Are You Following Me? The Effects of Shareholder Investment Horizon on Analyst Herding Behavior

Ryan D. Leece
Sheldon B. Lubar School of Business
University of Wisconsin - Milwaukee
Milwaukee, WI 53201
Phone: (414) 229-3837
E-mail: leece@uwm.edu

Todd P. White
Haworth College of Business
Department of Accountancy
Western Michigan University
Kalamazoo, MI 49008
Phone: (269) 387-5661
E-mail: todd.white@wmich.edu

Abstract

The results of this study are consistent with the interpretation that the incidence of private information, measured by the presence of short-term institutional owners, explains analyst herding behavior. Specifically, we find the percentage of short-term institutional owners is positively related to herding behavior. We also find early, bolder and relatively more accurate forecasts are associated with short-term institutional owners. Both results are consistent with reputational herding theory. Lastly, we provide evidence of a positive relationship between the length of institutional investment horizon and analysts' likelihood of forecast revision following management issued guidance providing further support for the link between institutional investment horizon and analyst behavior.

Keywords: financial analysts, institutional ownership, herding, earnings forecasting.

JEL Classification: D82, D84, G20

February 28th, 2014

1 Introduction

The informational role of institutional investors and sell-side analysts illustrates the differentiation in the degree to which market participants are informed. For example, research shows institutions' investment horizon is informative of future earnings and stock returns (e.g., Yan et al. 2009). In addition, analysts' issuing earlier and more accurate earnings forecasts are indicative of more capable analysts acting early and basing their forecasts on private information. (e.g., Scharfstein and Stein 1990; Trueman 1994; Keskek et al. 2014). In this study, we bridge the institutional investor and analyst herding literatures. First, we show the investment horizon of institutional investors is informative of analyst herding behavior. Second, we find institutional investment horizon is associated with analysts' propensity to issue forecast revisions subsequent to management issued guidance.

Research indicates short-term (transient) institutional owners possess superior information regarding firm performance. Institutional investors employ earnings momentum strategies and have high portfolio turnover (Bushee 1998). Ke and Petroni (2004) find transient institutional owners predict bad news breaks in a company's ability to meet quarterly earnings benchmarks. In addition, Ke, Petroni and Yu (2008) provide further evidence of a causal link between institutions' information advantage and their portfolio decisions based on the implementation of Regulation Fair Disclosure.[1] Similarly, Yan et al. (2009) and Hu et al. (2009) find transient institutional owners are more informed and use their superior information to earn positive abnormal returns.

Earnings forecasting is a highly visible and widely followed financial analyst activity. Analysts' earnings forecasts help investors predict a firm's future cash flows and are most useful

[1] The Securities and Exchange Commission enacted Regulation Fair Disclosure on September 23, 2000 in order limit selective information disclosure.

if they are accurate and timely. Current and potential investors extract relevant information about upcoming corporate earnings from analyst forecasts. As argued by Arya et al. (2005), herding behavior by financial analysts can be detrimental to efficient markets because it limits the information available to investors when individual analysts partially or fully mask their private information in order to bias their forecasts towards those of colleagues.

This study seeks to differentiate between analysts' herding behavior due to individuals acting in concert based on similar information vs. individuals herding due to variation in the degree to which they are informed. Predicting earnings requires analysts to gather both public and private information. Corporate disclosures and conference calls encompass the bulk of public information available to all analysts. Private information, information the analysts uncovers himself, differentiates the analysts' forecasts from those of his peers. Research suggests analyst herd when analysts with superior information issue early forecasts (Keskek et al. 2014). We identify the presence of private firm information by the incidence of short-term institutional owners in the firm.

Disagreement exists in extant literature regarding analyst herding behavior. Several herding related studies predict and find evidence of analysts issuing forecasts which deviate from their private beliefs in order to conform to the consensus.[2] Conflicting results are found in Bernhardt et al. (2006) and Chen et al. (2006). In contrast to finding support for analyst herding behavior, Bernhardt, et al. (2006); and Chen et al. (2006) do not find evidence of analysts biasing forecasts toward the consensus. Our research adds to this debate by identifying a measure of private information and linking it to analyst herding behavior.

To investigate the relationship between analyst herding behavior and the presence of institutional investors, we follow Bernhardt et al. (2006) and employ the S-statistic, a measure of

[2] See Scharfstein and Stein (1990); Trueman (1994); Clement and Tse 2003, 2005; Gleason and Lee 2003

analyst herding. The S-statistic identifies the frequency with which analysts bias their forecasts towards the consensus and away from the consensus (i.e., herding and anti-herding). The benefit of the S-statistic is no assumptions are made regarding how the analyst arrives at his posterior. The calculation rests on two conditional probabilities 1) conditional probability of ½ that a forecast exceeds actual earnings given it is greater than the consensus 2) conditional probability of ½ that a forecast falls short of actual earnings given it is less than the consensus. To control for systematic bias and unforecasted earnings shocks, the conditional probabilities are averaged. The results of this study are consistent with analysts herding to a greater extent in their earnings forecasts when transient institutional investors are present.

An additional analysis focuses on the timing and quality of analysts' forecasts and seeks to provide further evidence of a herding relationship with the incidence of private information. By incorporating the procedure used in Keskek et al. (2014), we develop forecast quality metrics which capture the timing and the relative accuracy of forecasts in order to determine whether analysts engage in reputational herding to a greater degree in firms with higher proportions of transient institutional investors. Reputational herding theory predicts less informed analysts will follow more informed analysts in issuing forecasts to avoid negative reputational effects. We predict greater variation in the degree to which analysts are informed based on the presence of private information. Tests demonstrate the timing and quality of analysts' forecasts are associated with the proportion of transient institutional owners and thus consistent with reputational herding behavior.

Lastly, our study investigates whether the informational role of institutional investors impacts the credibility of management's earnings forecast to provide further evidence of a link between institutional investment horizon and analyst behavior. We predict the informational role of institutional investors impacts analysts' forecast revisions subsequent to management issued earnings guidance due to analysts' perceptions of disclosure quality. For instance, Matsumoto (2002) finds firms with higher proportions of transient institutional owners are more likely to guide analysts' earnings forecasts down in order to avoid market penalties associated with missing analysts' expectations. In order to test our last supposition, we follow Cotter et al. (2006) and calculate the percentage of analyst forecast revisions following the issuance of quarterly management earnings guidance to determine whether the incidence of transient institutional investors is informative of analyst forecast revisions. The results are consistent with the interpretation that firms with a substantial percentage of dedicated institutional shareholders improve the credibility of management disclosures through stronger monitoring mechanisms. Consequently, analysts are more likely to issue revised forecasts subsequent to management issued earnings guidance.

In robustness tests, we investigate whether the percentage of transient institutional investors is spuriously correlated with analyst herding behavior by measuring additional aspects of the firm information environment. Transaction costs and the level of firm information asymmetry represent constructs likely correlated with both analyst herding behavior and institutional investment horizon. Tests show our result is robust to additional controls providing evidence that the presence of transient institutional owners captures an element of the variation in herding behavior not explained by information asymmetry and transaction costs.

Overall, we provide evidence which helps market participates better evaluate analyst behavior. Our results contribute to the analyst herding debate by linking the informational role of institutional investors to analyst herding behavior. Specifically, we identify a cross-sectional determinant of analyst herding behavior not previously identified in the herding literature. Our findings advance the forecast quality literature by showing institutional investment horizon is predictive of relative forecast accuracy and timing, characteristics consistent with reputational herding behavior. Our evidence also contributes to the expectations management literature by showing analysts are more likely to revise their forecasts when institutional investment horizon is longer, an indication that analysts are aware of the informational role of institutional investors.

The remainder of this paper is organized as follows. Section two provides background information and the hypothesis development. Section three discusses our research methodology. Section four outlines our sample selection and descriptive statistics. Section five describes the main results of the study while section six describes additional tests. Finally, section seven includes concluding remarks and suggestions for future research.

2 Background and Hypothesis Development

While herding behavior has been examined across a variety of market participants, we focus on analyst earnings forecasts.[3] Herding refers to the decision to bias a forecast away from an analyst's estimate towards the consensus of earlier analysts (e.g., Bernhardt et al. 2006; Ke et al. 2008). Scharfstein and Stein (1990); Trueman (1994) develop models forming the basis of reputational herding theory. Reputational herding theory predicts less capable analysts will follow more capable analysts in issuing forecasts. For instance, Trueman finds low ability analysts imitate high ability analysts in order to achieve higher compensation. Both studies identify circumstances in which an analyst prefers to release a conforming forecast that is different than could be justified by his information.

[3] Macroeconomic forecasters and mutual fund managers are two examples of other participants receiving attention in the herding literature (e.g., Gallo, Granger, and Jeon 2002; Lamont 2002; Chevalier and Ellison 1999).

