Number of analysts	9.1	8.0	1.0	32.0
<i>B. Institutional ownership</i>				
All 13(f) institutions	58.5%	61.0%	4.1%	99.9%
Largest 5 institutions	20.9%	19.2%	2.1%	72.5%
Largest 10 institutions	29.8%	28.5%	3.3%	85.8%
Largest 20 institutions	39.8%	39.4%	3.9%	90.5%
<i>C. Ownership by manager type</i>				
Banks	12.9%	12.2%	0.4%	43.3%
Insurance companies	3.9%	2.8%	0.0%	59.6%
Investment advisors	36.2%	35.4%	1.8%	85.4%
Other managers	5.7%	5.3%	0.0%	31.7%
<i>D. Ownership by manager investment style</i>				
Aggressive growth	5.4%	2.6%	0.0%	58.3%
Other growth	25.0%	24.5%	0.5%	75.7%
Value	8.6%	6.6%	0.0%	70.8%
Income	13.5%	12.6%	0.1%	45.6%
<i>E. Ownership by momentum investors</i>				
	8.2%	5.6%	0.0%	53.1%
<i>F. Ownership by manager portfolio turnover</i>				
High turnover	10.8%	8.7%	0.0%	62.5%
Medium turnover	20.3%	19.6%	0.2%	71.5%
Low turnover	27.4%	27.5%	1.4%	60.2%

Table 2
Analysis of manager characteristics

Table provides an analysis of investment style for each manager type, momentum and turnover classification. N is the total number of managers of that classification on Spectrum in our sample period. Manager classifications are provided by Georgeson & Co and defined as in Table 1. "Balanced" investment style includes managers whose portfolios are not weighted toward any of the other style classifications. Momentum classifications indicate whether the manager does (1) or does not (0) exhibit earnings momentum trading behavior.

Investment style:	Aggressive growth	Growth	Value	Income	Balanced	N
<hr/>						
<i>A. All 13(f) institutions</i>	10.4%	46.9%	13.7%	20.6%	8.4%	2244
<hr/>						
<i>B. Manager type:</i>						
Banks	1.2%	38.3%	7.5%	43.3%	9.7%	321
Insurance companies	6.9%	43.8%	15.4%	15.4%	18.5%	130
Investment advisors	13.0%	50.1%	15.3%	15.7%	5.8%	1544
Other	7.6%	39.4%	10.4%	24.5%	18.1%	249
<hr/>						
<i>C. Momentum trading style</i>						
Momentum (1)	24.7%	52.3%	10.2%	10.6%	2.1%	235
Momentum (0)	8.6%	46.3%	14.2%	22.0%	8.9%	1970
<hr/>						
<i>D. Portfolio turnover:</i>						
High turnover	20.1%	42.3%	19.1%	14.4%	4.1%	492
Medium turnover	8.2%	52.2%	15.1%	20.9%	3.7%	464
Low turnover	3.4%	46.3%	10.1%	31.5%	8.7%	505
<hr/>						

Table 3
Stock price reactions to earnings announcements

The table reports the cumulative market model abnormal returns for the [-1,0] window relative to the earnings announcement. Market model parameters are estimated using returns from day -250 to day -50 relative to the earnings announcement. Firms which announce quarterly earnings below the I/B/E/S consensus forecast are designated as having negative earnings forecast errors; quarterly earnings more than \$0.02 per share above the forecast are designated as having positive forecast errors. The forecast partitioned samples are further divided into high/low institutional ownership sub-samples based on whether institutional ownership characteristics for that firm are above or below the sample median. P-values for test of difference in means and medians are shown in parentheses.

