Bias and Efficiency: A Comparison of Analyst Forecasts and Management Forecasts

Urooj Khan, Oded Rozenbaum, and Gil Sadka[1]

October 5, 2011

Abstract

Although managers possess superior firm-level information, recent studies document that management forecasts are less accurate than analyst forecasts. The differences in accuracy can be due to differences in biases, differences in forecast efficiency, or both. We test these hypotheses by comparing investors' earnings expectations, as reflected in stock prices, to that of the managers and analysts, as reflected in their respective forecasts. We find that for the sample of firms that have analyst as well as management forecasts, managers provided more efficient forecasts. However, management forecasts are optimistically biased whereas analyst forecasts are unbiased (only in the presence of a management forecasts). In sum, the superior analyst forecast accuracy is due to management bias rather than better forecasting efficiency.

JEL classification: D82, G17, M10, M41.
Keywords: management forecasts, analyst forecasts, forecast bias, market efficiency

[1] Urooj, Oded, and Gil are at Columbia University, e-mails: uk2117@columbia.edu, orozenbaum14@gsb.columbia.edu, and gs2235@columbia.edu. We thank Dan Amiram, Sid Balachandran, Tim Baldenius, Edwige Cheynel, Elizabeth Chuk, Trevor Harris, Sharon Katz, Stephen Penman, Yuan Zhang and seminar participants at Columbia Business School and Tel-Aviv University for their helpful comments and suggestions.

I. Introduction

Although managers possess superior firm-level information, recent studies (Hutton and Stocken, 2010 and Hutton et al., 2011) document that management forecasts are less accurate than analyst forecasts. The differences in accuracy can be due to differences in biases, differences in forecast efficiency, or both. We test these hypotheses by comparing investors' earnings expectations, as reflected in stock prices, to that of the managers and analysts, as reflected in their respective forecasts. More specifically, we examine whether the forecasts are biased and which of these forecasts better incorporate publicly available information. Using prior stock returns as a proxy for publicly available information, we test whether stock returns prior to the forecast predict forecast errors. If analysts and managers provide efficient forecasts, defined as reflecting all the information available to investors (see, McNichols, 1989; and Abarbanell, 1991), prior stock returns should not predict forecast errors. Our empirical analysis suggests that while prior stock returns predict analyst forecast errors, they do not predict management forecast errors. Our findings imply that, on the one hand, management forecasts better reflect the information available to investors. On the other hand, management forecasts are optimistically biased whereas analyst forecasts are unbiased (for our sample firms).

In order to compare the bias and efficiency of management and analyst forecasts we follow prior studies, such as McNichols (1989), Abarbanell (1991), and Lys and Sohn (1991).[2] Specifically, we use a regression model of forecast errors on prior stock returns. If the forecast is efficient, i.e., reflects all information available to investors, the slope coefficient on stock returns would be insignificantly different than zero (Keane and Runkle,

[2] Also see, Abarbanell and Lehavy (2003) and Hughes, Liu and Su (2008) and Konchitchki, Lou, Sadka and Sadka (2011).

1998). A positive slope implies forecast inefficiency. In the same vein, if the forecast is unbiased the intercept would be insignificantly different from zero. A positive intercept implies a pessimistic bias, while a negative intercept implies an optimistic bias. The bias is also apparent in the average forecast errors (a negative average forecast error represents optimistic forecasts).

Using the above mentioned models, prior studies find that analyst forecasts are both biased and inefficient (e.g., Abarbanell and Lehavy, 2003). Specifically, analyst forecast errors are predictable using prior stock returns and are generally optimistic. In contrast, our analysis, which is the first to compare the bias and efficiency of analyst versus management forecasts, includes only firms with both management and analyst forecasts and documents different results. We find that analyst forecasts are inefficient (i.e., they do not incorporate all the information available to investors), but unbiased. Conversely, managers' forecasts are efficient in the sense that their forecast errors are not predicted by prior stock returns.[3] But, management forecasts are more optimistically biased than those of analysts, perhaps due to overconfidence or other incentives (Rogers and Stocken, 2005; and Hribar and Yang, 2011). Also, the optimistic bias in management forecasts documented in this study provides an explanation for the positive serial correlation in management forecast errors found by Gong, Li and Wang (2011).

Next, we investigate the impact of the presence of management forecasts on analyst forecasts. Hassell, Jenning and Lasser (1988) find that analyst forecast errors for firms releasing management forecasts decrease more rapidly than analyst forecast errors for firms

[3] McNichols (1989) finds that management forecasts do not fully reflect the information in stock returns. However, we use a more recent database and a different sample of firms that have both management and analyst forecasts.

that do not release management forecasts. Their findings imply that analysts use management forecasts to provide more accurate forecasts. Using random sampling from the entire universe of firms with analyst forecasts, we find that in contrast to firms whose managers issue forecasts, analyst forecasts are biased. Also, the association between prior stock returns and analyst forecast errors is higher in the sample without management forecasts, implying that analysts are less efficient in incorporating all the available public information in their forecasts for firms whose managers do not issue forecasts. However, there is no evidence that managers reduce their forecasting bias when their firm has analyst following.

To further investigate the relation between management forecasts and analyst forecasts, we examine our sample firms (i.e., firms that have both analyst and management forecasts) in periods when management did not provide forecasts. Thus, we keep the firms constant and compare analyst forecasts in periods with and without management forecasts. Contrary to our initial findings where we document that analysts are unbiased in their forecasting, analyst forecasts for the same firms are biased if the management has not issued a forecast in the same period. This is further evidence of analysts finding management forecasts useful in improving their own forecasts.

While our findings imply that analyst forecasts are unbiased in the presence of management forecasts, our findings are inconsistent with managers issuing forecasts to reduce the bias in analyst forecasts (Cotter, Tuna and Wysocki, 2006). We sort our analyst forecast sample based on whether the forecast was made before or after the management forecast (following Waymire, 1986). Our findings suggest that analyst forecasts are unbiased regardless of whether the forecast preceded or followed the management forecast. In addition, analyst inefficiency in incorporating the information in stock returns is similar preceding and following management forecast. This result may occur if the dates are misspecified in the database (e.g., Ljungqvist, Malloy and Marston, 2009).

In addition to stock returns, we also test whether managers and analysts are efficient in incorporating information in other variables that have been found to be correlated with forecast errors by prior studies. Specifically, we test whether the forecasts incorporate the information in past accruals, earnings growth and revenue growth (Bradshaw, Richardson and Sloan, 2001). We find that management forecasts are efficient in incorporating all the past information reflected in the above mentioned variables, including past returns. However, analyst forecasts do not fully reflect the information contained in past accruals and returns. In sum, our findings suggest that management forecasts are more efficient than analyst forecasts.

Prior studies (e.g., Brown, Griffin, Hagerman, and Zmijewski, 1987; Brown, Richardson, and Schwager, 1987; Kross, Ro, and Schroeder, 1990) document that analyst forecast precision improves as the forecast approaches the announcement date. Therefore, we also test whether analyst and management forecasts closer to the earnings announcement are more accurate. We find that analyst forecast efficiency improves for more recent forecasts. In terms of our empirical model, we find that stock returns predict less (though the coefficient remains statistically significant) of analyst forecast errors as we approach the earnings announcement date. We find no such improvement in the efficiency of management forecasts because prior stock returns are not associated with management forecasts at any point during the fiscal year. However, the intercept, which reflects bias, decreases for the management forecasts as the earnings announcement date approaches (though the intercept remains statistically significant).

Finally, we examine the bias and efficiency of analyst and management forecasts by partitioning our sample based on settings where analysts and management might have relative information advantages. Hutton et al. (2010) find that analysts provide more accurate earnings forecasts than managers when the firm's fortunes move in concert with macroeconomic factors whereas management forecasts are more accurate when management actions are more difficult to anticipate by outsiders. Consistent with this notion, we find that analysts are more efficient in incorporating available public information in their forecasts for firms whose earnings are more in sync with the Gross Domestic Product (GDP) and for firms in regulated industries. Whereas analyst forecasts are less efficient for firms whose sales are more volatile.