Studies consistent with Scharfstein and Stein (1990) and Trueman (1994) analyze forecast clustering and temporal variation in market reactions and find support for reputational herding behavior. Market reactions to forecast revisions depend on the degree of innovation (i.e., new information) the revision contains. Gleason and Lee (2003) show forecast revisions garner larger market reactions when they deviate from the consensus. Similarly, Clement and Tse (2005) focus on innovative forecasts by classifying forecasts into bold and herding categories.[4] Clement and Tse find the market reaction is stronger for bold forecasts due to greater accuracy. Both studies conclude market reactions are stronger when forecasts express to a greater extent the analysts' private information. In addition, Clement and Tse (2005) and Hong et al. (2000) document career factors as important predictors of herding behavior.

By examining the timing of forecasts, Keskek et al. (2014) provide additional support for reputational herding theory. Keskek et al. find more capable analysts possess superior private information before less capable analysts. Therefore, forecasts issued during the early stages of information discovery and analysis are of higher quality (e.g., more accurate and more informative) than subsequent forecasts.[5]

Conflict exists among empirical studies seeking to substantiate the predictions of Scharfstein and Stein (1990) and Trueman (1994). In contrast to finding support for analyst herding behavior, Bernhardt, et al. (2006); and Chen et al. (2006) do not find evidence of analysts biasing forecasts toward the consensus. These studies find evidence of analysts issuing forecasts farther away from the consensus relative to their posterior distribution of earnings based on their information set (anti-herding). Our study adds to this debate by analyzing whether

[4] Clement and Tse (2005) identify forecasts as bold if they are above (below) the analysts' prior forecast and the consensus immediately before issuance.
[5] The information discovery stage is a 30 day window prior to a quarterly earnings announcement. The information analysis stage is the 5 day window on and after the quarterly earnings announcement.

cross-sectional variation in the presence of private information is associated with herding (anti-herding).

Research shows institutional investment horizon is indicative of variation in investors' information.[6] Institutional investors are typically disaggregated into two types based on their investment horizon. Dedicated institutional investors are defined as long-term investors in contrast to transient, or short-term, investors who have high portfolio turnover and employ earnings momentum strategies (Bushee 1998). Research indicates transient institutional owners possess superior information regarding firm performance. Ke and Petroni (2004) find transient institutional owners predict breaks in a company's ability to meet earnings benchmarks. Ke and Petroni interpret their finding as evidence of transient institutional investors possessing private information.[7] Similarly, Yan and Zhang (2009) and Hu et al. (2009) find transient institutional owners are more informed and use their superior information to earn positive abnormal returns.

The firm information environment is an important input into analyst earnings forecasts. The analyst develops a posterior distribution of earnings which takes into account both public and private information. Sell-side analysts consume various sources of public information (e.g., SEC filings, proxy statements, conference calls, quarterly and annual reports) in order to produce earnings forecasts. In addition, an analyst uncovers information through his own research (i.e., private information). An analyst's ability to gather and analyze private information impacts the timing and quality of their forecasts (Scharfstein and Stein 1990; Trueman 1994).

Overall, the presence of transient institutional investors signals the existence of private information. In this setting, we predict the incidence of transient ownership to be associated with

---

[6] See Barber and Odean (2000), Grinblatt and Titman (1989), Odean (1998), Wermers (2000), Yan and Zhang (2009).

[7] Ke and Petroni (2008) find evidence that transient institutional investors' trading behavior changed in a post Regulation FD environment.

greater variability in the degree to which analysts are informed. Therefore, analyst behavior will be impacted by the presence of private information channels that transient institutional owners exploit. Under reputational herding theory, more capable analysts are able to discover and analyze private information and issue timelier and higher quality earnings forecasts. Taken together, we predict the proportion of transient institutional investors to be associated with earlier and higher quality forecasts due to the presence of private information. This leads to our first hypothesis stated in alternative form.

H1*: The degree of reputational herding behavior is positively associated with the percentage of transient ownership in the firm.*

Our next hypothesis incorporates research which finds firm behavior is impacted by institutional shareholder investment horizon and seeks to determine whether analyst behavior is also influenced. Specifically, we analyze analyst earnings forecast revisions subsequent to management issued guidance across cross-sectional variation in institutional shareholder investment horizon.

In the event of management earnings guidance, a forecast revision indicates the analyst views the guidance to be substantive and therefore incorporates the information into a revised forecast. If the analyst, however, believes the guidance is being used for manipulative purposes such as managing the consensus, they will not issue a revised forecast. Cotter et al. (2006) show the issuance of management guidance has a strong and direct influence on whether analysts switch and issue beatable targets. Analysts attempt to differentiate between valid guidance and manipulation. Since we cannot observe the input the analyst uses when deciding to revise their forecast in the face of management guidance, we focus on the output. The degree to which analysts revise their forecasts for a given firm can be used to evaluate whether analysts view earnings guidance to be credible. Thus, variability in analyst revisions across variations in long-term versus short-term institutional investors provides further insight into how the firm information environment impacts analyst behavior.

Research shows institutional investors impact managerial decisions. From a management control system perspective, institutional investors play an important role as monitors (e.g., Gillan and Starks 2000; Almazan et al. 2005; Dikolli et al. 2009). Short-term institutional investors have been found to not only possess private information which they leverage to make trading decisions, but they have also been found to be also associated with firms sacrificing long-term value for short-term gains. Matsumoto (2002) finds the presence of transient institutional owners is associated with a higher propensity to avoid negative earnings surprises. Empirically, Matsumoto shows firms with higher proportions of transient institutional ownership are more likely to guide analysts' earnings forecasts down in order to avoid market penalties associated with missing analysts' expectations. Liu and Peng (2006) find transient institutional ownership to be associated with low accrual quality and earnings management. Since transient ownership influences greater accounting discretion, a greater degree of uncertainty surrounds the firm's fundamental value.

In transient-owned firms, analysts may have concerns about the existence of private information channels and short-termism behavior, it is more likely analysts will question the credibility of firm guidance. If analysts believe there is greater uncertainty regarding firm earnings, they will be less likely to update their beliefs and issue a revised forecast. Under this scenario, we predict institutional ownership investment horizon to covary with analysts' propensity to issue revised forecasts subsequent to management issued guidance. Our second hypothesis stated in alternative form:

H2*: The percentage of transient ownership in a firm is negatively associated with the incidence of analyst revisions.*

3 Research Design

3.1 Is transient institutional ownership associated with reputational herding behavior (H1)?

We construct three models to address our first hypothesis. Our analyses are designed to test the relationship between the presence of private information and analyst herding behavior across two dimensions. First, we test for an association between institutional investment horizon and biased earnings forecasts. A biased forecast is a forecast that is not equal to the analyst's mean (median) posterior estimate of earnings per share.[8] Second, we test for an association between institutional investment horizon and the timing of high quality forecasts.

Taken together, our tests provide empirical support for the predictions of reputational herding theory. Reputational herding theory predicts more capable agents act early and base their estimates on their private information, whereas less capable agents herd because they have low quality information and seek to hide their low ability (Scharfstein and Stein 1990; Trueman 1994).

3.1.1 S-statistic test

Our first test incorporates the S-statistic developed by Bernhardt et al. (2006) in order to test for a relationship between institutional investment horizon and biased forecasts. The S-statistic improves upon the methodology used in past studies by making no assumptions regarding how an analyst forms his posterior distribution of earnings. For example, cross-sectional correlation (e.g., unforecasted earnings shocks) and/or systematic bias (e.g.,

[8] A biased forecast is indicative of either herding or anti-herding behavior. Anti-herding indicates an analyst forecasts away from the consensus (rather than towards it) in the direction of his private information.

consistently issuing an upward biased forecast) are not identified as herding behavior via the S-statistic.

