Institutional investor preferences for analyst forecast accuracy: Which institutions care?

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Abstract: We examine the association between analyst earnings forecast accuracy and three different types of institutional ownership for US firms: transient investors, dedicated investors, and quasi-indexers. After accounting for endogeneity, we find consistent evidence that transient investors prefer an information environment with lower forecast errors, while dedicated and quasi-indexers appear indifferent to analyst forecast accuracy. Interestingly, the presence of transient investors lead to lower forecast error, while the presence of dedicated investors and quasi-indexers increases forecast error. Our findings indicate that, the practice of achieving "predictable earnings" by management or analysts may only appeal to certain types of institutional investors

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I. Introduction

In this paper, we investigate the association between the analyst earnings forecast accuracy and three types of institutional ownership, i.e., transient investors, dedicated investors, and quasi-indexers. Institutional investors constitute more than 50% of the US aggregate corporate ownership (Smith 1996) and are responsible for about two-thirds of daily stock trading (Hutchins 1994). Prior research has documented both the prominent role of this group in corporate governance and its significant impact on the information environment. It has also highlighted the importance of considering the differences in investment horizons and styles of institutional investors in various decision domains and price impacts (e.g., Bushee, 1998; 2001; Koh, 2007; Chen, Harford, and Li, 2007; Wang and Zhang 2009; An and Zhang, 2013).

Higher accuracy of analyst forecasts is a common outcome of better corporate disclosure practices and improved corporate governance. In general, institutional investors who follow the "prudent person" standard in their investment choices could be attracted to companies with more accurate analyst earnings forecasts. Institutional investors perceive such companies to be less risky and view the accuracy of analyst earnings forecasts as a "safety-net attribute" (Badrinath et al., 1989), an indicator of reduced information asymmetry, lower price impact (Falkenstein, 1996; Gompers and Metrick, 2001), better corporate disclosure and improved corporate governance (Bushee et al., 2007). Moreover, because institutional investors care about corporate governance (Bushee et al., 2007), disclosure quality (Bushee and Noe, 2000), and price impacts (Falkenstein, 1996; Gompers and Metrick, 2001) in a different way, analyst forecast accuracy should have different impacts on investment decision of various institutional investors.

Due to different investment horizon, portfolio turnover and the degree of diversification, we hypothesize that different styles of institutional investors lead to disparities in their sensitivity to earnings forecast accuracy. Transient investors have a short-term investment focus, a high portfolio turnover and high diversification, thus, are more sensitive to stock liquidity. They are especially obsessed with immediate earnings targets (Bushee 2001). In the presence of transient investors, management employs "discretionary accruals" more extensively (Koh 2007). Transient investors might be

interested in the accuracy of analyst earnings forecasts as a factor that reduces the price impact of trades. Therefore, they should be attracted to companies with more accurate analyst earnings forecasts because they perceive such companies to be less risky, with less information asymmetry and a lower price impact.

Dedicated investors have a long-term focus with a low portfolio turnover and concentrated investment. They have better access to private information and the resources necessary for adequate information processing. Their monitoring role in corporate governance may further give them an informational advantage (Bushee and Noe 2000; Porter 1992; Wang and Zhang 2009). An example of dedicated investors is Warren Buffet's Berkshire Hathaway. Dedicated investors may prefer forecast accuracy if the increased accuracy signals decreased investment risk. Nonetheless, they may perceive accurate analyst forecast as a result of more disclosures and analyst guidance as a negative sign because they lose their information advantage and the value of independent information processing, and hence opportunities of profiting from mispricing. Due to the offsetting effects, the impact of forecast accuracy on dedicated investors is an empirical question to explore.

Quasi-indexers are characterized by diversified portfolio and low portfolio turnover and are likely to follow the "buy and hold" strategy. An example is California pension fund (CalPERS). Quasi-indexers with a large number of portfolio stocks may prefer higher quality disclosure as a way to offset monitoring costs (Bushee and Noe, 2001) and thus like accurate analyst forecast. On the other hand, they may dislike analyst forecast accuracy if it leads to fewer opportunities of profiting from mispricing. Additionally, if they track the performance of a certain index, they may form their portfolios by simply following certain index components. As a result of these factors, their holding may be insensitive to the accuracy of the analyst earnings forecasts.

By combining earnings forecast data and disaggregated institutional investor data for US firms, we find that the association between total institutional ownership and analyst forecast accuracy is insignificant. This could be due to offsetting effects from various types of institutions that respond to forecast error levels in their investment decisions differently. Indeed, we find negative (positive) relationship between the percentage of transient (dedicated) investors and forecast error, and insignificant

relationship between quasi-indexers and forecast error, after controlling for firm characteristics and time effect.

However, the presence of institutional investors may have a feedback effect on analyst forecast accuracy. Managers or analysts may react in response to institutional ownership demand effects by making more/less disclosures or being more/less diligent in producing accurate forecast. Therefore, we apply the simultaneous equation method to account for the endogeneity issue, following the approach of Bhojraj and Sengupta (2003). In line with our hypothesis, we find that transient investors desire investment in low forecast error firms. Forecast accuracy has a positive impact on the holding of dedicated investors, although the relationship is barely significant. Quasi-indexers appear indifferent to analyst forecast accuracy. Moreover, we find that a higher percentage of transient investors lead to lower forecast error, whereas a higher percentage of dedicated and quasi-indexers contributes to higher forecast errors. This could be due to a demand effect that transient investors prefer less information asymmetry and therefore more management disclosures and more accurate analysis from analysts. Dedicated investors and quasi-indexers have their own information advantage, and therefore are less likely to push the managers to make more disclosures or demand analysts to make more accurate forecasts. In addition, we document differences in preferences of different types of institutional investors toward other basic corporate characteristics such as company size, leverage, analyst following, and stock liquidity.

Overall, our results confirm the validity of prior calls to account for investors' heterogeneity in both research models and managerial decisions, rather than to cast institutional investors as a homogeneous group (e.g, Koh, 2007; Wang and Zhang, 2009; An and Zhang, 2013). Treating institutional investors without decomposition will preclude uncovering any genuine links in such cases. While prior earnings management research has concluded that the market pays close attention to analyst earnings forecasts by rewarding (punishing) firms for meeting (missing) these benchmarks, and that management "manages earnings" in response to investors' expectations (e.g., Graham et al., 2005), which *particular* types of market participants are responsible for this market reaction remains unclear. If the impact of analyst forecast accuracy on investor's holding is different, then our understanding of the mechanism of market reactions and

management's related motivation is incomplete. This may result in erroneous implications for mandatory disclosures and corporate governance issues.

We contribute to the literature by demonstrating the asymmetric impact of forecast accuracy on investment decisions across different types of institutional investors. We provide consistent evidence from both the association analysis and simultaneous equation analysis that transient investors are attracted to the companies with lower forecast errors and they are the likely source of the previously documented positive market responses to forecast accuracy. This is consistent with the finding by Bushee and Noe (2000) that improvements in disclosure quality produce contemporaneous increases in ownership primarily by transient-type institutions. We draw attention to the fact that corporate executives might be unaware that their self-admitted focus on earnings predictability at the expense of long-term value (Graham et al., 2005) caters to the interest of only the limited group of the institutional investors and might contribute to stock volatility. Our study also provides useful insights for members of corporate Audit Committees, who should be aware that the dominance of transient investors increases executives' motivation for managing earnings, and for external auditors who might consider "investor base" as an additional factor in their risk assessment models.

The remainder of this paper proceeds as follows. In the next section of this paper, we provide a review of the prior literature and develop our hypotheses. In section 3, we identify data sources and describe our sample. We then explain our model and present results of our multivariate analyses and simultaneous equations modeling. We conclude with a discussion of implications of our study results.