In sum, while management forecasts do not seem to be more accurate than analyst forecasts, this paper documents that the sources of the inaccuracies are different. Managers seem to be better informed and better reflect available information in their forecasts. However, management forecasts are more optimistically biased compared to analyst forecasts, resulting in higher forecast errors for managers.

This paper makes several contributions to the literature. To our knowledge, this is the first paper to compare the bias and efficiency of management forecasts versus analyst forecasts. Hutton et al. (2010) document that management forecasts are more accurate than analyst forecasts only about half the time. By documenting that management forecasts are biased but more efficient than analyst forecasts, we help to understand why, despite having superior firm-level information, management forecasts are not more accurate than those of the analysts. One implication of our findings is that investors may be better served by using management forecasts to develop earnings expectations based on management forecasts after correcting for the bias in them rather than using analyst forecasts because analyst forecasts do not reflect all the available information in past returns and accruals. Further, the optimistic bias in management forecasts documented in this study helps to explain the positive serial correlation in management forecast errors found in prior literature (Gong et al. 2011). Finally, our study extends prior literature that has examined the relationship between management forecasts and analyst forecasts (e.g., Waymire, 1986; Hassell et al. 1988, Williams 1996) by documenting that analyst forecasts are not biased and reflect more of the information available to investors in the presence of management forecasts.

The rest of the paper proceeds as follows. In section 2, we discuss the sample selection and the variables used in the tests. Section 3describes the empirical methodology employed. Section 4 outlines the results and findings. Section 4 presents additional tests and robustness of our main findings. Section 5 concludes.

II. Sample selection and variable description

We use the *First Call* database of "Company Issued Guidance" (CIG) in order to identify an initial sample of 46,564 annual management earnings forecasts issued between January 2001 and December 2009. Similar to Hutton et al. (2010), our sample begins from 2001 because of the passage of Regulation Fair Disclosure (Reg. FD). Prior to Reg. FD, managers could leak their forecasts privately to analysts, which could affect the information set of analysts, and therefore the comparison between analyst and management forecasts. Furthermore, we restrict our sample to earnings-per-share forecasts and eliminate qualitative estimates. We then merge the management EPS forecast with the actual EPS taken from the

First Call dataset, and calculate the forecast error: $E_{i,t} - MF_{i,t}$. We then scale the management forecast error by the share price at the end of the prior fiscal year.

Next, using the *I/B/E/S* detail history file (with actuals) we estimate monthly mean annual earnings analyst forecast for each firm in our sample. We do that in order to mitigate the staleness existing in the *I/B/E/S* analyst consensus forecasts. We then merge the *First Call* sample with *I/B/E/S* monthly mean forecasts. Since we are comparing the accuracy of analyst forecasts and management forecasts, we delete observations in which the analyst forecast was not released in the same month as the management forecast to avoid giving the analyst or the management an information advantage. This leads to the deletion of 31,182 observations. We then compute the analyst forecast error: $E_{i,t} - AF_{i,t}$ and scale it by the share price at the end of the prior fiscal year, where the actual EPS, $E_{i,t}$, is taken from the *I/B/E/S* dataset.

In addition, since we are comparing the accuracy of the forecasts as they get close to the fiscal year end, we restrict our sample to December fiscal year end firms in order to establish comparability. This leads to the deletion of another 3,136 observations. We then merge our sample with CRSP to obtain equity returns. This step leads to the deletion of an additional 1,638 observations.

Lastly, since we examine the changes in the accuracy of analyst and management forecasts over time, we delete observations prior to April of fiscal year t and observations in which the forecast was given before year t-1 earnings announcement in order to allow the analysts to incorporate prior year's financial information into the forecast. This leads to a further deletion of 4,224 observations. Our final sample consists of 5,919 observations after truncating the sample at the 1st and 99th percentile to get rid of outliers. Table 1 provides a summary of our sample selection process and our final sample size.

Table 2 Panel A provides summary statistics for our sample. The average management-forecast error is negative (-0.005) and the median is approximately zero. The asymmetric distribution of management forecast errors is also apparent in the quartiles. In particular, 25% of the management forecast errors are below -0.01 and 25% of the errors are above 0.002. These statistics imply that management forecasts are on average optimistically biased.

In order to compare analyst forecast to management forecasts, we only use firms with available management forecasts. Table 2 Panel A also provides summary statistics for analyst forecasts for the same firms. In our sample, i.e., firms for which both analyst and management forecasts are available, analyst forecast are not significantly biased. Both the mean and median analyst forecast errors are approximately zero. This finding is in contrast to prior studies that suggest analyst forecasts are optimistic (e.g., Brown, Griffin, Hagerman, and Zmijewski, 1987). The difference between our findings and those of prior studies stems from the difference in samples.[4] Also, the standard deviation of analyst forecasts (0.007) is significantly lower than that of management forecasts (0.014).

Table 2 Panel B reports the correlation between our variables. The correlation between management forecast errors (MFE) and analyst forecast errors (AFE) is positive. The Pearson correlation is 0.427 and the Spearman correlation is 0.648. Given that analysts and mangers are forecasting the same earnings, this correlation seems fairly low. The

[4] In a later empirical test, we expand our sample to the entire I/B/E/S universe and we find that analyst forecasts are on average optimistic.

correlation between prior stock returns and management forecast errors is much lower than the correlation between prior stock returns and analyst forecast errors. For example, using three months cumulative returns prior to the forecast, the correlation between prior stock returns and management forecast errors is 0.009 compared with 0.156 for analyst forecast errors. This suggests that analyst forecast errors are predictable using prior stock returns (i.e., they do not reflect investor expectations).

III. Empirical Methodology

We employ an empirical methodology similar to McNichols (1989), Abarbanell (1991), Lys and Sohn (1991) and Lou, Konchitchki, Sadka and Sadka (2010). Specifically, we regress forecast errors on prior stock returns as follows:

$$YFE_{i,t}/P_{i,t-1} = \alpha + \beta \cdot R_{m-1,j} + \varepsilon_{i,t} \qquad (1)$$

where j={3, 6} and Y={M, A}. $MFE_{i,t}$ is the management forecast error, calculated as the actual Earnings Per Share (EPS) from *First Call* minus the management forecasted EPS, scaled by the share price at the end of prior fiscal year. The analyst forecasted EPS is the mean forecasted EPS in the month of the management forecast. $AFE_{i,t}$ is the analyst forecast error, calculated as the actual EPS from *I/B/E/S* minus the mean analyst forecast in the month of the management forecast, scaled by the share price at the end of prior fiscal year. $R_{m-1,3}$ is the 3 month cumulative returns ending at the end of the month prior to the forecasts. $R_{m-1,6}$ is the 6 month cumulative returns ending at the end of the month prior to the forecasts.

This model allows us to test both efficiency and bias simultaneously (Keane and Runkle, 1998). The model's intercept, α, estimates the bias. If forecasts are optimistic (pessimistic), the intercept would be negative (positive). The slope coefficient, β, estimates the forecast efficiency. If the forecast incorporates all publicly available information included in stock prices, the slope coefficient would be insignificantly different from zero. In other words, prior stock returns should not predict forecast errors. In contrast, a positive slope, suggests that the forecast is inefficient in the sense that it does not fully incorporate the information in stock returns.

In this paper, we employ the same model for both management and analyst forecast errors. Therefore, we can use this model to examine which forecast is more biased and which is more efficient. This is because we employ the exact same regression model with the same independent variables on different forecast errors (dependent variables). For example, if we find that the slope is higher for analyst forecasts, we can conclude analysts are not as efficient as managers in incorporating available information.