The S-statistic rests on the conditional probability of ½ that an analyst issuing an unbiased forecast given the forecast is greater than (less than) the prior consensus. If forecasts above the consensus are frequently below actual earnings then it is indicative of analysts who are herding by pulling their forecasts closer to the consensus. If, on the other hand, forecasts above the consensus are frequently above actual earnings then it is indicative of anti-herding as analysts are not pulling their forecasts downward toward the consensus.[9] Exhibit 1 is adapted from Mensah and Yang (2008) and illustrates the calculation of the S-statistic:

	Forecast > Consensus	Forecast < Consensus
Forecast > Actual EPS	$\sum\delta+$	$\sum\gamma-$ less $\sum\delta-$
Forecast < Actual EPS	$\sum\gamma+$ less $\sum\delta+$	$\sum\delta-$
Column Total	$\sum\gamma+$	$\sum\gamma-$

$\delta^+ = 1$ if forecast > prior consensus forecast, and forecast > actual earnings; zero otherwise;

$\delta^- = 1$ if forecast < prior consensus forecast, and forecast < actual earnings; zero otherwise;

$\gamma^+ = 1$ if forecast > prior consensus forecast; zero otherwise;

$\gamma^- = 1$ if forecast < prior consensus forecast; zero otherwise;

Exhibit 1: Measurement of the S-statistic (Bernhardt et al. 2006; Mensah and Yang 2008)

[9] For example, assume the consensus annual EPS forecast for a company at time t is 1.25 and r days later (time t+r), the consensus rises to 1.35. Further, assume actual earnings per share are 1.30. Herding would be evidenced if the forecasts above the consensus (1.25) at time t were consistently below 1.30 and those below the consensus (1.35) at time t+r were consistently above 1.30. If this is the case, then the distribution of forecasts around actual earnings is not random, as analysts are adjusting their forecasts to be closer to the consensus.

$$\text{S-statistic} = 0.5 * \left[\frac{\sum_{i=1}^{N}\delta_i^+}{\sum_{i=1}^{N}\gamma_i^+} + \frac{\sum_{i=1}^{N}\delta_i^-}{\sum_{i=1}^{N}\gamma_i^-}\right] \quad (1)$$

The S-statistic is the average of 1) the percentage of forecasts above actual earnings when they are above the consensus and 2) the percentage of forecasts below actual earnings when they are below the consensus. Therefore, an S-statistic of 0 indicates perfect herding while an S-statistic of 1 indicates perfect anti-herding.

Based on the methodology in Mensah and Yang (2008), we estimate the following regression model:

$$S_j = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 RegFD + \beta_4 RegFD*TRA + \beta_5 RegFD*DED + \beta_6 NObs + \beta_7 NAnaly + \beta_8 RegFD*NAnaly + \beta_9 AGE + \beta_{10} HES + \beta_{11} SIZE + \beta_{12} F\_Error + \varepsilon \quad (2)$$

S_j, the S-statistic, is calculated using annual earnings forecasts, including all forecasts between the time period starting 150 days prior to the announcement of annual earnings and extending through the announcement date. Institutional investor horizon variables, *DED* and *TRA*, supplement the model and are calculated based on methodology in Bushee (1998). Specifically, dedicated institutional investor (*DED*) holdings and transient institutional investor holdings (*TRA*) are calculated as of the most recent calendar quarter prior to the S-statistic calculation window. Consistent with reputational herding theory, we expect an inverse relationship between the estimated coefficient, β_1, and the dependent variable, S_j, since a lower S-statistic is indicative of greater analyst herding. A statistically significant and negative coefficient on *TRA* (β_1) indicates a positive association with analyst herding and would provide support for our first hypothesis.

The SEC enacted Regulation Fair Disclosure (Reg. FD) on October 23, 2000 in an attempt to limit the private disclosure of information to select parties. *RegFD* is an indicator variable equal to one if the beginning of the observation period occurred after the passage of

Reg. FD and zero otherwise. Due to disagreement in the literature as to the effects Reg. FD has on analyst herding behavior, we make no predictions regarding the sign of *RegFD* and its interactions with *TRA* and *DED*.[10]

Equation 2 contains additional explanatory variables to control for firm and analyst characteristics which also explain variation in the degree of analyst herding (anti-herding). *NObs* measures the cumulative number of forecasts used to calculate the S-statistic. The size of *NObs* likely contributes to variation in the dependent variable. *NAnaly* is equal to the number of analysts following the firm. It is expected the estimated coefficient on this variable will be positive, consistent with anti-herding, since a greater analyst following is predicted to increase the incentives for analysts to differentiate themselves from their peers (e.g., Lin and McNichols 1998). The interaction of *NAnaly* and *RegFD* allows the estimated coefficient on *NAnaly* to vary in the pre and post-Reg. FD environment. No prediction is made regarding the sign of this interaction. *AGE* is the average age of the forecasts utilized in the observation period. Forecast age is calculated as the time in days between the forecast issue date and the earnings announcement date. We expect a positive relationship between *AGE* and S_j because older forecasts are predicted to be more dispersed, whereas newer forecasts are predicted to be closer together. *HES*, historical earnings stability, is calculated as the standard deviation of quarterly earnings over the past five years. We make no predictions regarding the sign of the estimated coefficient on *HES*. *HES* measures aspects of firm uncertainty (e.g., macroeconomic shocks) which could lead to increased or decreased forecast dispersion. *SIZE*, measured as the natural log of firm market capitalization, is calculated as the beginning of the year stock price multiplied by the number of common shares outstanding. No prediction is made with respect to the sign of

[10] In a theoretical study, Arya et al. (2005) predict Reg. FD could lead to increased herding behavior among analysts. In contrast, empirical studies (e.g., Mohanram et al. 2006; Mensah et al. 2008) find very little evidence that Reg. FD influenced analyst herding tendencies.

this variable. Finally, *F_Error* is the absolute value of the difference between actual earnings and the last consensus forecast issued before the earnings announcement. It is expected the sign on this variable will be positive since smaller forecast errors are indicative of newer forecasts and consequently less forecast dispersion.

3.1.2 Forecast timing and forecast quality tests

We develop two additional measures of herding behavior in order to capture forecast timing and forecast quality constructs consistent with reputational herding theory. Specifically, our tests are designed to determine whether early forecasts during the information discovery and information analysis stages of forecast development are indicative of well-informed analysts moving before less informed analysts. Our basic methodological framework is built on Chen et al. (2010) and Keskek et al. (2014).

Three time periods with respect to quarterly forecasts are identified in Chen et al (2010): information discovery, information analysis and post analysis periods. The periods differ with respect to when quarterly earnings are issued. The information discovery period concerns the thirty days before earnings are announced (day -30 to day -1). In this period, annual earnings information is released. The information analysis period represents the quarterly earnings announcement day through day 4 (from day 0 to day 4). Lastly, the post-analysis window covers day 5 to day 20.

Based on the results in Keskek et al. (2014), our study focuses on the information analysis and information discovery periods to determine whether transient ownership is associated with higher quality forecasts occurring more frequently in the "early" portion as opposed to the "late" portion of each period. The early portion of the information discovery period is represented by day -30 through day -11 while the late portion is represented by day -10 through day -1. The early portion of the information analysis period is represented by day 0 through day 2 while the late portion refers to day 3 and day 4.

Similar to Clement et al. (2005) and Keskek et al (2014), we develop two forecast quality metrics to test our first hypothesis. First, we measure the percentage of bold forecasts (*eBold*) occurring during the early periods of information discovery and information analysis. Hong et al. (2000) depict bold forecasts as diverging from peers' previous forecasts. Gleason and Lee (2003); Clement et al. (2005) identify bold forecasts as diverging from both peer's previous forecasts and the analyst's previous forecast. Bold forecasts are interpreted as providing new information to the market and thus reflecting an analyst's superior private information. Second, we measure the incidence of forecasts occurring during the early periods which are relatively more accurate than peers' outstanding forecasts (*eImprove*). The advantage of using a relative forecast accuracy measure is it alleviates the concern of a mechanical relationship between time and forecast accuracy. Specifically, forecast accuracy should improve as the earnings announcement date approaches. Consistent with Keskek et al. (2014), our relative accuracy measure detects a forecast's contribution to overall accuracy at the time of the forecast. The relationship between the forecast quality measures and institutional investment horizon is measured in Equations 3a and 3b.

$$eBold = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 RegFD + \beta_4 RegFD*TRA + \beta_5 RegFD*DED + \beta_6 NObs + \beta_7 NAnaly + \beta_8 RegFD*NAnaly + \beta_9 AGE + \beta_{10} HES + \beta_{11} SIZE + \beta_{12} F\_Error + \varepsilon \quad (3a)$$

$$eImprove = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 RegFD + \beta_4 RegFD*TRA + \beta_5 RegFD*DED + \beta_6 NObs + \beta_7 NAnaly + \beta_8 RegFD*NAnaly + \beta_9 AGE + \beta_{10} HES + \beta_{11} SIZE + \beta_{12} F\_Error + \varepsilon \quad (3b)$$

A forecast is bold if it is outside the interval defined by the analyst's previous forecast and the prevailing peers' forecast.[11] *eBold* capture a degree of innovation (i.e., new information) relative to forecasts which are inside the interval. *eImprove* is the percentage of forecasts that occur during the "early" periods and are more accurate than the prevailing peers' forecasts. As a relative forecast accuracy measure, *eImprove* reveals whether the forecast contributes to overall forecast accuracy.

In an environment with reputational herding, it is expected earlier forecasts are bolder and more informative while later forecasts exhibit a greater tendency to conform. A positive and statistically significant coefficient on *TRA* in both Equations 3a and 3b would provide support for a reputational herding effect in firms with higher a higher incidence of private information channels (i.e., firms with a higher concentration of transient institutional investors).

3.2 Is the presence of institutional owners associated with analyst forecast revisions subsequent to management issued guidance (H2)?