2. Theoretical Background and Hypotheses

2.1 Literature

Prior studies about motivations for earnings management have examined the market reaction to whether firms meet or miss analyst earnings forecasts and concluded that the market rewards (punishes) firms for meeting (missing) these benchmarks. Annual abnormal returns are higher for companies that consistently meet earnings targets (Kasznik and McNichols, 2002). Further, market penalties for missing forecasts are

greater than the rewards for beating forecasts (Lopez and Rees, 2002). Finally, meeting analysts' expectations recently became the most critical earnings threshold for corporate management (Brown and Caylor, 2005).

Researchers provide competing explanations for these phenomena. Burgstahler and Dichev (1997) employ prospect theory and argue for an irrational asymmetric response to bad versus good news. Instead, Kasznik and McNichols (2002) explain this anomaly from the efficient market perspective. They suggest that the market perceives meeting or missing a benchmark as a signal of the direction of future earnings, and that meeting a benchmark consistently is an indicator of reduced investment risk.

We contribute to this line of literature by examining how institutional investors, as a group, view the signal of earnings forecast accuracy and whether different types of institutional investors differ in their investment reactions to this signal. Our study complements prior accounting research about earnings management in several important ways. First, while prior studies modeled beating/missing forecasts as a dichotomous variable, we address investors' reaction to the more complex signal of overall earnings forecast accuracy. Second, our study is an association study, not an event study, and our focus is on the relatively long-term impact rather than immediate impact of forecasting accuracy. Third, we do not assume the homogeneity of investors' decision algorithms. Instead, we identify investors' heterogeneity and speculate about the divergence of their investment strategies. The focus of our inquiry is on institutional ownership as a whole group and by different types of institutional investors.

Research about the impact of investors' heterogeneity on corporate environments builds on the methodology of Bushee (1998), which assigns institutional investors to one of three empirically distinct clusters based on their trading patterns: transient investors, quasi-indexers, and dedicated investors. We employ this methodology and examine whether different investment horizons of institutional investors lead to disparities in their attention to the accuracy of analyst earnings forecasts. We predict significant differences in the sensitivity of institutional investors to earnings forecast accuracy. We complement findings of prior studies on determinants of institutional ownership (e.g., O'Brien and Bhushan 1990; Bushee and Noe 2000) and on studies exploring the impact of the presence of institutional ownership on corporate governance and information asymmetry

(e.g., Frankel et al., 2006; Ashbaugh-Skaife et al., 2007; Ajinkya et al. 2005; Shleifer and Vishny, 1997).

2.2 Hypotheses development.

The accuracy of analyst forecasts is a complex signal that reflects the degree of transparency in the corporate information environment and captures a variety of underlying factors, such as analyst following and corporate disclosure practices. Therefore, there are many reasons why institutional investors could be sensitive to accuracy of analyst forecasts.

First, institutional investors could be attracted to companies with more accurate analyst earnings forecasts because they perceive such companies to be less risky. Institutional investors manage financial portfolios for their clients, are subject to a variety of legal restrictions on their activities, and should follow the "prudent person" standard in their investment choices (Cummins et al., 1980; Cummins and Westerfield, 1981; Badrinath et al., 1989; O'Brien and Bhushan, 1990; Gompers and Metrick, 2001). Institutional portfolio managers are constantly evaluated and are motivated to present their choices as reasonable, well-informed, and discreet. During times of inferior portfolio performance, "a 'safety-net' is provided to managers if they can demonstrate that their judgment regarding the soundness of a particular investment choice was shared by others" (Badrinath et al., 1989, p. 607). Kasznik and McNichols (2002) suggest that the market perceives meeting analyst forecasts consistently as a signal of reduced investment risk. If this is true, institutional investors will find it easier to justify their investment in companies with more accurate earnings forecasts and to provide proof of care to their fiduciaries, should the need arise. Thus, institutional portfolio managers might perceive the accuracy of analyst earnings forecasts as a "safety-net attribute" (Badrinath et al., 1989).

Second, institutional investors value analyst earnings forecasts accuracy if they see it as a factor that reduces the price impact of trades. Higher accuracy of analyst forecasts is a common outcome of better corporate disclosure practices. In addition, increased forecast accuracy is an objective, tangible outcome of those disclosure practices, as compared to perceptions of analysts about those practices. Prior research demonstrates

that (1) institutions tend to invest in companies with a lower price impact (Falkenstein, 1996; Gompers and Metrick, 2001) and (2) greater disclosures reduce information asymmetry and decrease price impact (Diamond and Verrecchia, 1991).

Third, institutional investors might see improved forecast accuracy as a signal of improved corporate governance. Bushee et al. (2007) suggest that certain groups of institutional investors consider governance mechanisms in their investment choices. Thus, if those investors see increased analyst forecast accuracy as an outcome of improved corporate governance, they may include forecast accuracy as a factor in their investment decisions as well.

However, analyst forecast accuracy may change information conditions in the market and profitable trading opportunities opportunities, leading institutional investors to respond to this signal. Elliott et al. (2009) suggest that some categories of institutional investors attempt to anticipate the reaction of other market participants to certain signals in order to profit from temporal mispricing. More accurate forecast may make some investors lose their information advantage and trading opportunities from mispricing. In addition, some investors may not be sensitive to forecast accuracy if they choose portfolio by following the component firms of certain indexes. Thus, the association between the aggregate institutional holding and analyst forecast accuracy could be positive or negative.

Therefore, we turn to different groups of institutional investors, whose sensitivity to the accuracy of analyst earnings forecasts depends on their investment horizons and strategies. To capture these key parameters, we follow the methodology of Bushee (1998) and assign institutional investors, based on their trading behavior, to one of three distinct groups: transient investors, quasi-indexers, and dedicated investors.

The first group of institutional investors, transient investors, includes institutions with high portfolio turnover and high diversification. Prior research suggests that, due to their short-term investment focus, this type of institutional investor is especially obsessed with immediate earnings targets (Bushee 2001). In the presence of transient investors, management employs “discretionary accruals” more extensively (Koh 2007). Also, due to high portfolio turnover, transient investors might be especially interested in the accuracy

of analyst earnings forecasts as a factor that reduces the price impact of trades. Thus, our first hypothesis is:

H1: Ceteris paribus, the percentage of transient investors' ownership in a firm is positively associated with the accuracy of the analysts' earnings forecasts for that firm.

The second group of institutional investors – dedicated investors – is characterized by low portfolio turnover and concentrated investment. Due to their long-term focus, these institutions have stable ownership positions, better access to private information, and the resources necessary for adequate information processing (Bushee and Noe 2000; Porter 1992; Wang and Zhang 2009). Dedicated investors may consider more accurate earnings forecasts, which reflect better corporate disclosures and more precise analyst guidance, as a negative sign. Dedicated investors lose their information advantage in such situation; more private information becomes publicly available and analyst guidance decreases the value of independent information processing. Further, dedicated investors are not expected to care about the price impact of trades, as they trade infrequently. On the other hand, the forecast accuracy may appeal to dedicated investors if the increased accuracy signals decreased investment risk or improved corporate governance. Thus, the overall impact of forecast accuracy on dedicated investors is an empirical question to explore.

The final group of institutional investors – quasi-indexers - is characterized by diversified portfolio and low portfolio turnover. This group represents institutions that do not conduct extensive research and follow the passive, "buy and hold" strategy, often investing in companies to follow the composition of certain indices. Contrary to transient investors, quasi-indexers do not benefit from the decreased price impact of trades for companies with more accurate earnings forecasts because their trades are infrequent. Contrary to dedicated investors, quasi-indexers do not lose a private information advantage due to better disclosures and generally welcome corporate disclosures as cost-effective monitoring device (Bushee and Noe, 2000). Quasi-indexers still might find companies with more accurate earnings forecasts more attractive if the increased accuracy signals decreased investment risk or improved corporate governance. However, quasi-indexers may just strictly follow the composition of a certain index without any attention to the accuracy of the analyst earnings forecasts.