<i>A. Negative forecast errors</i>										
	Mean ^a	Median ^a	N	Mean ^a	Median ^a	N				
All observations	-0.83%	-0.54%	1113							
Ownership by:	Ownership > sample median			Ownership < sample median			Difference in means		Difference in medians	
All institutions	-1.00%	-0.58%	501	-0.65%	-0.34%	528	-0.35%	(0.031)**	-0.24%	(0.179)
Momentum investors	-1.22%	-0.69%	433	-0.53%	-0.41%	596	-0.69%	(0.000)***	-0.27%	(0.136)
Aggressive growth investors	-1.13%	-0.48%	419	-0.61%	-0.52%	610	-0.52%	(0.055)*	0.04%	(0.431)
All growth investors	-1.28%	-0.95%	444	-0.47%	-0.30%	585	-0.81%	(0.000)***	-0.65%	(0.005)***
High turnover investors	-1.06%	-0.51%	433	-0.65%	-0.52%	596	-0.42%	(0.043)**	0.01%	(0.220)
Investment advisors	-0.84%	-0.48%	459	-0.80%	-0.52%	569	-0.04%	(0.555)	0.04%	(0.686)
<i>B. Positive forecast errors</i>										
	Mean ^a	Median ^a	N	Mean ^a	Median ^a	N				
All observations	1.17%	0.88%	1083							
Ownership by:	Ownership > sample median			Ownership < sample median			Difference in means		Difference in medians	
All institutions	1.23%	1.09%	532	1.23%	0.83%	458	-0.01%	(0.982)	0.26%	(0.569)
Momentum investors	1.20%	1.14%	496	1.26%	0.85%	494	-0.06%	(0.361)	0.29%	(0.709)
Aggressive growth investors	1.22%	1.11%	492	1.24%	0.86%	498	-0.02%	(0.467)	0.25%	(0.655)
All growth investors	1.18%	1.03%	504	1.28%	0.83%	486	-0.10%	(0.307)	0.21%	(0.579)
High turnover investors	1.07%	1.05%	524	1.41%	0.85%	466	-0.35%	(0.024)**	0.20%	(0.733)
Investment advisors	1.27%	1.19%	539	1.18%	0.72%	451	0.09%	(0.247)	0.47%	(0.785)

^a All mean and median cumulative abnormal returns are significantly different from zero at the 1% level.
***, **, * denote significance at 1%, 5% and 10% level, respectively.

Table 4
Abnormal return regressions with institutional ownership levels

The dependent variable is the earnings announcement two day [-1,0] cumulative market model abnormal return. The earnings forecast error is defined as the difference between reported earnings per share and the consensus I/B/E/S forecast, deflated by the stock price 10 days prior to the announcement. Market value of equity, PE ratio, and market to book ratio are based on the stock price 30 days prior to the announcement. Prior 3 month stock return is the market adjusted return over the three months prior to the announcement date. Total 13(f) ownership is based on Spectrum's listing of all holdings by 13(f) institutions at the calendar quarter end preceding the announcement. All other ownership variables are based on Georgeson's classifications (defined in Table 1) and are calculated as a percent of total shares held by 13(f) institutions. Panel A is limited to earnings announcements where reported quarterly earnings per share is lower than the consensus I/B/E/S forecast. Panel B is limited to earnings announcements where reported quarterly earnings exceeds the consensus I/B/E/S forecast by more than \$0.02 per share. Standard errors are reported in parentheses.

Panel A: negative forecast errors

	(1)	(2)	(3)	(4)	(5)
Intercept	0.0319 (0.0264)	0.0403 (0.0264)	0.0370 (0.0308)	0.0444 (0.0298)	0.0373 (0.0311)
Forecast error	0.6892 (0.3606) ^c	0.7783 (0.3604) ^b	0.8428 (0.3598) ^b	0.6995 (0.3616) ^c	0.7002 (0.3611) ^c
PE ratio	0.0002 (0.0039)	0.0005 (0.0039)	0.0003 (0.0038)	0.0004 (0.0039)	0.0003 (0.0039)
Log (market value of equity)	-0.0013 (0.0012)	-0.0015 (0.0012)	-0.0014 (0.0013)	-0.0017 (0.0013)	-0.0014 (0.0013)
Market to book ratio	-0.0001 (0.0000) ^b	-0.0001 (0.0000) ^a	-0.0001 (0.0000) ^a	-0.0001 (0.0000) ^b	-0.0001 (0.0000) ^b
3 yr sales growth	0.0008 (0.0006)	0.0010 (0.0006)	0.0013 (0.0006) ^b	0.0009 (0.0006)	0.0008 (0.0006)
Dividend yield	0.0064 (0.0127)	0.0035 (0.0126)	0.0035 (0.0126)	0.0060 (0.0127)	0.0063 (0.0127)
Prior 3 mo. stock return	0.0126 (0.0107)	0.0108 (0.0107)	0.0085 (0.0107)	0.0121 (0.0107)	0.0120 (0.0107)
Total 13(f) ownership/shares outstanding	-0.0170 (0.0084) ^b	-0.0133 (0.0085)	-0.0183 (0.0086) ^b	-0.0149 (0.0087) ^c	-0.0167 (0.0086) ^c
Ownership by (as a % of total 13(f)):					
Momentum investors		-0.0511 (0.0177) ^a			
Aggressive growth investors			-0.0394 (0.0193) ^b		
Growth investors			-0.0125 (0.0143)		
Value investors			0.0401 (0.0180) ^b		
High turnover investors				-0.0200 (0.0181)	
Medium turnover investors				-0.0056 (0.0155)	
Investment advisors					-0.0037 (0.0138)
N	886	886	886	886	885
R ²	0.022	0.031	0.042	0.023	0.022

a,b,c indicate significance at the 1%, 5% and 10% level, respectively.