Our second and final hypothesis further investigates the relationship between the firm information environment and analyst behavior by determining whether analysts give more (less) weight to management earnings guidance when the institutional shareholder investment horizon is shorter (longer). Since extant literature shows institutional investment horizon influences firm behavior, we analyze analyst forecast revisions following management issued guidance to determine whether analysts are aware of this influence. In order to test our supposition, we calculate the percentage of analyst forecast revisions surrounding the issuance of management earnings guidance. The model is adapted from Cotter et al. (2006) and is as follows:

[11] The prevailing peers' forecast is defined as the most recent analyst forecast. If other forecasts were issued on the same day as the most recent forecast then the prevailing peers' forecast is the average of those forecasts.

$$\text{FRAC} = \alpha_1 + \beta_1\text{TRA} + \beta_2\text{DED} + \beta_3\text{AnalystOptimism} + \beta_4\text{AnalystDispersion} + \beta_5\text{ROA} + \beta_6\text{LOSS} + \beta_7\text{POINT} + \beta_8\text{RANGE} + \beta_9\text{LessThan} + \beta_{10}\text{GreaterThan} + \beta_{11}\text{TimeTrend} + \beta_{12}\text{NumFCast} + \beta_{13}\text{PostFD} + \beta_{14}\text{SIZE} + \varepsilon \quad (4)$$

The dependent variable, *FRAC*, is measured as the percentage of analysts who revise their forecast within five days of the issuance of management guidance. *TRA* and *DED* are calculated as previously defined. *AnalystOptimism* is the difference between the beginning of period consensus analyst forecast and actual earnings, scaled by the absolute value of earnings. A positive estimated coefficient on *AnalystOptimism* indicates analysts weigh management earnings guidance more when it is relatively pessimistic. The standard deviation of analysts' earnings per share forecasts as of the beginning of the quarter, scaled by the absolute value of earnings is defined as *AnalystDispersion*. A positive coefficient is expected on *AnalystDispersion* because high forecast dispersion typically leads management to issue corrective guidance. *ROA* is analysts' consensus quarterly earnings forecast at the beginning of the fiscal quarter, scaled by the lagged value of assets. *LOSS* is an indicator variable that equals 1 if analysts' consensus quarterly earnings forecast at the beginning of the quarter is a loss and 0 otherwise. No predictions are made with respect to *ROA* and *LOSS*.

Indicator variables representing the form of management guidance are included since extant literature shows this influences guidance reaction (Pownall 1993). *POINT* is an indicator variable that equals 1 if the forecast is a point forecast. *RANGE* is an indicator variable that equals 1 if the management earnings forecast is a range. It is anticipated the coefficient on both *POINT* and *RANGE* will be positive since both types of forecasts are more precise than open-set or qualitative forecasts. *LessThan* is an indicator variable equal to 1 if management provides "less than" guidance. Since analysts are more likely to react to bad news, the coefficient on *LessThan* is expected to be positive (Williams 1996). *GreaterThan* is an indicator variable equal to 1 if management provides "greater than" guidance. No prediction is made with respect to the sign of *GreaterThan*.

Additional control variables, *TimeTrend*, *NumFCast*, *PostFD*, *SIZE* supplement the model. *TimeTrend* is equal to 1 in the first quarter of the sample. *NumFCast* is equal to the number of analysts appearing in the consensus forecast. *PostFD* is an indicator variable equal to one if the beginning of the consensus period occurs after October 23, 2000. *SIZE* is equal to the natural log of the firm's market capitalization calculated as the firm's stock price times the number of common shares outstanding at the beginning of the quarter. No predictions are made with respect to the sign of estimated coefficients for *TimeTrend*, *NumFcast*, *PostFD*, and *SIZE*.

While our first hypothesis address whether institutional owner investment horizon is associated with reputational herding behavior, our second hypothesis addresses whether the presence of institutional shareholders influences how analysts view management issued guidance. Support for our second hypothesis exists if the coefficient on *TRA* is negative and significant.

4 Sample Selection and Descriptive Statistics

4.1 Sample Selection

Our analyses are evaluated over the sample period from 1998 to 2007. Institutional holdings data for the transient (*TRA*) and dedicated (*DED*) variables is gathered from the 13f filings on the Thomson-Reuters database and calculated according the procedure in Bushee (1998). We use I/B/E/S data to construct the S-statistic, the measure of herding behavior calculated using methodology in Bernhardt et al. (2006). I/B/E/S also provides the data to calculate the reputational herding measures, *eBold* and *eImprove*, in Equations 3a and 3b and analyst forecast error and analyst following measures used throughout the study. Additional data from Compustat and CRSP is used to calculate historical earnings stability, company size, transaction cost and the information asymmetry measures used in the supplemental analysis section of this study. Management guidance data was obtained from the First Call Company Issued Guidance database. Information surrounding analyst revisions and the consensus forecast were calculated using data from the First Call Analyst Estimate database. Finally, actual amounts for earnings announcements were obtained from the First Call Actuals database. As a result of the data requirements, our final sample contains 2,403 firms which correspond to 8,010 firm-quarter observations.

4.2 Descriptive Statistics

Descriptive statistics for all variables in our analyses are presented in Table 1.[12] The mean of the S-statistic in our sample is 0.627. Finding an average S-statistic greater than 0.50 is consistent with Bernhardt et al. (2006) and the mean in our sample closely approximates the S-statistic found in the Mensah and Yang (2008) sample of 0.63. Regarding the number of forecasts used in each S-stat calculation (NObs), our sample uses an average of 50.254 forecasts in each annual observation which on average, consists of 9.872 unique analysts following the firm. This amount of forecasts is similar to the average amount of 43.420 forecasts used in the Mensah and Yang (2008) sample. With respect to institutional ownership, the average amount of total shares owned by transient institutional investors is 17.9% and the average ownership by dedicated institutional investors is 7.1%. Finally, the average firm market capitalization in the sample is $1.989 billion.

[Table 1 Here]

[12] Five outlying data points with an HES greater than 100 were removed from our sample. Including those data points causes the standard deviation of HES to go from around 1 to 362. All of our results, however, are robust to the inclusion of those data points.

5 Results

This section describes the empirical analyses which test whether variation in institutional shareholder investment horizon is indicative of analyst behavior. All coefficients are estimated using OLS and all t-statistics are calculated using firm-level clustered standard errors to correct for serial-correlated residuals (White 1980; Peterson 2009).

5.1 Relation between S-statistic and institutional investment horizon

The results of estimating equation 2 which captures the relationship between the operational measure of herding (anti-herding) behavior, (the S-statistic) and institutional holdings measures (*TRA* and *DED*) with additional control variables are presented in Table 2.

[Table 2 Here]

The results match our prediction of a positive relationship between the degree of analyst herding and the degree of short-term institutional holdings in a firm. The estimated coefficient on *TRA* is negative and highly statistically significant (-0.0818; p=.002). Since a lower S-statistic is indicative of greater analyst herding, this supports H1 and implies higher proportions of transient institutional shareholders is associated with a greater degree of analyst herding in issuing forecasts. In addition, dedicated institutional ownership is negatively associated with analyst herding (0.0714; p=.037). A possible explanation for this result rests on research which suggests long-term shareholders improve the firm information environment (e.g., Bushee 1998).

From an economic significance standpoint, the coefficient of -0.0818 implies, ceteris paribus, a firm with the median amount of analyst herding (S-stat = 0.567) and no transient ownership would experience a move to the top quartile of firms experiencing analyst herding behavior (S-stat = 0.500), if ownership completely shifted to transient investors. Thus, the more transient ownership a firm has, the more likely an analyst will exhibit herding behavior and issue a conforming forecast.

By controlling for Reg. FD, our model captures the temporal change in the disclosure environment and its impact on herding behavior across variation in institutional ownership. Of the two institutional ownership interactions, only the estimated coefficient on the interaction term *DED*RegFD* is significant (-0.0768; p=.054). Our results suggest herding behavior continues post-Reg. FD in transient owned firms.

These results concur with those of Mensah and Yang (2008), as well as the majority of the estimated coefficients on the control variables. Minor differences relate to variables utilizing the indicator variable *RegFD* and could be due to the differential between the sample period Mensah and Yang (2008) evaluated and our study's sample period. Specifically, the sample examined in this study is dominated by the post Reg. FD period while that of Mensah and Yang (2008) is predominantly pre-Reg. FD. Lastly, the sign on F*_Error* is negative and significant and is, therefore, associated with a greater degree of herding while *AGE* is not found to be significantly related to analyst herding.

Overall, the results are consistent with the conjecture that analyst herding behavior is associated with a firm's information environment. Namely, firms with evidence of private information channels via higher proportions of transient institutional-owned firms are indicative of an environment conducive to analyst herding behavior.