Due to the offsetting effects, we are unable to formulate a directional hypothesis about the sensitivity of dedicated and quasi-indexers to accuracy of analyst earnings forecasts, and we simply speculate:

H2: There is no significant association between dedicated investors' and quasi-indexers' ownership in a firm and the accuracy of the analysts' earnings forecasts for that firm.

3. Empirical Design

3.1 Sample selection and calculation of institutional ownership.

The data for our empirical analysis is gathered from four sources. We obtain analyst forecast data from I/B/E/S and equity returns from CRSP. Compustat is our source for various measures of firm characteristics. Finally, our institutional holdings data is obtained from the Thomson Financial Institutional Holdings (13F) database. SEC Rule 13F requires that all institutions with more than $100 million of equity under management file a quarterly report that lists all equity holdings greater than 10,000 shares or $200,000 in market value. For each firm in our sample, we calculate the total institutional holdings (IO) by adding up the shares owned by all institutions filing Form 13F for that firm. Following Bushee's (1998, 2001) classification, we further break down the total institutional holdings for each firm into holdings by transient investors (TRA), quasi-indexers (QIX), and dedicated investors (DED). TRA, QIX, and DED are scaled by the year-end shares outstanding, and reported as ownership percentages.

In our paper, we adopt the decomposition algorithm developed by Bushee (1998, 2001). First, the extent of portfolio diversification for each institution is measured by the level of portfolio concentration, average percentage holding, fraction of institutional block holdings (defined as owning more than 5% of all shares outstanding), and a Herfindahl measure using the squared percentage of ownership in each firm. Next, trading frequency is measured by portfolio turnover, and a stability measure based on the fraction of equity held for more than two years. We then use these six measures in a principal component analysis to extract two common factors: block holdings (BLOCK)

and portfolio turnover (PTURN). A low (high) BLOCK indicates a diversified (concentrated) investment position, while a low (high) PTURN indicates a low (high) trading frequency for the institution. Finally, cluster analysis is performed to obtain the final separation of firms into three groups: (1) the transient group (TRA) with high turnover and highly diversified positions; (2) the quasi-indexing group (QIX) with low turnover and high diversification; and (3) the dedicated group (DED) with low turnover and high concentration in their investment.

We limited the firms included in our final sample to those that meet a number of additional criteria. All firm-year observations are for December fiscal-year ends[1] between 1986 and 2005. For each firm-year, the absolute value of earnings per share equals or exceeds $0.20, stockholders' equity is positive, and at least three individual analysts forecasted earnings per share for that firm-year. Financial-sector companies (SIC 6000-6999) are excluded from our data. Finally, any firm-years missing observations for any of our control variables were excluded from the sample. The final sample contains 12,872 observations for 2,686 companies.

3.2 Independent and control variables.

We calculate forecast accuracy following Haw et al. (1994) as $FERR_{it} = abs(A_{it} - F_{it}) / abs(A_{it})$, where A_{it} is actual earnings per share (EPS) for firm i in year t reported in I/B/E/S summary tape and F_{it} is the I/B/E/S analyst consensus EPS forecast issued during the first forecast period for firm i for year t. For our analysis, we use analysts' summary earnings forecasts issued for the current fiscal year during the first forecast period related to this fiscal year as identified on the I/B/E/S "Summary History Tape." Similar to Ackert and Athanassakos (2003), we exclude observations with absolute values of annual actual earnings below 20 cents to avoid extreme forecast errors due to small deflators.

[1] Similar to Ackert and Athanassakos (2003) and Givoly (1985) we choose firms with identical fiscal year end (December year end) to ensure an appropriate comparison due to common forecast horizon.

We include a variety of control variables in our model to capture previously documented determinants of institutional ownership. These variables are listed and described below.

Company size ($Size_{i,t}$ **)** is proxied by the natural logarithm of the market value of firm *i*, measured at the end of fiscal year *t*. This variable captures the preference of institutional investors for larger companies (Cummins and Westerfield, 1981; Badrinath et al., 1989; Ackert and Athanassakos, 2001; Gompers and Metrick, 2001).

Stock illiquidity ($Eliq_{i,t}$) controls for institutional investors' inclination to invest in more liquid stocks (Falkenstein, 1996; Gompers and Metrick, 2001). Following Amihud (2001) we measure equity illiquidity as the average daily price impact of trades over the current year as $Eliq = \frac{1}{D}\sum_{d=1}^{D}\frac{abs(r_d)}{Turn_d}$ where D is the number of days, r_d is equity returns at Day d, *abs* refers to the absolute value, and *Turn* is the turnover at Day d.

Stock turnover ($Turn_{i,t}$) captures how actively the stock of firm *i* is traded. Prior studies used this variable as indirect proxy for stock liquidity (e.g., Badrinath et al., 1989; Bushee and Noe, 2000). Alternatively, stock turnover might be a proxy for profitable trading opportunities if institutional investors anticipate short-term stock mispricing. We calculate stock turnover as the average daily turnover of the stock of firm *i* over year *t*, quoted as a percentage.

Stock volatility ($Vol_{i,t}$) is the control variable for the idiosyncratic volatility of firm *i* stock, measured as the standard deviation of the daily stock returns of firm *i* over year *t*, quoted as a percentage.[2] Prior research reports an association between institutional ownership and stock volatility (Sias, 1996; Bushee and Noe, 2000). While these studies suggest that increased stock volatility is the *consequence* of the presence of certain groups of investors, it is also feasible that some groups of institutional investors see high

[2] We also considered volatility of market adjusted returns, and the results are similar.

volatility as a signal of profitable trading opportunities and invest more heavily in those firms. To rule out this alternative explanation, we control for stock volatility in our model.

$BETA_{i,t}$ is the common control variable for *systematic* (market-wide) investment risk (correlation of stock returns with market returns), calculated from a market model using daily stock returns over an annual period.

$IRISK_{i,t}$ is our control variable for *idiosyncratic* (nonsystematic) investment risk calculated from a market model. We calculate IRISK as the standard deviation of market model residuals over an annual period. Prior research documents the positive association of institutional ownership with systematic risk (Badrinath et al., 1989; O'Brien and Bhushan, 1990) and the negative association of institutional ownership with idiosyncratic risk (Bushee, 2001). We therefore include IRISK and BETA in our model following the logic of Bushee and Noe (2000).

$LEV_{i,t}$ is our control variable for the capital structure of firm *i*, calculated as total liabilities divided by total equity at the end of the year *t*. Prior research reports that capital structure is associated with different categories of stock ownership (e.g., Chowdhury and Geringer, 2001; Li et al., 2009). This variable is also commonly used in empirical studies to capture various dimensions of firm risk (e.g., Badrinath et al., 1989; Bushee and Noe, 2000; Bushee, 2001).

We also include the following variables that capture other aspects of corporate performance that might be important for institutional investors trading decisions (Bushee, 1998; Bushee and Noe, 2001):

Annual market-adjusted return ($MRET_{i,t}$) captures the stock price performance. Higher stock returns supposedly reflect superior management ability (Badrinath et al., 1989), and prior research documents the positive association of this variable with higher ownership

by at least some categories of institutional investors (Badrinath et al., 1989; O'Brien and Bhushan, 1990; Bushee and Noe, 2000).