IV. Empirical Findings

We begin our analysis with a comparison between the success rates of analysts and management forecasts. The comparison is reported in Table 3. Panel A reports the proportion of observations with lower absolute forecast error for analysts. Panel A breaks out this proportion by year and month. Note that in almost all of the years and months, the proportion of observations where analyst forecast outperform management forecast is above 50%. In other words, analyst forecast have lower errors, in absolute value, compared with management forecast. The lowest proportion is 14% in June 2009 and the highest is 89% in May 2001. On average, for our entire sample, the proportion of observations with lower absolute forecast error for analysts is 64%.

The annual results also reveal a trend in the proportion of observations with lower absolute forecast error for analysts over time. Table 3 Panel B, reports the results of regressing the proportion of observations with lower absolute forecast error for analysts on a time variable. The coefficient is negative and statistically significant. When we exclude June 2009, where the proportion is 14%, from the regression, in Panel C, the slope coefficient declines in magnitude, but the coefficient remains negative and statistically significant. While the results suggest that the superiority of analyst forecasts over management forecasts is declining over time, it did not disappear in our sample period. Note that if this trend persists the observed superiority of analysts will disappear in a few years.

In addition to these findings, we examine the proportion of observations with lower absolute forecast error for analysts by firm. For this analysis, we require at least five observations per firm. The analysis shows that for 25% of our sample firms, analysts provided more accurate earnings forecasts more than 80% of the time. In contrast, only for approximately 5% of our firms, management provided more accurate forecasts than analysts 80% of the times. This analysis is consistent with our findings in Panel A, where we document that generally analyst forecast are more accurate than management forecasts. Our findings are also consistent with those of Hutton et al. (2010), who document that management forecasts are not superior to those of analyst forecasts.

Bias and Efficiency

Next we estimate the regression model in Equation (1). We employ this model to test the difference in bias and efficiency between management and analyst forecasts. In Table 4, we estimate equation (1) using a pooled regression over our sample period that spans the years 2001 to 2009 and we report *t*-statistics based on standard errors clustered by firm and year.

Table 4 Panel A reports the results of the pooled regression for equation (1). The results suggest that the management forecasts are optimistically biased. The intercept for the management forecast regression using the 3-months (6-months) cumulative returns ending the month prior to the forecast as the independent variable is -0.005 (-0.004) and the intercept is statistically significant with a t-statistic of -3.71 (-3.87). We also find that the slope coefficients from these regressions are statistically indifferent from zero suggesting that management incorporates all available public information in their forecasts. In contrast to management forecasts, we find that analyst forecasts are unbiased; however, they are not efficient. Upon estimating equation (1) using analyst forecast error as the dependent variable and the 3-months (6-months) cumulative returns ending the month prior to the forecasts as the independent variable, we find that the intercept is statistically indifferent from zero. Also, the estimated slope coefficient is 0.007 (0.005) and statistically significant with a *t*-statistic of 5.02 (4.54) suggesting that analyst forecasts do not reflect all information available to investors. In summary, we find that management forecasts are optimistically biased but they reflect all information available to equity investors. Further, analysts are unbiased in their forecasts but they fail to incorporate all the publicly available information in their forecasts.

Prior studies document that analyst forecasts are optimistically biased (e.g., O'Brien 1988; Butler and Lang 1991, Das, Levine and Sivaramakrishnan, 1998). However, in our sample analyst forecasts are unbiased. To reconcile our findings with those of these prior studies, in panel B of Table 5, we re-estimate equation (1) with analyst forecasts as the dependent variable using the entire *I/B/E/S* database as a sample and a random sample derived from the entire *I/B/E/S* universe. Specifically, we randomly select 5,919 firms (i.e., the number of firms in our sample in Panel A) from the *I/B/E/S* universe and examine whether analysts are optimistically biased.[5] The results of estimating equation (1) using the *I/B/E/S* universe or random firms as the sample suggest that on average analysts are optimistically biased. This is consistent with the findings of the above mentioned prior studies and in contrast to our finding that analyst forecasts are unbiased. We continue to find that analysts are not efficient in incorporating investor expectations in their forecasts (the estimated slope coefficients are statistically positive). However, the estimated slope coefficient is of a larger magnitude in panel B versus panel A, implying that in the absence of management forecasts analysts incorporate less of the investor expectations in their forecasts. These results imply that either analysts find management forecasts useful and use them to make their own forecasts more accurate or the presence of management forecasts pressures analysts to provide better forecasts. Our findings are consistent with those of Hassell, Jenning and Lasser (1988) who find that the analyst forecast errors for firms releasing management forecasts decrease more rapidly than the analyst forecast errors of firm that do not release management forecasts, implying that analysts find management forecasts useful.

[5] In unreported results we use only firms without management forecasts, i.e., firms that are excluded from our sample. Similarly, we generate the random sample from these firms. Our findings are similar to those reported in Table 5 Panel B and, hence, we do not report them.

In panel C of Table 4, we examine the bias and efficiency of management forecasts by re-estimating equation (1) using a sample that comprises of the entire First Call universe and a random sample of 5,919 firms from the First Call universe. That is, unlike in panel A, we do not restrict our sample to only those firms that have a management forecast and an analyst forecast in the same month. We do this to investigate whether managers also find the information present in analyst forecasts useful to improve their forecasts. The results in panel C are similar to those in panel A. We find that management forecasts are optimistically biased and they are efficient in reflecting investor expectations, suggesting that managers do not use the information in analyst forecasts to improve their own forecasts.

To sum up the findings of this section, our results imply that analysts are unbiased in their forecasts but not efficient in using all the available public information in coming up with their forecasts. On the other hand, management forecasts are optimistically biased but they reflect all the available public information.

Bias and Efficiency over Time

Prior studies (e.g., Brown, Griffin, Hagerman, and Zmijewski, 1987; Brown, Richardson, and Schwager, 1987; Kross, Ro, and Schroeder, 1990) find that analyst forecast precision improves as the forecast approaches the announcement date. In this section, we investigate whether the bias and efficiency of analyst and management forecasts improve as the forecasts are issued closer to the earnings announcement date. To do so, we estimate equation (1) in three different months of the year – April, July and October. We choose these three months for our analyses because of our sample, quarterly earnings are announced in these months and the information in them might be used by analysts and management to update their forecasts. Also, not surprisingly, analyst and management forecasts are clustered in these three months. Since we restrict our sample to firms with a December fiscal year end, if the bias and efficiency of forecasts improves as the earnings announcement date gets closer, we expect the magnitude of the estimated intercept and the slope coefficient to get smaller (ideally no different from zero if the forecasts are unbiased and fully efficient) as we move from April to October. The results of these analyses are reported in Table 5.

In panel A of Table 5, we report the intercept from the estimation of equation (1) using analyst forecast errors and management forecast errors as the dependent variable. For management forecasts, we find that the optimistic bias decreases as the forecasts are issued closer to the earnings announcement date. The intercept decreases progressively as the earnings announcement date approaches, from 0.08 (t-statistic of -6.17) in April to -0.004 (t-statistic of -3.17) in October. In the case of analyst forecasts, the estimated intercept is -0.002, -0.001 and 0.000 for the months of April, July, and October, respectively. However, the estimated intercepts for analyst forecasts are statistically indifferent from zero. So, we find that management forecasts issued closer to the earnings announcement are less biased whereas there is no such improvement in analyst forecasts. Note that it is not surprising that there is no improvement in bias for analyst forecasts issued closer to the earnings announcement for our sample of firms because we don't find analyst forecasts to be biased to start with.