Table 4 - continued

Panel B: positive forecast errors

	(1)		(2)		(3)		(4)		(5)	
Intercept	-0.0484	(0.0212) ^b	-0.0462	(0.0213) ^b	-0.0549	(0.0255) ^b	-0.0417	(0.0244) ^c	-0.0756	(0.0248) ^a
Forecast error	2.4823	(0.5700) ^a	2.4107	(0.5754) ^a	2.4577	(0.5783) ^a	2.5162	(0.5707) ^a	2.5668	(0.5703) ^a
PE ratio	0.0142	(0.0076) ^c	0.0139	(0.0076) ^c	0.0144	(0.0077) ^c	0.0135	(0.0076) ^c	0.0143	(0.0076) ^c
Log (market value of equity)	0.0024	(0.0009) ^b	0.0023	(0.0009) ^b	0.0026	(0.0010) ^b	0.0021	(0.0010) ^b	0.0031	(0.0010) ^a
Market to book ratio	-0.0004	(0.0002)	-0.0004	(0.0002)	-0.0004	(0.0002)	-0.0004	(0.0002)	-0.0004	(0.0002)
3 yr sales growth	0.0031	(0.0018) ^c	0.0035	(0.0019) ^c	0.0028	(0.0020)	0.0042	(0.0020) ^b	0.0023	(0.0019)
Dividend yield	-0.0001	(0.0095)	-0.0008	(0.0095)	0.0000	(0.0095)	-0.0008	(0.0095)	0.0001	(0.0095)
Prior 3 mo. stock return	-0.0149	(0.0090) ^c	-0.0132	(0.0092)	-0.0156	(0.0093) ^c	-0.0127	(0.0092)	-0.0184	(0.0092) ^b
Total 13(f) ownership/shares outstanding	0.0055	(0.0066)	0.0068	(0.0067)	0.0048	(0.0068)	0.0075	(0.0068)	0.0019	(0.0068)
Ownership by (as a % of total 13(f)):										
Momentum investors			-0.0113	(0.0124)						
Aggressive growth investors					0.0067	(0.0147)				
Growth investors					0.0020	(0.0112)				
Value investors					0.0064	(0.0151)				
High turnover investors							-0.0201	(0.0124)		
Medium turnover investors							0.0071	(0.0120)		
Investment advisors									0.0223	(0.0107) ^b
N	845		845		845		845		845	
R ²	0.037		0.038		0.038		0.042		0.042	

a,b,c indicate significance at the 1%, 5% and 10% level, respectively.

Table 5
Abnormal return regressions with changes in institutional ownership

The dependent variable is the earnings announcement two day [-1,0] cumulative market model abnormal return. The independent variables are a series of firm characteristic control variables, the earnings forecast error, and the change in the level and composition of institutional ownership. Changes in ownership are calculated as the change between the calendar quarter end dates surrounding the earnings announcement. Change in total 13(f) ownership is the change in holdings by all 13(f) institutions as a percentage of shares outstanding. All other ownership changes are based on Georgeson's classifications (defined in Table 1) and are measured as the change in holdings as a percentage of total 13(f) institutional holdings. Panel A is limited to earnings announcements where reported quarterly earnings per share is lower than the consensus I/B/E/S forecast. Panel B is limited to earnings announcements where reported quarterly earnings exceeds the consensus I/B/E/S forecast by more than \$0.02 per share. Standard errors are reported in parentheses.