$EP_{i,t}$ is the earnings-price ratio. This ratio reflects two conflicting effects: risk and growth opportunities. Prior research documents the negative association of total institutional ownership with the earnings-price ratio (Ackert and Athanassakos, 2001). This evidence suggests the dominance of the risk factor over the growth factor when institutional investors evaluate this investment signal.

Analyst following ($AN_{i,t}$), measured as the number of analysts who issued earnings forecasts for firm *i* for year *t*, captures differences in information intensity for firm *i*. Prior research documents the preference of institutional investors toward more "visible" firms with more transparent information environments, due to their fiduciary responsibility and other factors (e.g., Falkenstein, 1996; Bushee and Noe, 2000). Analyst following has been commonly used as a proxy for market visibility (e.g., Ackert and Athanassakos, 2001) and information availability (e.g., Bhushan, 1989; O'Brien and Bhushan, 1990). Prior research documents the positive association between this variable and institutional ownership (O'Brien and Bhushan, 1990). Therefore, we include this variable in our model to rule out the explanation that accuracy of analyst forecasts is merely an indirect proxy for analyst following.[3]

3.3 Descriptive statistics.

Table 1 provides descriptive statistics for our dependent, independent, and control variables for the overall sample, as well as for the initial (1986) and final (2005) years of the sample. Statistics for the initial and final years of our sample illustrate the evolution of the relevant firm characteristics over time.

[3] Prior researchers have employed many other variables as control variables in their models (e.g., O'Brien and Bhushan (1990) and Bushee and Noe (2000)). However, those studies had a different focus from our study. Further, prior research documents insignificant associations between many of those variables and institutional ownership. Nevertheless, in supplementary tests, we included book to price ratio, dividend yield, sales growth and membership in the S&P in our tests. The results of those tests lead to inferences identical to those presented later in this paper.

Descriptive data from Table 1 demonstrates that the mean forecast error decreases over the sample period from 0.49 in 1986 to 0.28 in 2005, while the mean of the analyst following the firm also decreases over the sample period from 11.14 in 1986 to 9.05 in 2005. This evidence suggests that analysts, on average, became better forecasters in recent years, even though the later years include smaller companies with less transparent information environments.[4]

Consistent with prior research we report an increase in companies' size (from 5.95 to 7.04), stock turnover (from 3.05 to 9.61), stock volatility (from 1.95 to 2.52), systemic risk (from 0.85 to 1.25), leverage (from 1.72 to 1.95), and market-adjusted returns (from -0.04 to 0.06) over the sample period. At the same time, the price impact of trades decreases (from 1.87 to 0.67) while idiosyncratic risk remains the same. We also report a 47.66% average increase in overall institutional ownership in our sample over our sample period, from 35.79 % in 1986 up to 59.29 % in 2005. However, our data suggest that this growth in institutional ownership is due to an increase in ownership by quasi-indexers (from 19.10 % in 1986 up to 46.48 % in 2005 with 25.21 % on average), while the extent of ownership by transient investors increased just slightly (9.53 % in 1986, 10.39 % in 2005 and 13.47 % on average) and the ownership of dedicated institutional owners fluctuates significantly over the years with no significant growth (7.16 % in 1986, 2.42 % in 2005 and 8.98 % during an average year).

[4] Given our research question, we focus in our study on forecast accuracy, which is the *absolute* difference between forecasted earnings and actual earnings scaled by actual earnings, rather than on forecast optimism, which is just the difference between forecasted earnings and actual earnings scaled by absolute value of actual earnings. Thus, the variable forecast accuracy is always positive while the variable of forecast optimism might have both positive (optimism) and negative (pessimism) values. The mean (median) of "forecast optimism" in our full sample was positive 0.23 (positive 0.03), positive 0.41 (positive 0.13) in the sample of observations for 1986, and positive 0.06 (negative 0.03) in the sample of observations for 2005. This is consistent with findings of prior studies (e.g., Brown, 1997; Ackert and Athanassakos, 2003) reporting that, while analysts are still optimistic in their earnings predictions, this optimism has declined significantly in recent years.

Table 1. Summary Statistics on Sample Firms. Full sample: 12, 872 observations for 2686 firms. This table reports the summarized characteristics of firms included in the final sample. The full sample includes data from January 1986 through December 2005. For comparative purposes the table also provides the separate information for the year 1986 and 2005.

Sample		1986	2005	1986-2005
Number of firms		408	841	2686
FERR	Mean	0.49	0.28	0.38
	Median	0.19	0.14	0.15
	5%	0.01	0.01	0.01
	95%	1.86	1.03	1.59
	Std. Deviation	0.66	0.43	0.57
Esize	Mean	5.95	7.04	6.44
	Median	5.83	6.81	6.26
	5%	3.70	4.93	4.02
	95%	8.74	9.84	9.53
	Std. Deviation	1.53	1.53	1.67
Eliq	Mean	1.87	0.67	1.85
	Median	1.05	0.26	0.71
	5%	0.30	0.10	0.18
	95%	5.44	1.80	6.82
	Std. Deviation	3.13	2.02	4.67
Turn	Mean	3.05	9.61	6.61
	Median	2.32	7.07	4.24
	5%	0.78	2.30	1.06
	95%	7.71	25.78	19.79
	Std. Deviation	3.71	10.32	7.69
Vol	Mean	1.95	2.52	3.09
	Median	1.74	2.36	2.70
	5%	1.02	1.10	1.21
	95%	3.58	4.52	6.30
	Std. Deviation	0.78	1.10	1.69
Beta	Mean	0.85	1.25	0.93
	Median	0.84	1.21	0.85
	5%	0.27	0.52	0.16
	95%	1.50	2.11	2.02
	Std. Deviation	0.40	0.48	0.58
Irisk	Mean	0.02	0.02	0.03
	Median	0.02	0.02	0.03

	5%	0.01	0.01	0.01
	95%	0.04	0.04	0.06
	Std. Deviation	0.01	0.01	0.02
Lev	Mean	1.72	1.95	2.04
	Median	1.15	0.89	1.07
	5%	0.24	0.13	0.14
	95%	4.06	5.14	5.31
	Std. Deviation	3.50	5.78	6.31
MadjRet	Mean	-0.04	0.06	0.05
	Median	-0.02	-0.03	-0.05
	5%	-0.61	-0.55	-0.70
	95%	0.48	0.86	1.05
	Std. Deviation	0.34	0.61	0.72
Ep	Mean	-0.06	0.01	-0.55
	Median	0.03	0.04	0.04
	5%	-0.35	-0.17	-0.25
	95%	0.09	0.09	0.11
	Std. Deviation	0.65	0.14	45.45
AN	Mean	11.14	9.05	9.27
	Median	8.00	7.00	6.00
	5%	3.00	3.00	3.00
	95%	28.00	22.00	25.00
	Std. Deviation	8.52	6.51	7.47
TRA	Mean	9.53	10.39	13.47
	Median	8.42	8.45	10.60
	5%	0.86	1.56	0.69
	95%	24.21	25.29	35.78
	Std. Deviation	7.36	7.64	10.93
DED	Mean	7.16	2.42	8.98
	Median	5.44	0.00	6.34
	5%	0.30	0.00	0.00
	95%	20.97	11.58	27.42
	Std. Deviation	6.80	5.14	9.35
QIX	Mean	19.10	46.48	25.21
	Median	19.01	47.94	23.61
	5%	2.03	14.21	3.14
	95%	40.60	72.57	54.11
	Std. Deviation	11.70	18.12	15.87
TIO	Mean	35.79	59.29	47.66
	Median	35.78	62.31	48.54
	5%	7.21	20.57	10.42
	95%	63.41	87.93	83.01
	Std. Deviation	17.05	20.49	22.36

Table 2. Pairwise Correlations. (Full sample: 12 872 observations for 2686 firms)

This table reports Pearson correlation coefficients with the p value for a test of the null hypothesis of zero correlation in parentheses. We provide the detailed description of all variables of the model on pp. 13-16 of our paper.