5.2 Relation between forecast timing/quality and institutional investment horizon

In this section, we report results to test the component of reputational herding theory which predicts analysts exhibit variation in forecast timing and quality when analysts are differentially informed. Table 3 presents a breakdown of the forecasts used to calculate *eBold* and *eImprove*. While more forecasts occur in the "early" as opposed to the "late" periods of analysis, there is not a general tendency that earlier forecasts are bolder or relatively more accurate.

[Insert Table 3]

Descriptive statistics for *eBold* and *eImprove* are presented in Table 4. The mean value of and the standard deviation for *eBold* (mean=0.594, std=0.313) and *eImprove* (mean=0.616, std=0.327) are similar.

[Insert Table 4]

We first investigate the degree to which transient ownership is associated with bold forecasts (*eBold*). The results are presented in Table 5. The coefficient on *TRA* is 0.324 and it is highly significant (p<.0001). The estimated coefficient on the interaction of *TRA*RegFD* is significant at the .05 level and shows the *TRA* reputational herding effect is adjusted to 0.192 (0.324-0.132) post-Reg. FD. The results indicate transient ownership is strongly related to the incidence with which bold forecasts are issued in the "early" portion as opposed to the "late" portion of the analyst forecast period. Dedicated institutional ownership is also found to be associated with reputational herding, however, the effect is only marginally significant (p=.073).

The economic significance of our result can be interpreted as follows. Combined with the interaction term, an estimated coefficient on *TRA* of 0.192 indicates a 25 percent increase in transient ownership is associated with a 4.8 percent (0.192*0.25) increase in the proportion of bold forecasts which appear in the "early" period as opposed to the "late" period. This result is consistent with the presence of private information channels associated with transient institutionally owned firms influencing analysts to engage in reputational herding behavior.

[Insert Table 5]

Next, we investigate the degree to which transient ownership is associated with early and relatively more accurate forecasts (*eImprove*). Results are presented in Table 6. Similar to the results in Table 5, the coefficient on *TRA* is 0.3291 and is very significant (p-value <.001). The slope shift resulting from the temporal change in the disclosure environment (Reg. FD.) adjusts the estimated coefficient on *TRA* to 0.199 (0.329-0.130). The results suggest in transient-owned firms, it is more likely forecasts containing new information are issued earlier and are less likely to be issued in the "late" portion of the forecast period. This is indicative of reputational herding since the early forecasts are relatively more accurate and more likely to contain new information. Overall, the results are consistent with a positive association between reputational herding and transient institutionally owned firms.

[Insert Table 6]

By allowing the partial effect of reputational herding to vary with respect to institutional ownership holdings and temporal changes in the disclosure regulatory environment, we provide additional insight into the efficacy of Reg. FD. Our results indicate reputational herding occurred pre-Reg. FD largely due to transient institutional investors. As a result of the disclosure policy shift brought on by Reg. FD, the magnitude of reputational herding explained by short-term institutions decreased but remains important. Our results suggest Reg. FD changed the information environment of the firm but did not entirely level the disclosure playing field. The continued existence of private information channels utilized by transient institutional investors provides one explanation for our results.

5.3 Analyst Revisions and Institutional Shareholder Horizon

The previous hypothesis examined analyst forecasting behavior in the presence of private information channels in order to identify herding consistent with reputational herding theory.

The second and final hypothesis further tests analyst forecasting behavior across variation in institutional ownership by examining analysts' propensity to revise their forecasts subsequent to management issued earnings guidance. Additional data was gathered in order to measure the percentage of analyst forecast revisions (*FRAC*) in addition to several control variables.

The descriptive statistics for the second developed dataset are presented in Table 7. The results are mostly consistent with Cotter et al. (2006). However, the percentage of "greater than" and "less than" forecasts are different.[13] Over our sample period, 8.6% of forecasts are "greater than" forecasts and 8.5% of forecasts are "less than" forecasts. This differs from the descriptive statistics reported in Cotter et al. (2006) where 7.2% of the forecasts are "greater than" forecasts and 16.6% of the forecasts are "less than" forecasts. The differences are likely the result of different time periods. Cotter et al. (2006) evaluated their sample over 1995-2001 while our sample is analyzed over 1998-2007.

[Insert Table 7]

The results of our second hypothesis tests are presented in Table 8. The results do not support our third hypothesis; however, the results do provide meaningful insight into the relationship between analysts' forecast revisions and institutional shareholder investment horizon. Specifically, no significant relation is found between analyst forecast revisions subsequent to management issued guidance and short-term institutional investors (*TRA*). In contrast, the estimated coefficient on dedicated institutional investors (*DED*) is both positive and significant (0.1819; p=.003). The coefficient of 0.1819 for *DED* indicates there is approximately an 18.2% increase in the number of analysts who revise their forecasts for firms with dedicated owners compared to firms with no dedicated owners. The results are consistent with the

[13] A "greater than" forecast is a form of guidance where management gives an indication that earnings are expected to be "greater than" some amount while a "less than" forecast is one where management explains that earnings are anticipated to be "less than" a given amount.

conjecture found in extant literature which predicts long-term institutional investors are better monitors (Bushee 1998; Gaspar et al. 2005; Chen et al. 2006; Liu 2006). Analysts are more likely to change their earnings expectations when guidance is issued by firms with better monitors of management.

[Insert Table 8]

The control variables in the model are similar in sign and significance to that of Cotter et al. (2006). *AnalystOpt*, *ROA*, *Range* and *LessThan* are all positively and significantly related to the percentage of analyst revisions. However, the estimated coefficients for *Point* and *GreaterThan*, are positive and statistically significant within conventional levels, a departure from the results in Cotter et al. (2006). Additionally, *AnalystDis*, a measure of forecast dispersion, was not found to be statistically significant, another departure from Cotter et al. Finally, while the results of Cotter et al. (2006) do not show *RegFD* to be significant, our findings demonstrate a marginally significant and positive relation between *RegFD* and the dependent variable (*Frac*). This is likely due to the differing periods used in our study versus Cotter et al. (2006).

Importantly, the results are consistent with the interpretation that firms with a substantial percentage of dedicated institutional shareholders improve the credibility of management disclosures through stronger monitoring mechanisms. Consequently, analysts are more likely to issue revised forecasts subsequent to management issued earnings guidance.

6 Additional Tests

In additional tests, we identify constructs which capture aspects of the firm information environment in order to mitigate a possible spurious correlation between transient institutional ownership and analyst herding behavior. Transaction costs and information asymmetry represent two possible constructs which are correlated with the presence of private information. If transaction costs exceed the expected gains of a trade, an investor may not act on their information (i.e., both public and private).[14] Consequently, the security's stock return will not reflect new information (Lesmond et al. 1999). In addition, high (low) information asymmetry between firms and financial statement users may also drive the correlation between transient institutional investors and analyst herding. The argument presented in this study identifies the incidence of transient institutional investors to be uniquely informative of analyst herding behavior.

In untabulated analyses, we test whether our results hold across temporal and cross-sectional variation in transaction costs and information asymmetry. Equations 2 and 3 are supplemented with operational measures of transaction costs and the degree of information asymmetry between the firm and investors. Each model is expanded to include a measure of transaction costs (*DaysZero*), and two measures of information asymmetry (*SPREAD, R&D*). *DaysZero* is the proportion of days in the measurement window where the stock had zero daily returns (Kim et al. 2012). A higher value for *DaysZero* indicates the stock is relatively illiquid. Zero-return days typically occur when trading transaction costs exceed the value of new information not yet reflected in prices, resulting in no investor trades (Lesmond et al. 1999). Following Yoon, Zo, and Cigadek (2011), the relative bid-ask spread (*SPREAD*) is calculated as (Ask-Bid)/((Ask+Bid)/2). *SPREAD* captures the amount of asymmetry priced in the stock. Market participants selling the stock require more money to trade with better informed market participants. Research and development expense (*R&D*) signals more complex operations which

[14] Transaction costs represent a threshold by which the marginal investor evaluates whether the incremental benefit from acting on new information exceeds the costs (Glosten and Milgrom 1985; Kyle 1985).

may cause a greater information gap between investors and management (Armstrong et al. 2011, Barth and Kasnik 1999, Barth, Kasnik, and McNichols 2001).

The tests show transaction costs and information asymmetry do not provide an alternative explanation for our results. The estimated coefficients on *TRA*, *DED* and the Reg. FD interactions continue to be consistent in sign, magnitude and significance across all analyses. In summary, the explanatory power contained in our proxy for private information, *TRA*, is not subsumed by the degree of information asymmetry or the magnitude of transaction costs in a firm.

7 Summary and Conclusion

Extant literature suggests the informational role of institutional investors varies across their investment horizon. Prior studies document short-term institutional investors possess superior predictive ability with regards to future earnings and stock prices while long-term institutional investors are better corporate monitors. No empirical studies, to our knowledge, have investigated whether the informational role of institutional investors is informative of analyst herding behavior. Financial analysts contribute to market efficiency through timely and accurate forecasts. Herding behavior reduces market efficiency if the behavior is the result of ignoring private information in order to conform to the consensus. Our study links institutional investment horizon with analyst herding behavior by identifying the extent of private information channels through the proportion of transient institutional investors while controlling for the amount of dedicated investors.