The estimated slope coefficient from a pooled regression of equation (1) is reported in panel B of Table 5. In the case of analyst forecasts, we find that the estimated slope coefficient decreases in magnitude from 0.016 (t-statistic of 3.02) in April to 0.004 (t-statistic of 3.47) in October when the 3-month cumulative returns is the independent variable. When 6-month accumulated returns is the independent variable, the estimated coefficient decreases from 0.008 (t-statistic of 3.66) in July to 0.003 (t-statistic of 3.49) in October. The slope coefficient for April is statistically indifferent from zero. Thus, analysts become better at incorporating more of investors' expectations in forecasts issued closer to the earnings announcement. For management forecasts, we don't find any improvement in efficiency as the earnings announcement draws closer. Again, this is not a surprising finding because past returns are not associated with management forecast errors to begin with in our sample. The slope coefficient for management forecast error regressions are statistically indifferent from zero for each of the three months. In conclusion, our evidence suggests that management forecasts issued closer to earnings announcement are less optimistically biased and analyst forecasts issued closer to the earnings announcement incorporate more of investors' expectations.

Panel C of Table 5 reports the results from re-estimating equation (1) with analyst forecasts issued in the months of April, July and October as the dependent variable using the entire *I/B/E/S* database as a sample and a random sample derived from the entire *I/B/E/S* universe.[6] The results indicate that for a sample comprising the entire *I/B/E/S* universe or for a random sample drawn from it, the analysts on average are optimistically biased. This result is consistent with the inferences drawn from panel B of Table 4 and in contrast to our finding of analyst forecasts being unbiased when the sample is restricted to firms that have management forecasts as well as analyst forecasts reported in panel A of Table 4 and panel A of Table 5. This lends further support to our earlier finding that analysts find management

[6] In unreported results, we use only firms without management forecasts. Similarly, we generate the random sample from these firms. Our findings are similar to those reported in Table 6 Panel C and, hence, are excluded.

forecasts useful and use them to make their own forecasts more accurate or the presence of management forecasts pressures analysts to provide better forecasts. We also find that the optimistic bias in analyst forecasts decreases and they become more efficient in incorporating investors' expectations as the earnings announcement draws closer. For example, for the full *I/B/E/S* sample when prior 6-months cumulative returns is the independent variable, the intercept progressively decreases from -0.007 (t-statistic of -3.08) in April to -0.002 (t-statistic of -2.20) in October. Also, the slope coefficient (which reflects efficiency) decreases from 0.015 (t-statistic of 2.06) in April to 0.004 (t-statistic of 2.82) in October.

In panel D of Table 5, we examine the bias and efficiency of management forecasts issued in April, July and October by re-estimating equation (1) using a sample that comprises of the entire First Call universe and a random sample of firms from the First Call universe. We find that management forecasts are efficient but they are optimistically biased. The optimistic bias is lower for forecasts issued closer to the earnings announcement date.

Accruals, Revenues, and Earnings Growth

In addition to stock returns, we use additional variables to test whether analysts and managers are more efficient in incorporating past information. Prior studies have found that forecast errors are correlated with publicly available information other than stock returns, such as information in past earnings, accruals and revenues. Accordingly, we test whether managers and analysts incorporate the information in past accruals, revenue growth and earnings growth in their forecasts. The results are reported in Table 6.

The sample in table 6 contains 5,495 firm-year observations, and is restricted to observations with all the necessary variables (a loss of 424 observations compared to the main sample). Similar to the main sample, this sample period is from 2001 to 2009. The variable definitions and calculations are as follows: the dependent variables are the management and analyst forecast errors, and are calculated as defined above. ACC_{t-1} is the operating accruals at period t-1, scaled by lagged total assets (Compustat items [IB – OANCF]/AT_t-1). $\Delta SALE_{\boldsymbol{t-1}}$ is the lagged change in sales, scaled by lagged market-cap (sales are measured by Compustat item SALE). $\Delta EARN_{t-1}$ is the lagged change in income before extraordinary items, scaled by lagged market-cap (income before extraordinary items is measured by Compustat item IB). $R_{m-1,3}$ is the three-month cumulative return ending at the end of the month prior to the forecast. The regressions are pooled with two-way clustered standard errors by firm and year, as prescribed in Gow et al. (2010).

Similar to our findings with respect to information contained in prior stock returns, the results suggest that managers are indeed more efficient in incorporating past information contained in these additional variables as well. When we regress management forecast errors on these variables, none of the estimated coefficients on past accruals, sales growth, earnings growth, and stock returns are statistically indifferent from zero. In contrast, analyst forecast do not fully incorporate the information in past accruals. This result is consistent with the findings of Bradshaw, Richardson, and Sloan (2001). The coefficient is positive (0.017) and statistically significant (with a *t*-statistic of 4.73). In the full model (Column 5), both accruals and returns remain statistically significant for analyst forecasts. The finding that the coefficient on past returns is statistically significant in the full model, suggests that analysts are inefficient in incorporating all the information contained in past stock returns even after controlling for all the past information conveyed by earnings, revenue changes and accruals.

The Impact of Management Forecasts on Analyst Forecasts

Table 7 provides additional evidence on the relation between analyst forecast characteristics and the existence of management forecasts. This table employs the regression model in Equation (1) for our sample firms in periods where management forecasts are unavailable. Thus, we are controlling for the firm and testing the impact of the presence of a management forecasts on analyst forecasts' bias and efficiency.

While our results indicate that on average analyst forecasts are unbiased for our sample firms, we find that forecasts for the same firms are biased in the months in which management forecasts are not available. The intercept, measuring the bias, is negative. It varies from -0.001 to -0.004 with a *t*-statistic varying from -1.24 to -3.13. The bias declines for more recent forecasts as the bias in October is only -0.001 and is statistically insignificant. These results are in contrast to those in Table 5 Panel A, where we document that analyst forecasts are unbiased (the intercept is statistically insignificantly different from zero).

While management forecasts are associated with less bias in analyst forecasts, we find no effect on forecast efficiency. The slope estimate is positive and largely statistically significant. The coefficient varies from 0.005 to 0.010 and the *t*-statistic varies from 1.59 to 3.86. Consistent with the results in Table 5 Panel B, the efficiency improves (the slope coefficient declines) as we approach the earnings announcement date. In sum, we find that the existence of management forecasts is associated with less analyst forecast bias, but there is no association with analyst forecast efficiency.

Management and Analyst Timing Advantage

As an additional test we conduct our main analyses under two extreme cases of management timing advantage and analyst timing advantage. We establish management forecast timing advantage by restricting our sample to the last management forecast in a given month, while the corresponding analyst forecast is the mean analyst forecast of forecasts given on or before the management forecast. Analyst forecast timing advantage is established by restricting the sample to the first management forecast in a given month, while the corresponding analyst forecast is the mean analyst forecast of forecasts given on or after the management forecast. We require that the mean analyst forecast is based on three or more different forecasts. The results of the tests are reported in table 8. The sample sizes (2,284 for management timing advantage and 5,073 for analyst timing advantage) imply that analyst forecasts are more prevalent after management forecasts. Furthermore, since we calculate the mean analyst forecast using three or more observations, it is possible that for a given company in a given month to have both a management timing advantage and an analyst timing advantage, although the mean analyst forecast will be different.

The results of the tests support the results for the main analyses and are not sensitive to the timing advantage. Specifically, there is a significant bias in the management forecasts under both management and analyst timing advantage. Furthermore, the coefficient of prior returns is positive and significant in the analyst forecast error regression under both management and analyst timing advantage.

V. Additional Tests

Partitioning Based on Firm Characteristics

As we note above, Hutton et all. (2010) document that managers have an advantage when their firm's earnings are less dependent on macroeconomic conditions, while analysts have a competitive advantage in analyzing firms which are more strongly affected by macroeconomic shocks. We test these hypotheses using our empirical methodology by partitioning our sample into three groups based on firm characteristics. Specifically, we sort firms based on cyclicality (correlation with Gross Domestic Product, GDP), volatility of sales, and industry regulation.[7] We sort our sample into three groups based on cyclicality and sales volatility, and we sort firms into two groups based on whether or not they operate in a regulated industry. Our findings are reported in Table 9.