	TRA	DED	QIX	FERR	Esize	Eliq	Turn	Vol	Beta	Irisk	Lev	Ret
TRA	1											
DED	-0.01 (0.3627)	1										
QIX	0.16 (<0.0001)	-0.04 (<0.0001)	1									
FERR	-0.04 (<0.0001)	0.01 (0.2607)	-0.12 (<0.0001)	1								
Esize	0.16 (<0.0001)	0.01 (0.4730)	0.39 (<0.0001)	-0.19 (<0.0001)	1							
Eliq	-0.18 (<0.0001)	-0.01 (0.6893)	-0.21 (<0.0001)	0.01 (0.5524)	-0.27 (<0.0001)	1						
Turn	0.29 (<0.0001)	-0.05 (<0.0001)	-0.03 (0.0010)	0.09 (<0.0001)	-0.03 (0.0004)	-0.17 (<0.0001)	1					
Vol	0.19 (<0.0001)	-0.12 (<0.0001)	-0.39 (<0.0001)	0.17 (<0.0001)	-0.36 (<0.0001)	0.12 (<0.001)	0.47 (<0.0001)	1				
Beta	0.24 (<0.0001)	-0.06 (<0.0001)	0.06 (<0.0001)	0.02 (0.0453)	0.15 (<0.0001)	-0.16 (<0.001)	0.40 (<0.0001)	0.34 (<0.0001)	1			
Irisk	0.11 (<0.0001)	-0.12 (<0.0001)	-0.42 (<0.0001)	0.25 (<0.0001)	-0.42 (<0.0001)	0.13 (<0.0001)	0.36 (<0.0001)	0.79 (<0.001)	0.27 (<0.001)	1		
Lev	-0.02 (0.01)	0.03 (0.0013)	-0.01 (0.1496)	0.04 (<0.0001)	0.03 (0.0002)	0.01 (0.9721)	-0.03 (0.0018)	-0.02 (0.0487)	-0.02 (0.0982)	0.01 (0.4378)	1	
Ret	0.07 (<0.0001)	-0.01 (0.2455)	-0.03 (0.0013)	-0.17 (<0.0001)	-0.03 (0.0008)	0.06 (<0.0001)	-0.01 (0.1140)	0.07 (<0.0001)	0.09 (<0.0001)	-0.01 (0.6660)	-0.01 (0.2064)	1
An	0.01 (0.1403)	0.05 (<0.0001)	0.29 (<0.0001)	-0.10 (<0.0001)	0.73 (<0.0001)	-0.19 (<0.0001)	-0.04 (<0.0001)	-0.33 (<0.0001)	0.07 (<0.0001)	-0.35 (<0.0001)	-0.01 (0.9498)	-0.03 (0.0001)

Table 2 reports pair-wise Pearson correlation coefficients for our dependent, independent and control variables with p-values for a null hypothesis of zero correlation in parentheses. The correlations reported in Table 2 support inclusion of our independent variables as predictors in the model, as most of them are significantly correlated at least with one of our dependent variables.

We found two cases of relatively high correlation between independent variables, suggesting the presence of multicollinearity in our data. These are the correlation between esize (logarithm of market value) and AN (number of analysts whose estimates are included in the consensus forecast), which is equal to 0.73, and the correlation between idiosyncratic risk (irisk) and stock volatility (vol), which is equal to 0.79. However, those variables are control variables; they are not the focus of our investigation. Prior research strongly supports the inclusion of all those variables as relevant predictors of institutional ownership. Although the t-tests related to these variables might be distorted (Studenmund 1997, p.266), we prefer this result to the alternative of dropping relevant variables from the model. In subsequent analyses, variance inflation factors (VIF) and condition indexes (CI) confirmed that overall multicollinearity in the model does not exceed the moderate level, using the common rule of VIF < 10, CI < 30 (Kennedy 1992; Kutner, Nachtsheim, and Neter 2004).[5] We also conducted sensitivity tests to ensure that exclusion of one of these control variables from the model does not significantly change our results.

4. Multivariate Tests

Our data is pooled time-series and cross-sectional unbalanced panel data. Since institutional ownership data is likely to be correlated across firms and industries and over time, we attempt to control for clustering by following the Petersen (2009) methodology. In our panel regression, we adjust for firm clustering effects and time and industry fixed effects in two specifications (current and lagged forecast errors) for institutional investors

[5] VIF for all control variables in our models were below 4. The VIF for esize is equal to 2.54. The VIF for AN is equal to 2.17. The VIF for irisk is equal to 3.03. The VIF for volatility is equal to 3.26. The maximum condition index was 21.5.

as a homogeneous group and separately for different types of institutional investors (INST). Each measure of INST is stated as a percentage, as we scale by year-end shares outstanding. We estimate the following equation, using as our dependent variable (INST) each of: TIO (the total institutional holdings for each firm), TRA (the institutional holdings by transient investors for each firm), DED (the institutional holdings by dedicated investors for each firm), or QIX (the institutional holdings by quasi-indexers for each firm) (Equation 1):

$$INST_{it} = \pi_0 + \pi_1 FERR_{it/it-1} + \pi_2 Esize_{it} + \pi_3 Eliq_{it} + \pi_4 Turn_{it} + \pi_5 Vol_{it} + \pi_6 Beta_{it}$$
$$+ \pi_7 Irisk_{it} + \pi_8 Lev_{it} + \pi_9 Madj\,\mathrm{Re}t_{it} + \pi_{10} EP_{it} + \pi_{11} AN_{it} + \sum_{t=1987(1988)}^{2005} \pi_t Y_t + \sum_{I=2}^{8} \pi_k I_k + \varepsilon_{it}$$

where of the dependent variable is institutional ownership, *i* is the company, *t* is the fiscal year. The major variable of concern is FERR, the measure of analyst forecast error. We also control for other firm characteristics and year and industry dummies.

Table 3 reports results from estimation of the model where the levels of each type of institutional ownership are regressed on the *contemporaneous* levels of the analyst forecast accuracy. Consistent with our hypothesis, the holding of transient investors is higher in companies with lower forecast errors (more accurate forecasts), as indicated by the negative coefficient of π_1, which is significant at the 1% level. This could be due to lower forecast errors lead to lower price impacts, which appeal to transient investors with high portfolio turnover. This finding is consistent with earlier findings that transient investors prefer a more transparent information environment (Wang and Zhang, 2009).

Interestingly, the holding of dedicated investors has a positive association with forecast errors. It is tempting to interpret this result as dedicated investors dislike firms with high forecast accuracy. However, this finding could be spurious due to the endogeneity issue that we address in next section. The holding by quasi-indexers is not associated with analyst forecast accuracy, as expected.

Table 3. Regression of Institutional Ownership on Accuracy of Analyst Forecasts: Level Analysis.