Panel A: negative forecast errors

	(1)	(2)	(3)	(4)	(5)
Intercept	0.0262 (0.0262)	0.0237 (0.0259)	0.0304 (0.0259)	0.0191 (0.0259)	0.0263 (0.0263)
Forecast error	0.6704 (0.3612) ^c	0.6517 (0.3561) ^c	0.7610 (0.3577) ^b	0.7499 (0.3570) ^b	0.6812 (0.3618) ^c
PE ratio	0.0005 (0.0039)	0.0004 (0.0038)	-0.0008 (0.0039)	0.0007 (0.0038)	0.0007 (0.0039)
Log (market value of equity)	-0.0015 (0.0012)	-0.0013 (0.0012)	-0.0016 (0.0012)	-0.0011 (0.0012)	-0.0015 (0.0012)
Market to book ratio	-0.0001 (0.0000) ^b	-0.0001 (0.0000) ^b	-0.0001 (0.0000) ^b	-0.0001 (0.0000) ^b	-0.0001 (0.0000) ^b
3 yr sales growth	0.0008 (0.0006)	0.0009 (0.0006)	0.0008 (0.0006)	0.0011 (0.0006) ^c	0.0009 (0.0006)
Dividend yield	0.0063 (0.0127)	0.0052 (0.0125)	0.0026 (0.0126)	0.0059 (0.0125)	0.0063 (0.0127)
Prior 3 mo. stock return	0.0104 (0.0110)	-0.0091 (0.0114)	-0.0033 (0.0112)	-0.0036 (0.0112)	0.0074 (0.0111)
Change in total 13(f) ownership	0.0351 (0.0197) ^c	0.0418 (0.0243) ^c	0.0523 (0.0250) ^b	0.0504 (0.0250) ^b	0.0689 (0.0246) ^a
Change in ownership by:					
Momentum investors		0.2083 (0.0404) ^a			
Aggressive growth investors			0.2273 (0.0547) ^a		
Growth investors			0.0307 (0.0390)		
Value investors			-0.0310 (0.0500)		
High turnover investors				0.2029 (0.0442) ^a	
Medium turnover investors				0.0128 (0.0375)	
Investment advisors					0.0074 (0.0337)
N	882	877	877	877	876
R ²	0.021	0.054	0.052	0.052	0.026

a,b,c indicate significance at the 1%, 5% and 10% level, respectively.

Table 5 - continued

Panel B: positive forecast errors

	(1)		(2)		(3)		(4)		(5)	
Intercept	-0.0487	(0.0205) ^b	-0.0540	(0.0203) ^a	-0.0515	(0.0204) ^b	-0.0487	(0.0202) ^b	-0.0488	(0.0205) ^b
Forecast error	2.2544	(0.5627) ^a	2.2602	(0.5564) ^a	2.2307	(0.5595) ^a	2.2302	(0.5556) ^a	2.2520	(0.5634) ^a
PE ratio	0.0152	(0.0075) ^b	0.0168	(0.0075) ^b	0.0175	(0.0075) ^b	0.0152	(0.0075) ^b	0.0152	(0.0076) ^b
Log (market value of equity)	0.0026	(0.0009) ^a	0.0028	(0.0009) ^a	0.0027	(0.0009) ^a	0.0026	(0.0009) ^a	0.0026	(0.0009) ^a
Market to book ratio	-0.0004	(0.0002)	-0.0005	(0.0002) ^b	-0.0004	(0.0002) ^c	-0.0004	(0.0002) ^c	-0.0004	(0.0002) ^c
3 yr sales growth	0.0020	(0.0018)	0.0027	(0.0018)	0.0024	(0.0018)	0.0032	(0.0018) ^c	0.0020	(0.0018)
Dividend yield	-0.0022	(0.0094)	-0.0010	(0.0093)	-0.0001	(0.0094)	-0.0020	(0.0093)	-0.0023	(0.0094)
Prior 3 mo. stock return	-0.0190	(0.0091) ^b	-0.0290	(0.0092) ^a	-0.0237	(0.0092) ^a	-0.0296	(0.0092) ^a	-0.0190	(0.0091) ^b
Change in total 13(f) ownership	0.0466	(0.0193) ^b	0.0319	(0.0196)	0.0393	(0.0199) ^b	0.0331	(0.0199) ^c	0.0483	(0.0196) ^b
Change in ownership by:										
Momentum investors			0.1592	(0.0350) ^a						
Aggressive growth investors					0.1238	(0.0466) ^a				
Growth investors					0.0954	(0.0377) ^b				
Value investors					-0.0025	(0.0496)				
High turnover investors							0.1646	(0.0364) ^a		
Medium turnover investors							0.0267	(0.0347)		
Investment advisors									0.0121	(0.0280)
N	837		836		836		836		836	
R ²	0.043		0.066		0.059		0.070		0.043	

a,b,c indicate significance at the 1%, 5% and 10% level, respectively.