Our results support the proposition that institutional shareholder investment horizon is informative of analyst herding behavior. Specifically, we find firms with higher proportions of transient investors are more likely to have analysts engaging in herding behavior. In particular, by analyzing the timing and quality of analysts' forecasts, we find evidence of early forecasts exhibiting higher quality across higher proportions of transient owned firms (which is indicative of reputational herding theory). These results suggest analysts view the risk-reward of being accurate versus safeguarding their reputation differently when there are transient owners present.

An additional result of this study concerns our finding of an increased likelihood that analysts issue revised forecasts subsequent to management guidance when more dedicated institutional investors are present. We interpret these results as analysts view disclosure by firms with more long-term shareholders to be more credible and thus, analysts are more likely to incorporate guidance by those firms into their information set. This result provides further support for the influence that institutional shareholder investment horizon has on analyst behavior as well as how analysts perceive firm disclosure.

While our results extend prior research in both the institutional investor and analyst behavior domains, future research is needed to further understand the consequences of the informational role of institutional investors. For example, additional research could further investigate expectations management across variation in institutional investors in order to determine whether management is aware of institutional investors' impact on analyst behavior.

References

Armstrong, C.S., Core, J.E., Taylor, D.J., and R.E. Verrecchia, 2011. When Does Information Asymmetry Affect Cost of Capital? *Journal of Accounting Research* 49 (1): 1-40.

Arya, A., Glover, J., Mittendorf, B., Narayanamoorthy, G., 2005. Unintended consequences of regulating disclosures: The case of Regulation Fair Disclosure. *Journal of Accounting and Public Policy* 24 (3): 243–252.

Barber, B., and T. Odean. 2000. Trading Is Hazardous to Your Wealth: the Common Stock Investment Performance of Individual Investors. *Journal of Finance* 55:773-806.

Barth, M.E., and R. Kasznik, 1999. Share Repurchases and Intangible Assets. *Journal of Accounting and Economics* 28: 211-241.

Barth, M.E., Kasznik, R. and M.F. McNichols, 2001. Analyst Coverage and Intangible Assets. *Journal of Accounting Research* 39 (1): 1-34.

Bernhardt, D., Campello, M., and E. Kutsoati, 2006. Who herds? *Journal of Financial Economics* 80: 657–675.

Bushee, B., 1998. The Influence of Institutional Investors on Myopic R&D Investment Behavior. *Accounting Review* 73, 305-333.

Chen, Q., and W. Jiang. 2006. Analysts' Weighting of Private and Public Information. *Review of Financial Studies* 19:319–55.

Chen, X., Cheng, Q., and K. Lo, 2010.On the relationship between analyst reports and corporate disclosures: Explaining the risks of information discovery and interpretation. *Journal of Accounting and Economics* 49: 206-226.

Chevalier, J., and G. Ellison. 1999. Career Concerns of Mutual Fund Managers. *The Quarterly Journal of Economics* 114 (2):389–432.

Clement, M.B., and S.Y. Tse, 2005. Financial Analyst Characteristics and Herding Behavior in Forecasting. *The Journal of Finance* Vol LX, No. 1: 307-341.

Cotter, J., Tuna, I., and P. Wysocki, 2006. Expectations Management and Beatable Targets: How Do Analysts React to Public Earnings Guidance? *Contemporary Accounting Research* 23(3): 593-624.

Dikolli, S.S, Kulp, S.L., and K.L. Sedatole, 2009. Transient Institutional Ownership and CEO Contracting. *The Accounting Review* 84: 737-770.

Gallo, G., C.W. Granger, and Y. Jeon. 2002. Copycats and Common Swings: The Impact of the Use of Forecasts in Information Sets. *IMF Staff Papers* 49:1–18.

Gaspar, J.M., Massa, M., and P. Matos, 2005. Shareholder investment horizons and the market for corporate control. *Journal of Financial Economics* 76: 135-165.

Gleason, C. A., and C. M. Lee. 2003. Analyst Forecast Revisions and Market Price Discovery. *The Accounting Review* 78:193–225.

Glosten, L., and P. Milgrom. 1985. Bid, Ask and Transaction Prices in a Specialist Market with Heterogenously Informed Traders. *Journal of Financial Economics* 14: 71-100.

Grinblatt, M., and S. Titman. 1989. Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings. *Journal of Business* 62:394-415.

Grinblatt, M., S. Titman, and R. Wermers. 1995. Momentum, Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior. *American Economic Review* 85:1088-105.

Hong, Harrison, and Jeffrey D. Kubik, 2003, Analyzing the analysts: Career concerns and biased forecasts, *Journal of Finance* 58, 313–351.

Hu, G., Ke, B., and Y. Yu, 2009. Do Transient Institutions Overreact to Small Negative Earnings Surprises? Babson College, Pennsylvania State, and University of Texas Working Paper Series, 1-59.

Jegadeesh, N., and W. Kim, 2009. Do Analysts Herd? An Analysis of Recommendations and Market Reactions. *Review of Financial Studies* v23 n2: 902-937.

Ke, B., and K. Petroni, 2004. How Informed Are Actively Trading Institutional Investors? Evidence from Their Trading Behavior Before a Break in a String of Consecutive Earnings Increases. *Journal of Accounting Research* 42: 895–927.

Ke, B., Petroni, K., and Y. Yu, 2008. The Effect of Regulation FD on Transient Institutions' Trading Behavior. *Journal of Accounting Research* 46(4): 853-883.

Keskek, S., Tse, S. and J.W. Tucker, 2012. Analyst Information Production and Forecast Timing. *Review of Accounting Studies, forthcoming.*

Kim, Y., Li, H. and S. Li, 2012. Does Eliminating the Form 20-F Reconciliation from IFRS to U.S. GAAP Have Capital Market Consequences? *Journal of Accounting and Economics* 53: 249-270.

Kyle, A. S., 1985. Continuous Auctions and Insider Trading. Econometrica, 53, 1315-1335.

Lamont, O. 2002. Macroeconomic Forecasts and Microeconomic Forecasters. *Journal of Economic Behavior and Organization* 48:265–80.

Lesmond, D., Ogden, J. and C. Trzcinka, 1999. A new estimate of transaction costs. *Review of Financial Studies* 12: 1113-1141.

Lin, H., and M. McNichols, 1998. Underwriting relationships, analysts' earnings forecasts and investment recommendations. *Journal of Accounting and Economics* 25(1): 101-127.

Lui, L., and E. Peng, 2006. Institutional Ownership Composition and Accruals Quality. California State – Fullerton and Fordham University Working Paper Series, 1-39.

Matsumoto, D.A. 2002. Management's Incentives to Avoid Negative Earnings Surprises. *The Accounting Review* 77 (3): 483-514.

Mensah, Y.M., and R. Yang, 2008. An empirical evaluation of analyst' herding behavior following Regulation Fair Disclosure. *Journal of Accounting and Public Policy* 27: 317-338.

Mohanram, P., Sunder, S., 2006. How has Regulation FD affected the operations of financial analysts? *Contemporary Accounting Research* 23 (2), 491–525.

Odean, T. 1998. Volume, Volatility, Price, and Profit When All Traders Are Above Average. *Journal of Finance* 53:1887-934.

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

Pownall, G., Wesley, C. and G. Waymire, 1995. The Stock Price Effects of Alternative Types of Management Earnings Forecasts. *The Accounting Review* 68(4): 896-912.

Scharfstein, D.S. and J.C. Stein, 1990. Herd Behavior and Investment. *The American Economic Review* 80 (3): 465-479.

Trueman, B., 1994. Analysts Forecasts and Herding Behavior. *The Review of Financial Studies* 7(1): 97-124.

Wermers, R. 2000. Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent,Style, Transactions Costs, and Expenses. *Journal of Finance* 55:1655-95.

White, H., 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica: Journal of the Econometric Society* 48(4): 817-838.

Williams, P., 1996. The Relation Between a Prior Earnings Forecast by Management and Analyst Response to a Current Management Forecast. *The Accounting Review* 71(1):103-113.

Yan, X. and Z. Zhang, 2009. Institutional Investors and Equity Returns: Are Short-Term Institutions Better Informed? *The Review of Financial Studies* 22(2): 893-924.

Yoon, H., Zo, H. and A.P. Ciganek, 2011. Does XBRL adoption reduce information asymmetry? *Journal of Business Research* 64: 157-163.