Levels of institutional ownership as of the end of the year are regressed on *contemporaneous* levels of analyst forecast accuracy (current year analyst forecast accuracy). The sample includes 12 872 observations for 2686 firms. The table provides unstandardized regression coefficients for independent and control variables with p-values for tests of their significance in parentheses (two-tailed). ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variables	**TIO3**	**TRA**	**DED**	**QIX**
Independent Variables				
Intercept	29.094*** (<0.0001)	7.6043*** (<0.0001)	5.263*** (0.0049)	16.226*** (<0.0001)
FERR	0.236 (0.4782)	-0.6461*** (<0.0001)	0.674*** (<0.0001)	0.208 (0.3214)
Esize	0.158 (0.6847)	-0.011 (0.9352)	-0.245* (0.0528)	0.415* (0.0607)
Eliq	-0.333*** (<0.0001)	-0.111*** (<0.0001)	-0.029 (0.1980)	-0.192*** (0.0001)
Turn	0.439*** (0.0001)	0.318*** (<0.0001)	0.036*** (0.0029)	0.084*** (<0.0001)
Vol	-4.039*** (<0.0001)	-1.089*** (<0.0001)	-0.643*** (<0.0001)	-2.306*** (<0.0001)
Beta	6.382*** (<0.0001)	3.839*** (<0.0001)	0.857*** (<0.0001)	1.685*** (<0.0001)
Irisk	-290.948*** (<0.0001)	-48.451*** (<0.0001)	-57.182*** (<0.0001)	-185.315*** (<0.0001)
Lev	-0.009 (0.8130)	-0.035*** (0.0016)	0.055** (0.0222)	-0.028 (0.1612)
MadjRet	-0.258 (0.3152)	0.251* (0.0504)	0.072 (0.4680)	-0.582*** (<0.0001)
Ep	-0.002 (0.3787)	0.001 (0.6652)	-0.002** (0.0374)	-0.001 (0.5381)
An	0.266*** (<0.0001)	-0.032 (0.1758)	0.021 (0.4438)	0.277*** (<0.0001)
F-Value for the model	86.96 (<0.0001)	117.25 (<0.0001)	97.03 (<0.0001)	160 (<0.0001)
R-Squared	0.3218	0.3845	0.2833	0.4507
Adjusted R-Squared	0.3199	0.3828	0.2812	0.4491

Table 4. Regression of Institutional Ownership on Accuracy of Analyst Forecasts: Lagged Level Analysis.

Levels of institutional ownership as of the end of the year are regressed on *lagged* levels of analyst forecast accuracy (prior year analyst forecast accuracy). The sample includes 9178 observations for 1918 firms**.** The table provides unstandardized regression coefficients for independent and control variables with p-values for tests of their significance in parentheses (two-tailed). ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variables	**TIO3**	**TRA**	**DED**	**QIX**
Independent Variables				
Intercept	33.019*** (<0.0001)	10.058*** (<0.0001)	2.743 (0.1530)	20.218*** (<0.0001)
FERR	-0.202 (0.6468)	-0.889*** (<0.0001)	0.893*** (<0.0001)	-0.205 (0.4439)
Esize	0.086 (0.8556)	0.033 (0.8388)	-0.282* (0.0795)	0.335 (0.2261)
Eliq	-0.496*** (0.0004)	-0.154*** (<0.0001)	-0.033 (0.4128)	-0.310*** (<0.0001)
Turn	0.787*** (0.0001)	0.492*** (<0.0001)	0.086*** (0.0003)	0.207*** (<0.0001)
Vol	-5.148*** (<0.0001)	-1.480*** (<0.0001)	-0.745*** (<0.0001)	-2.924*** (<0.0001)
Beta	6.264*** (<0.0001)	3.625*** (<0.0001)	0.912*** (0.0002)	1.727*** (<0.0001)
Irisk	-211.319*** (<0.0001)	-16.892 (0.2476)	-44.849*** (<0.0001)	-149.579*** (<0.0001)
Lev	-0.008 (0.9038)	-0.041** (0.0238)	0.044 (0.1420)	-0.011 (0.7698)
MadjRet	-0.356 (0.3581)	0.229 (0.2839)	-0.043 (0.7904)	-0.543*** (0.0073)
Ep	-0.004* (0.0563)	-0.003** (0.0310)	-0.0001 (0.9602)	-0.001 (0.4262)
An	0.084 (0.2441)	-0.086*** (0.0015)	-0.0001 (0.9882)	0.171*** (<0.0001)
F-Value for the model	62.26 (<0.0001)	101.01 (<0.0001)	84.67 (<0.0001)	139.13 (<0.0001)
R-Squared	0.3099	0.4279	0.3084	0.4398
Adjusted R-Squared	0.3072	0.4257	0.3057	0.4376

Table 4 reports the results of the model where the levels of the particular type of institutional ownership are regressed on the *prior-year* levels of the analyst forecast accuracy. Results are qualitatively similar.

5. Endogeneity of Institutional Ownership and Analyst Forecast Accuracy

Our prior analysis suggests that institutional investors respond differently to the signal of analyst earnings forecast accuracy. However, there is an alternative explanation for our reported associations. The presence of institutional investors might impact analyst earnings forecast accuracy by changing analyst following, affecting transparency of the information environment, and influencing corporate governance (Frankel et al. 2006, Ajinkya et al. 2005).

Because behaviors of analysts and institutional investors could be jointly defined, a simultaneous equation approach could provide more accurate inferences about the corporate information environment (Ackert and Athanassakos 2003; O'Brien and Bhushan 1990). To address this endogeneity concern, we follow the approach of Bhoraj and Sengupta (2003) and Wang and Zhang (2009), treat institutional ownership and analyst earnings forecast accuracy as endogeneous variables, and perform a three-stage least square (3SLS) estimation for the following system:

$$INST_{it} = \pi_0 + \pi_1 FERR_{it} + \pi_2 Esize_{it} + \pi_3 Eliq_{it} + \pi_4 Turn_{it} + +\pi_5 Vol_{it} + \pi_6 Beta_{it}$$
$$+ \pi_7 Irisk_{it} + \pi_8 Lev_{it} + \pi_9 Madj\,\mathrm{Re}t_{it} + \pi_{10} EP_{it} + \pi_{11} AN_{it} + \sum_{t=1987}^{2005} \pi_t Y_t + \sum_{I=2}^{8} \pi_k I_k + \varepsilon_{it}$$

$$FERR_{it} = \lambda_0 + \lambda_1 INST_{it} + \lambda_2 Esize_{it} + \lambda_3 AN_{it} + \lambda_4 EarnVar_{it} +$$
$$+ \lambda_5 Loss_{it} + \lambda_6 DI_{it} + \sum_{t=1987}^{2005} \pi_t Y_t + \sum_{I=2}^{8} \lambda_k I_k + \varepsilon_{it}$$

We follow Equation 1 in our choice of control variables for the institutional ownership equation. The choice of control variables for analyst accuracy is based on the existing literature about determinants of earnings forecast accuracy and includes company size (e.g., Atiase, 1985; Lang and Lundholm, 1996), analyst following (O'Brien

and Bhushan 1990; Mikhail et al., 1997),[6] prior earnings variability measured as the standard deviation of quarterly earnings over 12 quarters ending in the current fiscal year (Albrecht et al. 1977; Kross et al., 1990; Ajinkya et al. 2005), an indicator of losses (Duru and Reeb, 2002; Brown, 2001), and depreciation expense intensity measured as the ratio of depreciation expense to sales (Haw et al., 1994; Lev, 1983).[7]

Table 5 reports the estimated coefficients for the systems of the simultaneous equations. In parentheses we provide p-values of the null hypothesis that the specific coefficient is equal to zero (two-tailed test). After controlling for endogeneity between institutional ownership and forecast accuracy, we find that the institutional investors as a group like to invest in firms with low forecast error (high forecast accuracy), while the presence of institutional investors increases forecast error. The result for the whole group is a weighted result for three groups of institutional investors.

When we treat them separately, we confirm the hypothesized preference of transient investors toward companies with lower forecast errors (π_1 = - 4.7388 with p <0.0001). The results on the forecast accuracy equations are consistent with prior studies. Forecast errors are smaller for larger firms and firms with more analyst following, lower losses, and higher depreciation expense intensity. After controlling for these factors, we find that more transient investors help to lower forecast errors (λ_1 = - 0.0038, p=0.0035).