Table 6
Logit Regressions for Individual Institution's Probability of Selling/Buying in Response to Negative/Positive Earnings News

Sell (Buy) > 10%, 20%, 50% indicates the investor decreased (increased) shares held by greater than 10%, 20% or 50% respectively, in response to negative (positive) earnings news. The change in shares held is measured over the quarterly period containing the earnings announcement. Abnormal trading volume is calculated as the difference between daily turnover (volume/shares outstanding) and the median daily turnover on days -250 to -60. The s.d. of analysts' forecasts is the standard deviation of forecasts from I/B/E/S prior to the announcement. Momentum investor, aggressive growth or growth investor, investment advisor and hi turnover investor are dummy variables indicating investor characteristics. P-values are reported in parentheses.

Panel A: Negative forecast errors

Dependent Variable:	Sell > 10%		Sell > 20%		Sell > 50%	
N (Sell = 1)	99,099		86,233		69,335	
N (Sell = 0)	159,010		171,876		188,774	
Total N	258,109		258,109		258,109	
Intercept	0.994	(0.0001) ^a	1.443	(0.0001) ^a	1.841	(0.0001) ^a
Forecast error	-1.531	(0.0413) ^b	-0.841	(0.2722)	0.420	(0.6004)
Log (market value of equity)	-0.112	(0.0001) ^a	-0.147	(0.0001) ^a	-0.180	(0.0001) ^a
Stock return over quarter	-0.163	(0.0001) ^a	-0.219	(0.0001) ^a	-0.260	(0.0001) ^a
Market return over quarter	0.910	(0.0001) ^a	1.226	(0.0001) ^a	1.732	(0.0001) ^a
PE ratio	0.000	(0.0001) ^a	0.000	(0.0036) ^a	0.000	(0.0109) ^b
Market to book ratio	0.001	(0.0051) ^a	0.001	(0.0018) ^a	0.001	(0.0006) ^a
s.d. of analysts' forecasts	0.099	(0.2517)	0.122	(0.1700)	0.018	(0.8495)
Abnormal stock trading volume	0.148	(0.0001) ^a	0.156	(0.0001) ^a	0.147	(0.0001) ^a
Momentum investor	0.173	(0.0001) ^a	0.167	(0.0001) ^a	0.150	(0.0001) ^a
Aggressive growth or growth investor	0.052	(0.0001) ^a	0.060	(0.0001) ^a	0.069	(0.0001) ^a
Investment advisor	0.322	(0.0001) ^a	0.361	(0.0001) ^a	0.399	(0.0001) ^a
Hi turnover investor	0.701	(0.0001) ^a	0.763	(0.0001) ^a	0.800	(0.0001) ^a
Log likelihood	12413		14721		15378	

Table 6 - continued

Panel B: Positive forecast errors

Dependent Variable:	Buy > 10%	Buy > 20%	Buy > 50%
N (Buy = 1)	41,184	30,275	18,172
N (Buy = 0)	202,286	213,195	225,298
Total N	243,470	243,470	243,470
Intercept	-1.7947 (0.0001) ^a	-1.8207 (0.0001) ^a	-2.4864 (0.0001) ^a
Forecast error	0.1703 (0.9320)	-2.1408 (0.3415)	-2.8335 (0.3094)
Log (market value of equity)	-0.0133 (0.0025) ^a	-0.0373 (0.0001) ^a	-0.0417 (0.0001) ^a
Stock return over quarter	-0.1791 (0.0002) ^a	-0.1054 (0.0460) ^b	0.0333 (0.6095)
Market return over quarter	-0.8478 (0.0001) ^a	-1.0287 (0.0001) ^a	-1.6221 (0.0001) ^a
PE ratio	0.0000 (0.8273)	0.0000 (0.4892)	-0.0001 (0.0337) ^b
Market to book ratio	0.0004 (0.7368)	0.0006 (0.6257)	0.0019 (0.2326)
s.d. of analysts' forecasts	0.6448 (0.0001) ^a	0.6604 (0.0001) ^a	0.7057 (0.0006) ^a
Abnormal stock trading volume	0.1130 (0.0001) ^a	0.1462 (0.0001) ^a	0.1762 (0.0001) ^a
Momentum investor	0.2397 (0.0001) ^a	0.2785 (0.0001) ^a	0.3399 (0.0001) ^a
Aggressive growth or growth investor	-0.0030 (0.7881)	0.0094 (0.4643)	0.0284 (0.0777) ^c
Investment advisor	-0.0486 (0.0001) ^a	0.0093 (0.4749)	0.0779 (0.0001) ^a
Hi turnover investor	0.1057 (0.0001) ^a	0.2041 (0.0001) ^a	0.2875 (0.0001) ^a
Log likelihood	948	1404	1582