Table 1

Descriptive Statistics

Variable	N	Mean	Median	Std Dev	1rst Quartile	3rd Quartile
S-Stat	8010	0.627	0.567	0.158	0.500	0.740
TRA	8010	0.179	0.145	0.135	0.080	0.247
DED	8010	0.071	0.049	0.079	0.009	0.107
RegFD	8010	0.743	1.000	0.437	0.000	1.000
NAnalyst	8010	9.872	8.000	6.940	5.000	13.000
NObs	8010	50.254	36.000	46.031	19.000	66.000
AGE	8010	87.580	88.121	16.170	78.077	97.875
HES	8010	0.527	0.284	1.070	0.159	0.556
SIZE	8010	21.411	21.333	1.722	20.188	22.581
FERROR	8010	0.112	0.035	0.406	0.013	0.090

S-Stat is a measure of herding and is calculated as described on p. 11-12. **TRA** is calculated as the percentage of transient investors (Bushee 1998) in the stock. **DED** is calculated as the percentage of dedicated investors (Bushee 1998) in the stock. **RegFD** is an indicator variable equal to 1 if the S-statistic calculation period began after October 31, 2001 and zero otherwise. **NAnalyst** is equal to the number of analysts who issued forecasts during the S-statistic calculation period. **NObs** is equal to the number of forecasts issued by analysts in the fiscal year. **AGE** is calculated as the average age of the forecasts used to calculate the S-statistic where age is the number of days before earnings are announced. **HES** is the historical earnings volatility calculated as the standard deviation of quarterly earnings over the previous 5 years. **SIZE** is the natural log of firm market capitalization. **FERROR** represents the forecast error or surprise and is calculated as the last consensus forecast minus actual announced earnings per share.

Sample Selection

	Companies	Firm Qtrs
Companies with sufficient information on I/B/E/S to calculate S-statistic	5,564	18,230
Companies that do not have information available on Compustat	(2,432)	(6,654)
Companies missing institutional holdings information from 13f filings	(665)	(3,328)
Companies with other missing information	(64)	(238)
Final Sample	2,403	8,010

Table 2

Effect of Shareholder Horizon on Degree of Analyst Herding

$$S_j = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 RegFD + \beta_4 RegFD*TRA + \beta_5 RegFD*DED + \beta_6 NObs + \beta_7 NAnalyst + \beta_8 RegFD*NAnalyst + \beta_9 AGE + \beta_{10} HES + \beta_{11} SIZE + \beta_{12} F\_Error + \varepsilon \quad (2)$$

Variable	+/-	Est. Coeff.	T-Stat	P-Value
Intercept		0.61007	18.29	<.0001
TRA	-	-0.08180	-2.87	0.002
TRA*RegFD	?	0.02395	0.75	0.227
DED	?	0.07141	1.79	0.037
DED*RegFD	?	-0.07684	-1.61	0.054
RegFD	?	0.01413	1.48	0.070
NAnalyst	+	-0.00283	-4.08	<.0001
NAnalyst*RegFD	?	-0.00049	-0.93	0.177
NObs	+	0.00056	6.88	<.0001
AGE	+	-0.00018	-1.55	0.061
HES	?	0.00051	0.32	0.375
SIZE	?	0.00186	1.22	0.111
F_Error	+	-0.03643	-4.64	<.0001
N				8,010
Adj. R-Squared				1.77%

S-Stat is a measure of herding and is calculated as described on p. 11-12. **TRA** is calculated as the percentage of transient investors (Bushee 1998) in the stock. **DED** is calculated as the percentage of dedicated investors (Bushee 1998) in the stock. **RegFD** is an indicator variable equal to 1 if the S-statistic calculation period began after October 31, 2001 and zero otherwise. **NAnalyst** is equal to the number of analysts who issued forecasts during the S-statistic calculation period. **NObs** is equal to the number of forecasts issued by analysts in the fiscal year. **AGE** is calculated as the average age of the forecasts used to calculate the S-statistic where age is the number of days before earnings are announced. **HES** is the historical earnings volatility calculated as the standard deviation of quarterly earnings over the previous 5 years. **SIZE** is the natural log of firm market capitalization. **FERROR** represents the forecast error or surprise and is calculated as the last consensus forecast minus actual announced earnings per share. All t-statistics are calculated using firm-level clustered standard errors to correct for serial-correlated residuals (White 1980; Peterson 2009).

Table 3 - Analyst Forecast Breakdown

	Period Division	Information Discovery Aggregate	Information Discovery Firm Mean	Information Analysis Aggregate	Information Analysis Firm Mean	Post-Analysis Aggregate	Post-Analysis Firm Mean
All Forecasts	Early	30,674	5.01	40,337	6.17	n/a	n/a
	Late	12,157	2.84	7,289	2.57	n/a	n/a
	Total	42,831	7.85	47,626	8.74	19,667	3.23
Bold Forecasts	Early	16,463	3.44	21,229	3.64	n/a	n/a
	Late	7,002	2.18	4,000	1.92	n/a	n/a
	Total	23,465	5.62	25,229	5.56	11,679	2.30
Improve Forecasts	Early	12,775	3.01	17,065	3.07	n/a	n/a
	Late	5,175	1.93	3,063	1.70	n/a	n/a
	Total	17,950	4.94	20,128	4.77	8,350	1.94

This table breaks down the frequency of analyst forecasts by analyst forecast periods as outlined in Chen et al. (2010). The "information discovery" period refers to the thirty day forecast period before quarterly forecasts are issued (day -30 to -1). This period is further divided into the "early" portion which is comprised of the first 20 days of the period (day -30 to day -11) and the late portion which is the remaining 10 days (day -10 to day -1). The "information analysis" period refers to the period beginning with the quarterly announcement date and extending to 4 days after (day 0 to day 4). It is further divided into the "early" portion which is comprised by the first 3 days (day 0 to day 2) and the "late" portion which is comprised of the following 2 days (day 3 and day 4). Finally, the "post-analysis" period refers to all days outside of the "information discovery" and "information analysis" periods. Bold and Improve forecasts are as defined on p. 17.

Table 4

Descriptive Statistics

Variable	N	Mean	Median	Std Dev	1rst Quartile	3rd Quartile
eBold	7731	0.594	0.656	0.313	0.400	0.833
eImprove	7468	0.616	0.667	0.327	0.429	0.889
TRA	8010	0.179	0.145	0.135	0.080	0.247
DED	8010	0.071	0.049	0.079	0.009	0.107
RegFD	8010	0.743	1.000	0.437	0.000	1.000
NAnalyst	8010	9.872	8.000	6.940	5.000	13.000
NObs	8010	50.254	36.000	46.031	19.000	66.000
AGE	8010	87.580	88.121	16.170	78.077	97.875
HES	8010	0.527	0.284	1.070	0.159	0.556
SIZE	8010	21.411	21.333	1.722	20.188	22.581
FERROR	8010	0.112	0.035	0.406	0.013	0.090

ebold is the percentage of Bold forecasts that were issued "early" as described on page 14-15. **eImprove** is the percentage of Improve forecasts that were issued "early" as described on p. 14-15. **TRA** is calculated as the percentage of Transient (Bushee 1998) Investors in the stock. **DED** is calculated as the percentage of dedicated investors in the stock. **RegFD** is an indicator variable equal to 1 if the S-statistic calculation period began after October 31, 2001 and zero otherwise. **NAnalyst** is equal to the number of analysts who issued forecasts during the S-Statistic calculation period. **NObs** is equal to the number of forecasts issued by analysts in the fiscal year. **AGE** is calculated as the average age of the forecasts used to calculate the S-Statistic where age is the number of days before earnings are announced. **HES** is the historical earnings volatility calculated as the standard deviation of quarterly earnings over the previous 5 years. **SIZE** is the natural log of firm market capitalization. **FERROR** represents the forecast error or surprise and is calculated as the last consensus forecast minus actual announced earnings per share.

Table 5

Effect of Shareholder Horizon on Degree of Analyst Herding

$$eBold = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 RegFD + \beta_4 RegFD*TRA + \beta_5 RegFD*DED + \beta_6 NObs + \beta_7 NAnalyst + \beta_8 RegFD*NAnalyst + \beta_9 AGE + \beta_{10} HES + \beta_{11} Size + \beta_{12} F\_Error + \varepsilon \quad (3a)$$

Variable	+/-	Est. Coeff.	T-Stat	P-Value
Intercept		0.20401	2.90	0.002
TRA	?	0.32443	5.29	<.0001
TRA*RegFD	?	-0.13186	-1.95	0.025
DED	?	0.13530	1.45	0.073
DED*RegFD	?	-0.02336	-0.22	0.414
RegFD	?	0.02677	1.27	0.102
NAnalyst	+	0.00693	5.08	<.0001
NAnalyst*RegFD	?	0.00066	0.63	0.266
NObs	+	-0.00029	-1.79	0.037
AGE	+	0.00049	1.91	0.028
HES	?	-0.00659	-1.98	0.024
SIZE	?	0.01048	3.35	0.000
F_Error	+	-0.04064	-3.34	0.000
N				7,731
Adj. R-Squared				4.39%

eBold is the percentage of bold forecasts that occur early and is calculated as described on p.14-15. **TRA** is calculated as the percentage of transient investors (Bushee 1998) in the stock. **DED** is calculated as the percentage of dedicated investors (Bushee 1998) in the stock. **RegFD** is an indicator variable equal to 1 if the S-statistic calculation period began after October 31, 2001 and zero otherwise. **NAnalyst** is equal to the number of analysts who issued forecasts during the S-statistic calculation period. **NObs** is equal to the number of forecasts issued by analysts in the fiscal year. **AGE** is calculated as the average age of the forecasts used to calculate the S-statistic where age is the number of days before earnings are announced. **HES** is the historical earnings volatility calculated as the standard deviation of quarterly earnings over the previous 5 years. **SIZE** is the natural log of firm market capitalization. **FERROR** represents the forecast error or surprise and is calculated as the last consensus forecast minus actual announced earnings per share. All t-statistics are calculated using firm-level clustered standard errors to correct for serial-correlated residuals (White 1980; Peterson 2009).