Our results show that the proportion of firms with lower absolute analyst forecast errors is higher for more cyclical firms. With respect to analyst forecasts, we find that they are unbiased and inefficient for high as well as low cyclical firms. But, the analyst forecast inefficiency is higher for low cyclicality firms, consistent with the notion that analysts are more efficient in forecasting macroeconomic shocks. In contrast to analyst forecasts, we find little evidence that management forecasts are affected by cyclicality. We find that

[7] The sales standard deviation is measured by the standard deviation of revenue (saleq), measured over the prior 12 quarters, scaled by the mean revenue over the same time period.

management forecast bias is marginally higher for high cyclicality firms and find no impact on efficiency. Consistent with our results for cyclicality, we find that analyst forecast efficiency is lower for firms with high sales volatility. For management forecasts, we document a marginally higher bias for firms with higher sales volatility. Finally, our findings indicate that analyst inefficiency is driven by unregulated industries. When we partition our sample between regulated and unregulated firms, analyst forecasts are inefficient in incorporating the past information contained in prior stock returns only for the subsample comprising of unregulated firms. But, note that the lack of significance in the regulated industries may be due to the small sample size (there are only 560 observations in our regulated firms subsample).

Consistency of the Earnings Construct between *I/B/E/S* and First Call

In our main analyses, we calculate the management forecast error using the reported EPS number from the CIG database of First Call whereas the analyst forecast error is calculated using the reported EPS number from *I/B/E/S.* As we use EPS data from both First Call and *I/B/E/S,* as a robustness test we ensure that EPS being forecasted by the managers and analysts is consistent. Accordingly, we re-run our main analyses after deleting observations where the EPS values from First Call and *I/B/E/S* are not equal. In unreported results, we find that the inferences drawn are similar to those drawn from our main sample in which we do not delete observations where the EPS value is different between First Call and *I/B/E/S.* In the restricted sample, we continue to find that analyst forecasts are unbiased on average whereas management forecasts are optimistically biased. However, analyst forecasts are inefficient in incorporating all the available public information in contrast to management forecasts which efficiently reflect all available public information.

Estimating Analyst Forecast Errors using Analyst Consensus Estimates from *I/B/E/S*

As a robustness check, we re-run our main analyses by estimating analyst forecasts errors as the difference between the EPS value and the *I/B/E/S* mean consensus forecast estimate rather than using the *I/B/E/S* detail history file to estimate the mean analyst forecast for each firm in our sample. We do not use the *I/B/E/S* mean consensus forecast estimate in our main analyses to mitigate the staleness existing in the *I/B/E/S* mean consensus forecast estimate. The untabulated results are very similar; all of our main inferences remain unchanged.

VI. Conclusion

In this paper, we examine firms with available management and analyst forecasts. We document that while both analyst and management forecasts are inaccurate, the sources of inaccuracies are different. We find that while the analysts are unbiased in their forecasts, management forecasts are optimistically biased. In addition, we document that analyst do not incorporate all of investors' available information, but managers do. Further, we document that the bias in management forecasts and the inefficiency in analyst forecasts decreases when the forecasts are released closer to the earnings announcement date. Finally, our results suggest that analys forecasts are less biased in periods when the management also releases a forecast.

Our paper contributes to the recent finding in the literature that management forecasts are not more accurate than analyst forecasts. While Hutton and Stocken (2010) and Hutton et al. (2010) document that managers do not provide more accurate forecasts than analysts, they do not investigate the impact of biases and efficiency on forecast errors. To our knowledge, we are the first to compare the impact of biases and efficiency on both analyst forecast errors and management forecast errors. Our empirical evidence would be useful to users of analyst and management forecasts in forming their own expectations. One implication of our findings is that for firms that have both analyst and management forecasts available, since management forecasts are more efficient in reflecting past information, an earnings expectations model based on management forecasts corrected for the optimistic bias in management forecasts would be better than an expectations model based on inefficient analyst forecasts that fail to reflect all available past information.

References

Abarbanell, J. S., 1991, Do analysts' earnings forecasts incorporate information in prior stock price changes? *Journal of Accounting and Economics*, 14, 147-165.

Abarbanell, J. S. and R. Lehavy, 2003, Biased forecasts or biased earnings? The role of reported earnings in explaining apparent bias and over/underreaction in analysts' earnings forecasts, *Journal of Accounting and Economics*, 36, 105-146.

Ajinkya, Bipin B, and Michael J Gift, 1984, Corporate managers' earnings forecasts and symmetrical adjustments of market expectations, *Journal of Accounting Research*, 22 (2), 425-444.

Bradshaw, Mark T., Scott A. Richardson, and Richard G. Sloan, 2001, Do analysts and auditors use information in accruals? *Journal of Accounting Research*, 45-74.

Brown, L. D., P. A. Griffin, R. L. Hagerman, and M. E. Zmijewski, 1987, Security analyst superiority relative to univariate time-series models in forecasting quarterly earnings, *Journal of Accounting Research*, 29, 61-87.

Brown, L. D., G. D. Richardson, and S. J. Schwager, 1987, An informational interpretation of financial analyst superiority in forecasting earnings, *Journal of Accounting Research*, 25, 49-67.

Butler, K. C., and L. H. P. Lang. 1991. Evidence of systematic optimism and pessimism. *Journal of Accounting Research* 29 (Spring): 150-156.

Cotter, Julie, Irem Tuna and Peter D. Wysocki, 2006, Expectations management and beatable targets: How do analysts react to explicit earnings guidance? *Contemporary Accounting Research*, 23, 593-623.

Darrough, M., and T. Harris. 1991. Do management forecasts of earnings affect stock prices in Japan? *Journal of Accounting, Auditing and Finance Supplement*: 119 – 154.

Das, S., B. Levine, and K. Sivaramankrishnan. 1998. Earnings predictability and bias in analysts' earnings forecasts. *The Accounting Review* 73: 277-294.

Gong, G., L. Y. Li and J. J. Wang. 2011. Serial correlation n management earnings forecast errors. *Journal of Accounting Research* forthcoming.

Gow, I., G. Ormazabal, and D. Taylor. 2010. Correcting for cross-sectional and time-series dependence in accounting research. *The Accounting Review* 85: 483 – 512.

Hassell, J., R. Jenning and D. Lasser. 1988. Management earnings forecasts; Their usefulness as a source of firm-specific information to security analysts. *The Journal of Financial Services Research* 11: 303-320.

Hribar, Paul and Holly Yang, 2011, CEO overconfidence and management forecasting, Working Paper University of Iowa and University of Pennsylvania.

Hughes, J., J. Liu, and W. Su, 2008, On the relation between predictable market returns and predictable analyst forecast errors, *Review of Accounting Studies*, 13:266-291.

Hutton, A. and P. Stocken, 2010, Prior forecasting accuracy and investor reaction to management earnings forecasts, Working paper - Boston College and Dartmouth College.

Hutton, A., L. F. Lee, and S. Shu, 2010, Do managers always know better? An examination of the relative accuracy of management and analyst forecasts, Working Paper - Boston College.

Keane, M. P. and D. E. Runkle, 1998, Are financial analysts' forecasts of corporate profits rational? *Journal of Political Economy* 106, 768-805.

Konchitchki, Y., X. Lou, G. Sadka, and R. Sadka, 2011, Underreaction or risk? Expected earnings and the post-earnings-announcement drift, Working Paper – Columbia University, Boston College, University of California Berkeley, and University of Delaware.

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

Ljungqvist, Alexander, Christopher Malloy and Felicia Marston, 2009, Rewriting history, *Journal of Finance*, 64, 1935-1960.

Lys, T. and S. Sohn, 1990, The association between revisions of financial analysts' earnings forecasts and security-price changes*, Journal of Accounting and Economics* 13, 341-363.

Matsumoto, D. 2002. Management's incentive to avoid negative earnings surprises. *The Accounting Review* 77: 483 – 514.