Table 7
Computed Probabilities from Logit Regressions:
Individual Institution's Probability of Selling/Buying in Response to Negative/Positive Earnings News

Sell (Buy) > 10%, 20%, 50% indicates the investor decreased (increased) shares held by greater than 10%, 20% or 50% respectively, in response to negative (positive) earnings news. The change in shares held is measured over the quarterly period containing the earnings announcement. Probabilities are computed using estimates reported in Table 6. Base case is calculated setting all independent variables to their sample means or to zero for dummy variables. Additional probability estimates are calculated by increasing the independent variable by one standard deviation or setting the dummy variable for investor characteristics equal to one. Difference from base case probability is shown in parentheses.

Dependent variable from logistic regression:	Negative forecast errors:			Positive forecast errors:		
	Sell > 10%	Sell > 20%	Sell > 50%	Buy > 10%	Buy > 20%	Buy > 50%
<i>Base case (all at means, or 0)</i>	30.47%	25.12%	18.85%	16.35%	11.26%	6.17%
Momentum investor	34.25% (3.79%)	28.38% (3.26%)	21.26% (2.41%)	19.89% (3.55%)	14.35% (3.10%)	8.46% (2.29%)
Aggressive growth or growth investor	31.58% (1.11%)	26.27% (1.15%)	19.93% (1.07%)	16.31% (-0.04%)	11.35% (0.09%)	6.34% (0.17%)
Investment advisor	37.69% (7.22%)	32.50% (7.38%)	25.71% (6.86%)	15.69% (-0.65%)	11.35% (0.09%)	6.64% (0.47%)
Hi turnover investor	46.90% (16.43%)	41.85% (16.73%)	34.07% (15.22%)	17.85% (1.50%)	13.46% (2.21%)	8.06% (1.89%)

Table 8
Trading volume regressions with institutional ownership levels

The dependent variable is the earnings announcement two day [-1,0] abnormal trading volume. Abnormal trading volume is calculated as the difference between daily turnover (volume/shares outstanding) and the median daily turnover on days -250 to -60. The independent variables are a series of firm characteristic control variables, and the level and composition of institutional ownership. Abnormal return is the two day [-1,0] cumulative market model abnormal stock return. The s.d. of analysts' forecasts is the standard deviation of forecasts from I/B/E/S prior to the announcement. Total 13(f) ownership is based on Spectrum's listing of all holdings by 13(f) institutions at the calendar quarter end preceding the announcement. All other ownership variables are based on Georgeson's classifications (defined in Table 1) and are calculated as a percent of total shares held by 13(f) institutions. Panel A is limited to earnings announcements where reported quarterly earnings per share is lower than the consensus I/B/E/S forecast. Panel B is limited to earnings announcements where reported quarterly earnings exceeds the consensus I/B/E/S forecast by more than \$0.02 per share. Standard errors are reported in parentheses.

Panel A: negative forecast errors

	(1)	(2)	(3)	(4)	(5)
Intercept	3.9938 (0.5459) ^a	3.5215 (0.5319) ^a	2.0919 (0.6059) ^a	3.1938 (0.5592) ^a	1.2713 (0.6021) ^b
Abnormal return [-1,0]	-3.8560 (0.6886) ^a	-3.5394 (0.6680) ^a	-3.4853 (0.6557) ^a	-3.7532 (0.6702) ^a	-3.8927 (0.6607) ^a
s.d. of analysts' forecasts	2.3714 (0.5331) ^a	2.8670 (0.5199) ^a	2.8132 (0.5151) ^a	2.4766 (0.5190) ^a	2.6146 (0.5121) ^a
Log (market value of equity)	-0.0256 (0.0247)	-0.0135 (0.0239)	0.0353 (0.0250)	0.0317 (0.0255)	0.0407 (0.0248)
3 yr sales growth	0.0403 (0.0151) ^a	0.0263 (0.0147) ^c	-0.0050 (0.0150)	0.0185 (0.0150)	0.0237 (0.0146)
Dividend yield	-0.4526 (0.2739) ^c	-0.2835 (0.2661)	-0.2648 (0.2608)	-0.3983 (0.2666)	-0.4548 (0.2627) ^c
Prior 3 mo. stock return	-0.9522 (0.2162) ^a	-0.9038 (0.2095) ^a	-0.7594 (0.2059) ^a	-0.9192 (0.2107) ^a	-0.8192 (0.2080) ^a
Total 13(f) ownership/shares outstanding	1.1615 (0.1798) ^a	0.9342 (0.1764) ^a	0.9245 (0.1759) ^a	0.8471 (0.1821) ^a	0.8190 (0.1765) ^a
Ownership by (as a % of total 13(f)):					
Momentum investors		2.9037 (0.3628) ^a			
Aggressive growth investors			3.8259 (0.3878) ^a		
Growth investors			0.9550 (0.2841) ^a		
Value investors			0.4149 (0.3640)		
Hi turnover investors				1.6219 (0.4412) ^a	
Low turnover investors				-1.0155 (0.3134) ^a	
Investment advisors					2.5555 (0.2776) ^a
N	959	959	959	959	958
R ²	0.122	0.178	0.213	0.170	0.194