Table 6

Effect of Shareholder Horizon on Degree of Analyst Herding

$$eImprove = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 RegFD + \beta_4 RegFD*TRA + \beta_5 RegFD*DED + \beta_6 NObs + \beta_7 NAnalyst + \beta_8 RegFD*NAnalyst + \beta_9 AGE + \beta_{10} HES + \beta_{11} Size + \beta_{12} F\_Error + \varepsilon \quad (3b)$$

Variable	+/-	Est. Coeff.	T-Stat	P-Value
Intercept		0.16178	2.12	0.017
TRA	?	0.32910	5.07	<.0001
TRA*RegFD	?	-0.13017	-1.81	0.035
DED	?	0.09257	1.05	0.146
DED*RegFD	?	0.00442	0.04	0.483
RegFD	?	0.02578	1.11	0.134
NAnalyst	+	0.00719	5.08	<.0001
NAnalyst*RegFD	?	0.00113	1.02	0.155
NObs	+	-0.00051	-3.24	0.001
AGE	+	0.00083	3.01	0.001
HES	?	-0.00866	-2.27	0.012
SIZE	?	0.01236	3.63	0.001
F_Error	+	-0.03701	-3.00	0.001
N				7,468
Adj. R-Squared				3.90%

eImprove is the percentage of improved forecasts that occur early and is calculated as described on p.14-15. **TRA** is calculated as the percentage of transient investors (Bushee 1998) in the stock. **DED** is calculated as the percentage of dedicated investors (Bushee 1998) in the stock. **RegFD** is an indicator variable equal to 1 if the S-statistic calculation period began after October 31, 2001 and zero otherwise. **NAnalyst** is equal to the number of analysts who issued forecasts during the S-statistic calculation period. **NObs** is equal to the number of forecasts issued by analysts in the fiscal year. **AGE** is calculated as the average age of the forecasts used to calculate the S-statistic where age is the number of days before earnings are announced. **HES** is the historical earnings volatility calculated as the standard deviation of quarterly earnings over the previous 5 years. **SIZE** is the natural log of firm market capitalization. **FERROR** represents the forecast error or surprise and is calculated as the last consensus forecast minus actual announced earnings per share. All t-statistics are calculated using firm-level clustered standard errors to correct for serial-correlated residuals (White 1980; Peterson 2009).

Table 7

Descriptive Statistics

Variable	N	Mean	Median	Std Dev	1rst Quartile	3rd Quartile
FRAC	8315	0.498	0.500	0.409	0.000	1.000
TRA	8315	0.207	0.177	0.147	0.096	0.284
DED	8315	0.067	0.040	0.082	0.000	0.109
AnalystOpt	8315	0.134	0.061	0.450	0.024	0.133
AnalystDis	8315	0.563	0.050	2.628	-0.083	0.500
ROA	8315	0.011	0.012	0.031	0.005	0.021
POINT	8315	0.282	0.000	0.450	0.000	1.000
RANGE	8315	0.581	1.000	0.494	0.000	1.000
GreaterThan	8315	0.086	0.000	0.281	0.000	0.000
LessThan	8315	0.085	0.000	0.278	0.000	0.000
LOSS	8315	0.102	0.000	0.303	0.000	0.000
NumFCast	8315	4.838	4.000	4.137	2.000	6.000
RegFD	8315	0.726	1.000	0.446	0.000	1.000
T	8315	4.801	5.000	2.536	3.000	7.000
SIZE	8315	20.932	20.775	1.768	19.733	22.030

FRAC is the percentage of analysts who revised their earnings forecasts within five days of the issuance of management earnings guidance. **TRA** is calculated as the percentage of transient investors (Bushee 1998) in the security. **DED** is calculated as the number of dedicated investors (Bushee 1998) in the stock. **AnalystDis** is calculated as the standard deviation of the beginning consensus forecast. **AnalystOpt** is calculated as the difference between analyst consensus forecast and actual earnings, scaled by the absolute value of earnings. **ROA** is calculated as the actual amount of earnings, scaled by the lagged value of assets. **POINT** is an indicator variable equal to 1 if management guidance is given as a point estimate. **RANGE** is an indicator variable equal to 1 if management guidance is given in the form of a range. **GreaterThan** is an indicator variable equal to 1 if guidance is "greater than" guidance. **LessThan** is an indicator variable equal to 1 if guidance is "less than" guidance. **LOSS** is an indicator variable equal to 1 if management guidance is a loss. **NumFCast** is equal to the number of forecasts in the consensus. **RegFD** is an indicator variable that is equal to 1 if the beginning of the consensus period occurs after October 31, 2001. **T** is a time trend variable. **SIZE** is the natural log of the firm's market capitalization.

Sample Selection

	Companies	Firm Qtrs
Observations of management issued guidance	3,524	32,643
Companies missing analyst forecasts or actual reported earnings	(1,024)	(22,421)
Companies missing Compustat information for control variables	(108)	(333)
Companies missing institutional holdings information from 13f filings	(243)	(1,511)
Companies with other missing information	7	(92)
Final Sample	2,142	8,315

Table 8

Effect of Shareholder Horizon on Degree of Analyst Revisions

$$FRAC = \alpha_1 + \beta_1 TRA + \beta_2 DED + \beta_3 AnalystOptimism + \beta_4 AnalystDispersion + \beta_5 ROA + \beta_6 LOSS + \beta_7 POINT + \beta_8 RANGE + \beta_9 LessThan + \beta_{10} GreaterThan + \beta_{11} TimeTrend + \beta_{12} PostFD + \varepsilon \quad (4)$$

Variable	+/-	Est. Coeff.	T-Stat	P - Value
Intercept		0.62337	6.47	<.0001
TRA	-	-0.01471	-0.38	0.351
DED	+	0.18194	2.72	0.003
AnalystOpt	+	-0.02683	-1.46	0.073
AnalystDis	+	0.01968	4.64	<.0001
ROA	?	0.85510	3.43	0.000
POINT	+	0.11116	6.89	<.0001
RANGE	+	0.23022	13.88	<.0001
GreaterThan	?	0.04013	2.07	0.019
LessThan	+	0.15635	8.20	<.0001
LOSS	?	0.00034	0.02	0.493
NumFCast	?	0.00155	0.97	0.166
RegFD	?	0.03583	2.20	0.014
T	?	-0.00877	-2.91	0.002
SIZE	?	-0.01552	-3.36	0.000
N				8,315
Adj. R-Squared				5.11%

FRAC is the percentage of analysts who revised their earnings forecasts within five days of the issuance of management earnings guidance. **TRA** is calculated as the percentage of transient investors (Bushee 1998) in the security. **DED** is calculated as the number of dedicated investors (Bushee 1998) in the stock. **AnalystDis** is calculated as the standard deviation of the beginning consensus forecast. **AnalystOpt** is calculated as the difference between analyst consensus forecast and actual earnings, scaled by the absolute value of earnings. **ROA** is calculated as the actual amount of earnings, scaled by the lagged value of assets. **POINT** is an indicator variable equal to 1 if management guidance is given as a point estimate. **RANGE** is an indicator variable equal to 1 if management guidance is given in the form of a range. **GreaterThan** is an indicator variable equal to 1 if guidance is "greater than" guidance. **LessThan** is an indicator variable equal to 1 if guidance is "less than" guidance. **LOSS** is an indicator variable equal to 1 if management guidance is a loss. **NumFCast** is equal to the number of forecasts in the consensus. **RegFD** is an indicator variable that is equal to 1 if the beginning of the consensus period occurs after October 31, 2001. **T** is a time trend variable. **SIZE** is the natural log of the firm's market capitalization. All t-statistics are calculated using firm-level clustered standard errors to correct for serial-correlated residuals (White 1980; Peterson 2009).