McNichols, M. 1989. Evidence of information asymmetries from management earnings forecasts and stock return. *The Accounting Review*, 64, 1-27.

O'Brien, P. C. 1988. Analysts' forecasts as earnings expectations. *Journal of Accounting and Economics* 10: 53-83.

Rogers, Jonathan L, and Philip C. Stocken, 2005, Credibility and management forecasts, *The Accounting Review*, 80 (4), 1233-1260.

Waymire, Gregory, 1986, Additional evidence on the accuracy of analyst forecasts before and after voluntary management earnings forecasts, *The Accounting Review*, 61 (1), 129-142.

Williams, P. A. 1996. The relation between a prior earnings forecast by management and analyst response to a current management forecast. *The Accounting Review* 71 (1): 103-115.

Table 1 – Sample Selection

	Number of Forecasts
Initial sample from First Call CIG dataset of annual EPS forecasts from January 2001 to December 2009	46,564
Less:	
Observations with missing corresponding I/B/E/S analyst consensus forecast	31,182
Observations with non-December fiscal year end	3,161
Observations with missing return data from CRSP	1,638
Observations with forecasts made before April of the fiscal year	4,224
Observations at the upper and lower percentile	440
Final sample	**5,919**

Table 2 – Descriptive statistics

This tables reports (Panel A) the descriptive statistics of the management forecast errors, analyst forecast errors, and 3 and 6 month cumulative returns. Panel B reports the correlations amongst management forecast errors, analyst forecast errors, and 3 and 6 month cumulative returns. Pearson correlations are reported above the diagonal and Spearman correlations are reported below the diagonal. p-values are reported in the parentheses. *MFE* is the management forecast error, calculated as the actual EPS from *First Call* minus the management forecasted EPS, and scaled by the share price at the end of prior fiscal year. The management forecasted EPS is the mean forecasted EPS in the month of the management forecast. *AFE* is the analyst forecast error, calculated as the actual EPS from *I/B/E/S* minus the mean analyst forecast in the month of the management forecast, scaled by the share price at the end of prior fiscal year. $R_{m-1,3}$ is the 3 month cumulative returns ending at the end of the month prior to the forecasts. $R_{m-1,6}$ is the 6 month cumulative returns ending at the end of the month prior to the forecasts. The distribution statistics are calculated based on means across the years 2001 to 2009. The distributions are based on 5,919 observations, and are restricted to observations from April to December in order to allow for prior year's earnings announcement to be released.

Panel A: Descriptive Statistics

	Mean	Std. deviation	P25	P50	P75
MFE	-0.005	0.014	-0.010	-0.000	0.002
AFE	-0.000	0.007	-0.001	0.000	0.002
$R_{m-1,3}$	0.018	0.155	-0.079	0.015	0.109
$R_{m-1,6}$	0.056	0.224	-0.091	0.043	0.184

Panel B: Correlations

Variable	*MFE*	*AFE*	$R_{m-1,3}$	$R_{m-1,6}$
MFE	1	0.427	0.009	-0.032
		(0.000)	(0.498)	(0.013)
AFE	0.648	1	0.156	0.160
	(0.000)		(0.000)	(0.000)
$R_{m-1,3}$	0.090	0.172	1	0.659
	(0.000)	(0.000)		(0.000)
$R_{m-1,6}$	0.074	0.178	0.658	1
	(0.000)	(0.000)	(0.000)	

Table 3 – Management and analyst absolute forecast error comparison

This table shows the proportion of observations (by year and month) in which analyst absolute forecast errors are lower than management absolute forecast errors. Analyst and management absolute forecast errors are calculated as $\left|EPS_{i,t} - AF_{i,t,m}\right|/P_{t-1}$ and $\left|EPS_{i,t} - MF_{i,t,m}\right|/P_{t-1}$, where EPS is the earnings per share of firm i in year t, AF is firm i's monthly analyst forecasts' mean for period t, given in month m, and P is the share price at the end of period t-1. MF is firm i's management forecast for period t, given in month m. Panel B represents the time series regression of the aforementioned proportions, and panel C represents the same regression with the exclusion of the outlying observation from June 2009. Panel D represents the distribution of the proportion of observations with lower absolute forecast error for analysts relative to management, by firm. We require at least 5 observations per firm. This leads to a sample consisting of 417 firms. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

Panel A: Proportion of observations with lower absolute forecast error for analysts

	April	May	June	July	August	September	October	November	December	All
2001	0.71	0.89	0.64	0.64	0.75	0.60	0.72	0.46	0.60	0.67
2002	0.63	0.73	0.70	0.69	0.67	0.74	0.66	0.59	0.58	0.70
2003	0.75	0.73	0.69	0.66	0.76	0.62	0.68	0.76	0.86	0.70
2004	0.76	0.79	0.77	0.75	0.54	0.69	0.74	0.74	0.73	0.74
2005	0.83	0.68	0.74	0.67	0.53	0.48	0.71	0.57	0.56	0.67
2006	0.65	0.75	0.60	0.63	0.61	0.75	0.65	0.69	0.63	0.65
2007	0.61	0.62	0.71	0.64	0.64	0.44	0.62	0.60	0.76	0.62
2008	0.62	0.60	0.50	0.53	0.55	0.57	0.48	0.52	0.63	0.54
2009	0.57	0.57	0.14	0.57	0.52	0.69	0.56	0.61	0.57	0.57
All	0.68	0.66	0.65	0.64	0.60	0.62	0.64	0.62	0.67	0.64

Panel B: Time series of the proportion of observations with lower absolute forecast error for analysts (n=81)

	Intercept	Coefficient	Adjusted R-squared
Estimate	0.731	-0.002	0.20
t-stat	33.69***	-4.60***	

Panel C: Time series of the proportion of observations with lower absolute forecast error for analysts, with the omission of one outlying observation (n=80)

	Intercept	Coefficient	Adjusted R-squared
Estimate	0.722	-0.002	0.19
t-stat	38.30***	-4.39***	

Panel D: Distribution of the proportion of lower analyst absolute forecast error, by firm

Mean	Std. Dev	P5	P10	P25	P50	P75	P90	P95
0.63	0.22	0.22	0.33	0.50	0.63	0.80	0.93	1.00

Table 4 –Regressions of management and analyst forecast errors on prior returns

This table reports the results of estimating the models: $YFE_{i,t}/P_{i,t-1} = \alpha + \beta \cdot R_{m-1,j} + \varepsilon_{i,t,}$ where j={3, 6} and Y={M, A}. *YFE* is the management (analyst) forecast errors, and *R* is the 3 and 6 month cumulative returns ending at the end of the month prior to the forecast. The management and analyst forecast errors are calculated as the actual EPS minus the predicted EPS, scaled by the price at the end of period t-1. Analyst forecasts are the mean monthly analyst forecasts, and require that a management forecast will be given in the particular month. The regressions are pooled with two-way clustered standard errors by firm and year, as prescribed in Gow et al. (2010). Our main sample (in panel A) is restricted to observations with management and analyst forecasts that are given in the same month to the same company. The full analyst forecast sample (in panel B) does not require a matching management forecast, and the full management forecast sample (in panel C) does not require a matching analyst forecast. The year span of all samples is 2001 to 2009. The random samples (in panels B and C) are created based on 100 samples with replacement, and the sample size is similar to the sample size in panel A. The estimates and t-stats of the random sample regressions are based on the mean of the estimates from the 100 samples. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

Panel A: Pooled regressions of management and analyst forecast error on prior returns (N = 5,919)

		Intercept		Beta		
		Estimate	t-stat	Estimate	t-stat	R-square
$R_{m-1,3}$	Management	-0.005	-3.71***	0.001	0.20	-0.000
	Analysts	-0.000	-0.59	0.007	5.02***	0.024
$R_{m-1,6}$	Management	-0.004	-3.87***	-0.002	-0.66	0.001
	Analysts	-0.000	-0.85	0.005	4.54***	0.026