a,b,c indicate significance at the 1%, 5% and 10% level, respectively.

Table 8 - continued

Panel B: positive forecast errors

	(1)		(2)		(3)		(4)		(5)	
Intercept	5.0837	(0.5094) ^a	4.8215	(0.4981) ^a	3.4635	(0.6120) ^a	3.4793	(0.5280) ^a	2.5953	(0.5785) ^a
Abnormal return [-1,0]	6.6691	(0.8383) ^a	6.9934	(0.8188) ^a	6.6747	(0.8141) ^a	7.0730	(0.8063) ^a	6.2705	(0.8116) ^a
s.d. of analysts' forecasts	2.4224	(0.7258) ^a	3.1198	(0.7147) ^a	3.0002	(0.7174) ^a	2.5878	(0.7008) ^a	3.1783	(0.7074) ^a
Log (market value of equity)	-0.0706	(0.0230) ^a	-0.0654	(0.0224) ^a	-0.0165	(0.0248)	-0.0014	(0.0240)	-0.0079	(0.0235)
3 yr sales growth	0.2614	(0.0509) ^a	0.1677	(0.0514) ^a	0.1005	(0.0534) ^c	0.1066	(0.0518) ^b	0.1858	(0.0500) ^a
Dividend yield	-0.6622	(0.3545) ^c	-0.4683	(0.3468)	-0.5078	(0.3450)	-0.5177	(0.3408)	-0.5843	(0.3428) ^c
Prior 3 mo. stock return	1.2265	(0.2266) ^a	0.9130	(0.2255) ^a	0.8014	(0.2263) ^a	0.8454	(0.2223) ^a	0.8910	(0.2228) ^a
Total 13(f) ownership/shares outstanding	0.8529	(0.1673) ^a	0.6086	(0.1668) ^a	0.6103	(0.1664) ^a	0.5343	(0.1664) ^a	0.5277	(0.1665) ^a
Ownership by (as a % of total 13(f)):										
Momentum investors			2.1886	(0.3122) ^a						
Aggressive growth investors					2.7347	(0.3688) ^a				
Growth investors					0.7452	(0.2770) ^a				
Value investors					0.4910	(0.3776)				
Hi turnover investors							2.5155	(0.3808) ^a		
Low turnover investors							-0.2846	(0.2999)		
Investment advisors									2.1500	(0.2626) ^a
N	941		941		941		941		941	
R ²	0.159		0.201		0.212		0.226		0.216	

a,b,c indicate significance at the 1%, 5% and 10% level, respectively.

Table 9
Variance of stock returns on days around earnings announcements

The table reports the mean squared standardized OLS market model excess return on days -1 through +5 relative to the earnings announcement. Under the null hypothesis that the same OLS market model holds in both the estimation period (days -250 to -60) and the test period, the squared standardized prediction error has an expected value of one. a,b,c indicate the mean squared standardized return is significantly different between subgroups of ownership greater or less than the sample median at the 1%, 5% and 10% level, respectively. T-statistics (in parentheses) are provided for the test that the average ratio of the variance on that date to the daily variance during the estimation period is different from one.