Dedicated investors appear attracted to firms with lower forecast errors, albeit the relationship is barely significant. The documented positive association in prior section is likely attributed to the positive impact of the dedicated investor holding on forecast errors, which is significant at the 5% level (λ_1 =0.0099 with p=0.0153).

There is no significant impact of forecast accuracy on holdings of quasi-indexers, suggesting that forecast accuracy is less important for them to make investment choices. However, more quasi-indexers lead to higher forecast error (λ_1 = 0.0037, p<0.0001), similar to dedicated investors.

[6] In addition, prior research documented the significant correlation of analyst following with other factors affecting earnings forecasts, such as firm growth potential (O'Brien, 1990), research and development (R&D), advertising expenses, and balance sheet value of intangible assets (Barth et al., 2001). Thus, including AN in the model allows us to control indirectly for those factors without increasing the model's complexity.

[7] Some of the observations in our sample lacked the additional control variables from Compustat. Therefore, our sample for simultaneous equations modeling included 12,819 observations for 2,677 companies.

Table 5. Endogeneity control: simultaneous estimation using 3-stage least squares procedure. This table reports the estimated coefficients for the systems of the simultaneous equations regarding the relationship between institutional ownership and analyst forecast accuracy. The sample includes 12 819 observations for 2677 firms. In parentheses we report p-values of the null hypotheses that the coefficient is equal to zero (two-tailed test). ***, **, * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	System 1		**System 2**		**System 3**		**System 4**	
	TIO3	**FERR**	**TRA**	**FERR**	**DED**	**FERR**	**QIX**	**FERR**
Intercept	25.334*** (<0.0001)	0.543*** (<0.0001)	-4.732* (0.0817)	0.530*** (<0.0001)	11.081*** (<0.0001)	0.476*** (0.0007)	18.824*** (<0.0001)	0.548*** (<0.0001)
FERR	-6.560*** (<0.0001)		-4.738*** (<0.0001)		-0.885* (0.0843)		-1.056 (0.1558)	
TIO		0.0016** (0.043)						
TRA				-0.0038*** (0.0035)				
DED						0.0099** (0.0153)		
QIX								0.0037*** (<0.0001)
Esize	3.101*** (<0.0001)	-0.061*** (<0.0001)	1.823*** (<0.0001)	-0.044*** (<0.0001)	-0.655*** (<0.0001)	-0.048*** (<0.0001)	1.952*** (<0.0001)	-0.064*** (<0.0001)
Eliq	-0.485*** (<0.0001)		-0.248*** (<0.0001)		-0.0014 (0. 9397)		-0.231*** (<0.0001)	
Turn	0.479*** (<0.0001)		0.239*** (<0.0001)		0.018 (0.1550)		0.217*** (<0.0001)	
Vol	-1.549*** (<0.0001)		1.069*** (<0.0001)		-0.345*** (<0.0001)		-2.359*** (<0.0001)	
Beta	4.041*** (<0.0001)		1.349*** (<0.0001)		-0.377** (0.0228)		2.948*** (<0.0001)	
Irisk	-251.58*** (<0.0001)		4.2711 (0.6631)		-47.994*** (<0.0001)		-195.792*** (<0.0001)	
MadjRet	0.175 (0.5427)		0.892*** (<0.0001)		-0.381*** (0.0045)		-0.558*** (0.0043)	
Lev	0.027 (0.3258)		-0.017 (0.2163)		0.061*** (<0.0001)		-0.015 (0.4213)	
Ep	-0.002 (0.6373)		0.001 (0.5592)		-0.002 (0.2358)		-0.001 (0.8451)	
An	-0.179*** (<0.0001)	0.007*** (<0.0001)	-0.236*** (<0.0001)	0.007*** (<0.0001)	0.101*** (<0.0001)	0.007*** (<0.0001)	-0.044* (0.0623)	0.007*** (<0.0001)
Earnvol		-0.001 (0.5034)		-0.001 (0.2466)		-0.001 (0.6595)		-0.001 (0.7001)
DepInt		-0.011*** (<0.0001)		-0.010*** (<0.0001)		-0.011*** (<0.0001)		-0.011*** (<0.0001)
Loss		0.561*** (<0.0001)		0.552*** (<0.0001)		0.568*** (<0.0001)		0.574*** (<0.0001)
Adj. R-squared	0.2339	0.1728	0.1749	0.1726	0.0287	0.1704	0.2891	0.1726

Taken together, both transient and dedicated investors like an information environment with lower forecast errors, while quasi-indexers appear indifferent to analyst forecast errors. The presence of transient investors lead to lower forecast error, while the presence of both dedicated investors and quasi-indexers increases forecast error.

Consistent with the evidence in Table 3, our results also highlight different preferences of the various types institutional investors with respect to financial leverage. While transient investors and quasi-indexers appear to ignore this characteristic in their investment decisions, dedicated investors seem to invest more in companies with higher levels of debt (π_8=0.0605, p<0.0001). Also, dedicated investors seem to invest more in smaller firms, while consistent with prior findings on institutional ownership, transient investors and quasi-indexers prefer bigger firms. We also find that stock liquidity and stock turnover explain investments by transient investors and quasi-indexers, but not by dedicated investors.

While our model explains approximately 17.5 % of variance in levels of transient investors and 28.9% of variance in levels of quasi-indexers, the model explains roughly only 2.9% of variance in levels of dedicated investors. This finding highlights the uniqueness of the investment strategy of dedicated investors and warrants further investigation.

We also conduct several robustness checks to address the endogeneity issues. Since many variables affect institutional ownership but not forecast accuracy and vice versa, our model is "overidentified". We check robustness of our findings with 2SLS estimates which is a single equation estimation method. The results are similar. We also re-estimate our model by excluding insignificant variables in both equations. Our results remain qualitatively the same. Similar to Wang and Zhang (2009), we also run year-by-year estimates for the system of simultaneous equations. We then apply Fama-MacBeth procedure to obtain the time-series average of estimated coefficients and to obtain the simple t-test that coefficients are different from zero. Our results with respect to our variables of interest are qualitatively identical.

6. Concluding Remarks

In this study, we examine the association between analyst earnings forecast error and institutional ownership, measured separately for different groups of institutional investors (transient, dedicated, and quasi-indexers). To account for the endogeneity issue, we conduct a simultaneous equations analysis on their association. Understanding the relation between investment choices and information environment characteristics is important because it speaks directly to the question of whether and how accounting matters to users.

Consistent with our hypothesis, we find that transient investors are indeed drawn to companies with lower forecast errors and increase their holdings when the forecast error decreases. Moreover, a higher percentage of transient investors leads to lower forecast error.

Dedicated investors appear to like investing firms with lower analyst forecast error, and the forecast error does not impact *levels* of ownership by quasi-indexers. Interestingly, ownership by dedicated investors and quasi-indexers leads to increases in earnings forecast errors. Our results are consistent with prior findings (e.g., Ajinkya et al., 2005; Wang and Zhang, 2009; and Porter, 1992) that, in certain conditions, institutions exercise their control over corporate management to achieve exclusive self-serving benefits and to suppress the information access of other capital providers.

Finally, we report that the various types of institutional investors demonstrate different preferences toward other basic corporate characteristics, such as company size, leverage, and stock turnover. Thus, the factors documented by prior studies as determinants of institutional ownership, such as stock liquidity and stock turnover, explain investments by transient investors and quasi-indexers, but not by dedicated investors. Also, while transient investors and quasi-indexers prefer larger companies and are insensitive to the leverage of those firms as prior studies have suggested, dedicated investors seem to invest in smaller and higher leveraged companies.