Panel B: Pooled full I/B/E/S sample and random sample regressions of analyst forecast error on prior returns

		Intercept		Beta			
		Estimate	t-stat	Estimate	t-stat	N	R-square
$R_{m-1,3}$	Full sample	-0.004	-3.67***	0.011	5.03***	37,623	0.009
	Random sample	-0.004	-3.58****	0.011	4.13***	5,919	0.010
$R_{m-1,6}$	Full sample	-0.005	-3.90***	0.009	3.68***	37,623	0.013
	Random sample	-0.005	-3.78***	0.009	3.32***	5,919	0.013

Panel C: Pooled full First Call sample and random sample regressions of management forecast error on prior returns

		Intercept		Beta			
		Estimate	t-stat	Estimate	t-stat	N	R-square
$R_{m-1,3}$	Full sample	-0.005	-3.66***	0.001	0.17	14,512	-0.000
	Random sample	-0.005	-3.63***	0.001	0.19	5,919	0.000
$R_{m-1,6}$	Full sample	-0.005	-3.86***	-0.002	-0.49	14,512	0.000
	Random sample	-0.005	-3.82***	-0.002	-0.44	5,919	0.001

Table 5 – Regression of management and analyst forecast errors on prior returns – by month

This table reports the results of estimating the models: $YFE_{i,t}/P_{i,t-1} = \alpha + \beta \cdot R_{m-1,j} + \varepsilon_{i,t,}$ where j={3, 6} and Y={M, A}. *YFE* is the management (analyst) forecast errors, and *R* is the 3 and 6 month cumulative returns ending at the end of the month prior to the forecast. The management and analyst forecast errors are calculated as the actual EPS minus the predicted EPS, scaled by the price at the end of period t-1. Analyst forecasts are the mean monthly analyst forecasts, and require that a management forecast will be given in the particular month. The regressions are pooled with two-way clustered standard errors by firm and year, as prescribed in Gow et al. (2010). Our main sample (in panels A and B) is restricted to observations with management and analyst forecasts that are given in the same month to the same company, and includes 680 observations for April, 1,489 observations for July, and 1,653 observations for October. The full analyst forecast sample (in panel C) does not require a matching management forecast, and the full management forecast sample (in panel D) does not require a matching analyst forecast. The year span of all samples is 2001 to 2009. The random samples (in panels C and D) are created based on 100 samples with replacement, and the sample size is similar to the sample size in panels A and B. The estimates and t-stats of the random sample regressions are based on the mean of the estimates from the 100 samples. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

Panel A: Analysis of the intercept for management and analyst forecast errors, with different return windows and different forecast months

		$R_{m-1,3}$			$R_{m-1,6}$		
		Intercept	t-stat	R-square	Intercept	t-stat	R-square
April	Management	-0.008	-6.17***	0.002	-0.008	-6.20***	-0.001
N=680	Analysts	-0.002	-1.71	0.044	-0.002	-1.68	0.032
July	Management	-0.006	-4.63***	0.005	-0.005	-4.30***	0.001
N=1,489	Analysts	-0.001	-1.78	0.047	-0.001	-1.62	0.047
October	Management	-0.004	-3.17**	-0.001	-0.004	-3.35***	-0.000
N=1,653	Analysts	0.000	1.90*	0.026	0.000	0.91	0.044

Panel B: Analysis of the coefficient estimate (β) for management and analyst forecast errors, with different return windows and different forecast months

		$R_{m-1,3}$			$R_{m-1,6}$		
		Beta	t-stat	R-square	Beta	t-stat	R-square
April	Management	0.007	1.46	0.002	0.000	0.10	-0.001
N=680	Analysts	0.016	3.02**	0.044	0.008	1.67	0.032
July	Management	0.007	1.25	0.005	-0.003	-1.03	0.001
N=1,489	Analysts	0.010	2.79**	0.047	0.008	3.66***	0.047
October	Management	-0.000	-0.09	-0.001	-0.001	-0.23	-0.000
N=1,653	Analysts	0.004	3.47***	0.026	0.003	3.49***	0.044

Panel C: Analysis of the intercept and Beta for analyst forecast errors, based on I/B/E/S full (unmerged) sample

			Intercept		Beta			
			Estimate	t-stat	Estimate	t-stat	N	R-square
April	$R_{m-1,3}$	Full sample	-0.006	-2.92**	0.020	3.76***	6,076	0.012
		Random sample	-0.006	-2.74**	0.020	2.12*	680	0.013
	$R_{m-1,6}$	Full sample	-0.007	-3.08**	0.015	2.06*	6,076	0.020
		Random sample	-0.007	-2.99**	0.016	2.05*	680	0.023
July	$R_{m-1,3}$	Full sample	-0.004	-3.01**	0.011	3.09**	6,409	0.014
		Random sample	-0.004	-2.90**	0.012	2.70**	1,489	0.017
	$R_{m-1,6}$	Full sample	-0.004	-3.37**	0.011	3.83***	6,409	0.020
		Random sample	-0.004	-3.18**	0.012	3.24*	1,489	0.022
October	$R_{m-1,3}$	Full sample	-0.002	-1.98*	0.004	2.21*	6,888	0.004
		Random sample	-0.002	-1.90*	0.004	1.72	1,653	0.006
	$R_{m-1,6}$	Full sample	-0.002	-2.20*	0.004	2.82**	6,888	0.009
		Random sample	-0.002	-2.11*	0.004	2.17*	1,653	0.011

Panel D: Analysis of the intercept and Beta for management forecast errors, based on First Call full (unmerged) sample

			Intercept		Beta			
			Estimate	t-stat	Estimate	t-stat	N	R-square
April	$R_{m-1,3}$	Full sample	-0.008	-4.60***	0.001	0.27	1,910	-0.001
		Random sample	-0.008	-4.35	0.001	0.28	680	0.000
	$R_{m-1,6}$	Full sample	-0.008	-4.21***	-0.001	-0.10	1,910	-0.001
		Random sample	-0.008	-4.02***	-0.001	-0.15	680	0.001
July	$R_{m-1,3}$	Full sample	-0.007	-4.57***	0.002	0.29	3,164	-0.000
		Random sample	-0.007	-4.42***	0.002	0.31	1,489	0.001
	$R_{m-1,6}$	Full sample	-0.006	-4.57***	-0.005	-1.13	3,164	0.004
		Random sample	-0.006	-4.39***	-0.005	-1.03	1,489	0.005
October	$R_{m-1,3}$	Full sample	-0.004	-3.02**	0.002	0.37	3,266	0.000
		Random sample	-0.004	-2.92**	0.002	0.35	1,653	0.001
	$R_{m-1,6}$	Full sample	-0.004	-3.19**	0.001	0.30	3,266	-0.000
		Random sample	-0.004	-3.07**	0.001	0.34	1,653	0.001

Table 6 – Accruals, Revenues and Earnings

The table reports the results of the regression of analyst and management forecast errors on the prior three-month compounded returns, with additional control variables. The dependent variables are the management and analyst forecast errors. The forecast errors are calculated for forecasts given between April and December of a given year. The management and analyst forecast errors are calculated as the actual EPS minus the predicted EPS, scaled by the price at the end of period t-1. Management forecasts are obtained directly from First Call. Analyst forecasts are the mean monthly analyst forecasts, obtained from I/B/E/S, and require that a management forecast will be given in the particular month. ACC_{t-1} is the operating accruals at period *t-1*, scaled by lagged total assets (measured by Compustat items [IB – OANCF]/AT_t-1). $\Delta SALE_{t-1}$ is the lagged change in sales, scaled by lagged market-cap (Sales are measured by Compustat item SALE). $\Delta EARN_{\boldsymbol{t-1}}$ is the lagged change in income before extraordinary items, scaled by lagged market-cap (measured by Compustat item IB). $R_{m-1,3}$ is the three-month cumulative return ending at the end of the month prior to the forecast. The regressions are pooled with two-way clustered standard errors by firm and year, as prescribed in Gow et al. (2010). The sample period is between 2001 and 2009. All necessary variables need to be available in order to be included in our sample for this table. The total number of firm-year observations is 5,495. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