Panel A: Negative Forecast Errors

		Day relative to earnings announcement:							
		-1	0	+1	+2	+3	+4	+5	N
All observations		2.21 (5.46)	3.36 (7.08)	2.49 (4.78)	1.24 (2.32)	1.11 (1.44)	0.96 (-0.55)	1.03 (0.65)	1113
Ownership by									
All institutions:	< sample median	1.77 ^b (3.14)	2.90 ^c (4.03)	1.94 ^c (4.83)	1.07 (1.02)	1.12 (0.84)	0.97 (-0.18)	0.92 (-0.76)	528
	> sample median	2.86 (4.45)	3.99 (5.52)	3.28 (3.44)	1.41 (1.92)	1.11 (1.19)	0.96 (-0.28)	1.14 (1.28)	501
Momentum investors:	< sample median	1.85 ^b (4.20)	2.79 ^a (5.61)	2.08 ^c (4.13)	1.08 (1.17)	1.01 (0.27)	1.03 (0.56)	1.05 (0.68)	596
	> sample median	2.92 (3.87)	4.31 (4.55)	3.29 (3.19)	1.46 (1.85)	1.27 (1.39)	0.88 (-1.28)	1.00 (0.11)	433
All growth investors:	< sample median	1.98 (3.89)	2.84 ^b (5.13)	1.68 ^a (4.76)	1.28 (1.60)	1.15 (1.10)	1.05 ^c (0.82)	1.03 (0.46)	585
	> sample median	2.73 (3.87)	4.20 (4.70)	3.79 (3.68)	1.18 (1.65)	1.07 (0.82)	0.86 (-1.74)	1.02 (0.34)	444
High turnover investors:	< sample median	2.10 (3.87)	3.14 (4.87)	2.60 (3.04)	1.14 (1.72)	1.13 (0.96)	1.00 (0.25)	1.13 ^c (1.30)	596
	> sample median	2.58 (3.81)	3.83 (4.72)	2.57 (4.54)	1.38 (1.57)	1.10 (1.08)	0.92 (-0.89)	0.88 (-1.35)	433
Investment advisors:	< sample median	2.11 ^c (3.42)	2.90 ^c (3.87)	2.01 (5.11)	1.19 (1.07)	1.12 (0.89)	0.99 (0.02)	0.96 (0.49)	569
	> sample median	2.54 (4.32)	4.09 (6.28)	3.32 (3.38)	1.30 (1.90)	1.12 (1.13)	0.94 (-0.55)	1.11 (0.33)	459

Table 9 - continued

Panel B: Positive Forecast Errors

		Day relative to earnings announcement:							
		-1	0	+1	+2	+3	+4	+5	N
All observations		1.84 (8.52)	2.72 (12.65)	2.19 (9.23)	1.43 (5.01)	1.08 (1.03)	1.14 (2.11)	1.11 (2.46)	1083
Ownership by									
All institutions:	< sample median	1.90 (5.68)	2.85 (7.95)	1.90 (6.04)	1.23 ^b (2.99)	1.14 (1.47)	1.16 (1.34)	1.13 (1.64)	458
	> sample median	1.86 (6.22)	2.72 (9.17)	2.43 (6.51)	1.62 (3.87)	1.05 (-0.59)	1.15 (1.79)	1.04 (1.53)	532
Momentum investors:	< sample median	2.11 ^c (5.73)	3.07 (8.37)	2.35 (5.12)	1.49 (3.52)	1.09 (0.88)	1.21 (0.76)	0.97 (1.06)	494
	> sample median	1.65 (6.14)	2.49 (8.73)	2.01 (7.36)	1.39 (3.41)	1.11 (0.35)	1.10 (2.26)	1.19 (1.98)	496
All growth investors:	< sample median	1.91 (5.33)	3.03 (7.76)	1.99 (4.75)	1.48 (3.43)	1.22 ^c (1.63)	1.13 (0.91)	1.15 (1.25)	486
	> sample median	1.84 (6.60)	2.54 (9.41)	2.36 (7.26)	1.40 (3.52)	0.97 (-0.63)	1.18 (2.08)	1.01 (1.89)	504
High turnover investors:	< sample median	1.93 (5.29)	2.75 (8.92)	2.13 (4.93)	1.37 (3.33)	1.00 (0.70)	1.11 (0.96)	0.92 (0.19)	466
	> sample median	1.83 (6.53)	2.81 (8.73)	2.23 (7.57)	1.51 (3.57)	1.18 (0.57)	1.20 (2.03)	1.22 (2.50)	524
Investment advisors:	< sample median	1.90 (5.93)	2.49 (9.11)	1.61 ^a (5.90)	1.18 ^b (3.10)	1.14 (0.87)	1.13 (1.12)	1.15 (1.52)	451
	> sample median	1.86 (5.81)	3.03 (8.36)	2.66 (6.65)	1.66 (3.87)	1.06 (0.38)	1.17 (1.94)	1.02 (1.64)	539