Overall, our empirical evidence confirms the heterogeneity of investment interests among transient investors, dedicated investors, and quasi-indexers, including differential attention to analyst earnings forecast accuracy. Therefore, we join prior researchers in

their call to adjust for investors' heterogeneity in research models rather than to cast institutional investors as a homogeneous group. Different types of institutional investors are often driven by opposite factors and may have opposite impacts on a variety of financial variables.

References:

Ackert, L. F. and G. Athanassakos 2001. Visibility, institutional preferences, and agency considerations. *Journal of Psychology and Financial Markets*, 2 (4): 201-209.

Ackert, L. F., and G. Athanassakos 2003. A simultaneous equations analysis of analysts' forecast bias, analyst following, and institutional ownership. *Journal of Business Finance and Accounting*, 30 (7/8): 1017-1041.

Albrecht, W. S., O. Johnson, L. L. Lookabill and D. J. H. Watson 1977. A comparison of the accuracy of corporate and security analysts' forecasts of earnings: a comment. *The Accounting Review*, 52 (2): 736-740.

An, H. and T. Zhang 2013, Stock price synchronicity, crash risk, and institutional investors, *Journal of Corporate Finance*, Volume 21, June, Pages 1–15.

Ashbaugh-Skaife, H., D. W. Collins, W. R. Kinney Jr. 2007. The discovery and reporting of internal control deficiencies prior to SOX-mandated audits. *Journal of Accounting and Economics*, 44 (1/2): 166-192.

Ajinkya, B., S. Bhojraj, and P. Sengupta. 2005. The association between outside directors, institutional investors and the properties of management earnings forecasts. *Journal of Accounting Research*, 43 (3): 343-376.

Badrinath, S. G., G. D. Gay, and J. R. Kale 1989. Patterns of institutional investment, prudence and the managerial "safety-net" hypothesis. *Journal of Risk & Insurance,* 56 (4): 605-629.

Bhushan, R. 1989. Firm characteristics and analysts following. *Journal of Accounting and Economics* 11 (July): 255-74.

Bhojraj, S., Sengupta, P. 2003. Effect of corporate governance on bond ratings and yields: the role of institutional investors and outside directors. *Journal of Business*, 76 (3), 455–475.

Brown, L. D. 1997. Analyst forecasting errors: additional evidence. *Financial Analysts Journal* 53 (November/December): 81-88.

Brown, L. 2001. A temporal analysis of earnings surprises: profits versus losses. *Journal of Accounting Research* 39 (September): 221-242.

Brown, L. D. and M. L. Caylor, 2005. A temporal analysis of quarterly earnings thresholds: propensities and valuation consequences. *The Accounting Review*, 80 (2): 423-440.

Bushee, B. J., 1998. The influence of institutional investors on myopic R&D investment behavior. *The Accounting Review* 73: 305-333.

Bushee, B. J. 2001. Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research* 18 (2): 207-246.

Bushee, B. J., M. E. Carter, and J. Gerakos, 2007. Institutional investor preferences for corporate governance mechanisms. SSRN paper.

Bushee, B. J. and C. F. Noe, 2000. Corporate disclosure practices, institutional investors, and stock return volatility. *Journal of Accounting Research* 38 (3): 171-202.

Chen, X., Harford, J. and K. Li, 2007. Monitoring: Which institutions matter? *Journal of Financial Economics* 86 (2): 279-305.

Chowdhury, S. D. and J. M. Geringer, 2001. Institutional ownership, strategic choices and corporate efficiency: evidence from Japan. *Journal of Management Studies*, 38 (2): 271-291.

Cummins, J. D., J. Percival, R. Westerfield, and J. G. Ramage, 1980. Effects of ERISA on the Investment Policies of Private Pension Plans: Survey Evidence. *Journal of Risk and Insurance*, 47: 447-476.

Cummins, J. David, and Randolf Westerfield, 1981. Patterns of Concentration in Private Pension Plan Common Stock Portfolios since ERISA. *Journal of Risk and Insurance*, 48: 201-219.

D'Souza, J., K. Ramesh, and M. Shen 2007. The interdependence between institutional investor stock ownership and information dissemination by capital market data aggregators. Working paper. SSRN.

Diamond D. and R. Verrecchia, 1991. Disclosure, liquidity, and the cost of capital. *Journal of Finance* 66 (September): 1325-1355.

Duru, A., and D. M. Reeb. 2002. International diversification and analysts' forecast accuracy and bias. *The Accounting Review* 77 (April): 415-433.

Elliott, W. B., S. D. Krische and M. E. Peecher. 2009. Expected mispricing: the joint influence of accounting transparency and investor base. AAA 2009 Financial Accounting and Reporting paper.

Falkenstein, F.1996. Preferences for stock characteristics as revealed by mutual fund portfolio holdings. *Journal of Finance* 51 (March): 111-135.

Frankel, R., S. P. Kothari, and J. Weber. 2006. Determinants of the informativeness of analyst research. *Journal of Accounting and Economics*, 41 (1/2): 29-54.

Gompers, P. A. and A. Metrick. 2001. Institutional investors and equity prices. *Quarterly Journal of Economics*, 116 (1): 229-259.

Graham J. R., C. R. Campbell, R. Harvey, and S. Rajgopal. 2005. The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, 40 (1/3): 3-73.

Haw, I., K. Jung, and W. Ruland. 1994. The accuracy of financial analysts' forecasts after mergers. *Journal of Accounting, Auditing and Finance* 9 (Summer): 465-486.

Hutchins, H. R. 1994. Annual reports: earning surprising respect from institutional investors. *Public Relations Review* 20 (4): 309-317.

Kasznik, R. and M. F. McNichols, 2002. Does Meeting Earnings Expectations Matter? Evidence from Analyst Forecast Revisions and Share Prices. *Journal of Accounting Research*, 40 (3): 727-759.

Koh, P., 2007. Institutional investor type, earnings management and benchmark beaters, *Journal of Accounting and Public Policy*, 26 (3), 267–299.

Kross, W., B. Ro, and D. Schroeder, 1990. Earnings Expectations: The analysts' information advantage. *The Accounting Review* 65 (2): 461-476.

Lev, B. 1983. Some economic determinants of time-series properties of earnings. *Journal of Accounting and Economics* 5 (April): 31-48.

Li, K. , H. Yue, and L. Zhao, 2009. Ownership, institutions, and capital structure: Evidence from China. *Journal of Comparative Economics*, 37 (3): 471-490.

Lopez, T. and L. Rees, 2002. The Effect of Beating and Missing Analysts' Forecasts on the Information Content of Unexpected Earnings. *Journal of Accounting, Auditing & Finance*, 17 (2): 155-184.

Mikhail, M. B., B. R. Walther, and R. H. Willis. 1997. Do security analysts improve their performance with experience? *Journal of Accounting Research* 35 (Supplement): 131-157.

O'Brien P. C. and R. Bhushan 1990. Analyst following and institutional ownership. *Journal of Accounting Research*, 28 (Supplement): 55-76.

Petersen, M. A. 2009. Estimating standard errors in finance panel data sets: comparing approaches. *Review of Financial Studies*, 22 (1), 435-480.

Shleifer, A and R. W. Vishny 1997. The limits of arbitrage. *Journal of Finance, 52 (1): 35-55.*

Sias, R. 1996. Volatility and the institutional Investor. *Financial Analysts Journal*, March/April: 13-20.

Wang, A. W. and G. Zhang. 2009. Institutional ownership and credit spread: an information asymmetry perspective. *Journal of Empirical Finance*, 16: 597-612.