	Management					**Analysts**				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Intercept	-0.005**	-0.004***	-0.005***	-0.005***	-0.004**	0.001*	-0.000	-0.000	-0.000	0.001**
	(-2.84)	(-3.50)	(-3.52)	(-3.73)	(-2.82)	(2.04)	(-0.05)	(-0.06)	(-0.40)	(2.57)
ACC_{t-1}	-0.000				0.000	0.017***				0.015***
	(-0.05)				(0.04)	(4.73)				(4.77)
$\Delta SALE_{t-1}$		-4.53			-4.60		0.016			-0.626
		(-1.43)			(-1.45)		(0.01)			(-0.48)
$\Delta EARN_{t-1}$			0.606		1.24			2.703		2.350
			(0.16)		(0.30)			(0.94)		(0.81)
$R_{m-1,3}$				0.000	0.000				0.007***	0.006***
				(0.03)	(0.06)				(5.49)	(5.37)
R-square	-0.00	0.00	-0.00	-0.00	0.00	0.02	-0.00	0.00	0.03	0.04

Table 7 – Analysis of analyst forecasts for firms with management forecasts

This table reports the results of estimating the models: $AFE_{i,t}/P_{i,t-1} = \alpha + \beta \cdot R_{m-1,j} + \varepsilon_{i,t,}$ where j={3, 6}. *AFE* is the analyst forecast error, and *R* is the 3 and 6 month cumulative returns ending at the end of the month prior to the forecast. The analyst forecast errors are calculated as the actual EPS minus the predicted EPS, scaled by the price at the end of period t-1. Analyst forecasts are the mean monthly analyst forecasts, and require that a management forecast will be given, but not in the same month as the analyst forecast. The regressions are pooled with two-way clustered standard errors by firm and year, as prescribed in Gow et al. (2010). The year span of the sample is from 2001 to 2009. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

		Intercept		Beta			
		Estimate	t-stat	Estimate	t-stat	R-squared	N
April	$R_{m-1,3}$	-0.003	-2.53**	0.010	2.33**	0.006	2,410
	$R_{m-1,6}$	-0.004	-2.50**	0.007	1.59	0.010	
July	$R_{m-1,3}$	-0.003	-2.34**	0.011	2.35**	0.024	1,841
	$R_{m-1,6}$	-0.002	-2.41**	0.010	2.81**	0.032	
October	$R_{m-1,3}$	-0.001	-1.24	0.006	1.66	0.010	1,911
	$R_{m-1,6}$	-0.001	-1.62	0.005	2.99**	0.021	
All	$R_{m-1,3}$	-0.002	-3.00**	0.010	3.86***	0.015	12,432
	$R_{m-1,6}$	-0.003	-3.13**	0.008	3.00**	0.020	

Table 8 – Management and analyst timing advantage

This table reports the results of estimating the models: $YFE_{i,t}/P_{i,t-1} = \alpha + \beta \cdot R_{m-1,3} + \varepsilon_{i,t}$, with the imposition of management and analyst timing advantages. *YFE* is the management (analyst) forecast errors, and *R* is the 3-month cumulative return ending at the end of the month prior to the forecast. Management advantage is imposed by setting management forecasts to the last management forecast in a given month, and the analyst forecast is the mean analyst forecast for forecasts given on or prior to the management forecast in the same month. Analyst advantage is imposed by setting management forecasts to the first management forecast in a given month, and the analyst forecast is the mean analyst forecast for forecasts given on or after the management forecast in the same month. We require at least 3 observations for the calculation of the mean analyst forecast. The year span of all samples is 2001 to 2009. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

		Intercept		Beta			
		Estimate	t-stat	Estimate	t-stat	R-squared	N
Management advantage	Management	-0.004**	-3.30	0.002	0.41	0.00	2,284
	Analysts	-0.000	-0.31	0.006***	3.51	0.03	
Analyst advantage	Management	-0.004***	-3.66	-0.000	-0.01	-0.00	5,073
	Analysts	-0.000	-0.26	0.006***	5.15	0.02	

Table 9 – Regressions of management and analyst forecast errors on prior returns, partitioned by the characteristics in Hutton et al. (2010)

This table reports the results of estimating the models: $YFE_{i,t}/P_{i,t-1} = \alpha + \beta \cdot R_{m-1,j} + \varepsilon_{i,t,}$ where j={3, 6} and Y={M, A}. *YFE* is the management (analyst) forecast errors, and *R* is the 3 month cumulative returns ending at the end of the month prior to the forecast. The management and analyst forecast errors are calculated as the actual EPS minus the predicted EPS, scaled by the price at the end of period t-1. Analyst forecasts are the mean monthly analyst forecasts, and require that a management forecast will be given in the particular month. The regressions are pooled with two-way clustered standard errors by firm and year, as prescribed in Gow et al. (2010). The variables we partition our sample by in the table are based on Hutton et al. (2010). Specifically, cyclicality is measured as the R-squared from the firm-level estimation of the model over the prior 12 quarters: $EARN_{i,t} = \alpha_0 + \alpha_1 GDP_t + \varepsilon_{i,t}$ where EARN is defined as income before extraordinary item (ibq) and GDP is the nominal quarterly Gross Domestic Product. The industry classification is based on Fama and French (1997). The sales standard deviation is measured by the standard deviation of revenue (saleq) measured over the prior 12 quarters scaled by the mean revenue over the same time period. Lastly, a company is considered to belong to a regulated industry if it has a four-digit SIC code 4900-4999 (utilities), 6000-6099, 6100-6199 (banking), and 6200-6299, 6700-6799 (financial institutions). An observation in panels A and B is considered to have a low (high) level if it belongs to the lower (upper) tercile. *,**, *** represent significance levels of 10%, 5%, and 1%, respectively.

Panel A: Regression of management and analyst forecast errors on prior returns, by the level of cyclicality

		Intercept	t-stat	Beta	t-stat	N	R-square
Management	Low cyclicality	-0.004	-3.11**	0.002	0.53	1,832	0.000
	High cyclicality	-0.005	-3.70***	-0.007	-1.56	1,834	0.004
Analysts	Low cyclicality	-0.000	-0.38	0.007	3.21**	1,832	0.024
	High cyclicality	0.000	0.13	0.004	3.66***	1,834	0.019

Panel B: Regression of management and analyst forecast errors on prior returns, by the level of sales standard deviation

		Intercept	t-stat	Beta	t-stat	N	R-square
Management	Low sales std. dev.	-0.004	-3.06**	0.004	1.18	1,836	0.001
	High sales std. dev.	-0.005	-3.84***	0.001	0.31	1,839	-0.000
Analysts	Low sales std. dev.	-0.000	-0.09	0.006	2.72**	1,836	0.021
	High sales std. dev.	-0.001	-0.82	0.009	4.63***	1,839	0.035

Panel C: Regression of management and analyst forecast errors on prior returns, by industry regulation

		Intercept	t-stat	Beta	t-stat	N	R-square
Management	Non-regulated	-0.005	-4.04***	0.001	0.36	4,938	0.000
	Regulated	-0.004	-1.84	-0.006	-0.66	560	0.001
Analysts	Non-regulated	-0.001	-0.78	0.007	4.64***	4,938	0.029
	Regulated	0.000	0.58	0.005	1.47	560	0.008

Panel D: Proportion of observations with lower absolute analyst forecast errors, by different partitions			
	Proportion	Std. dev.	Difference
Low cyclicality	0.59	0.492	-0.09***
High cyclicality	0.68	0.465	
Low sales std. dev.	0.62	0.487	-0.02*
High sales std. dev.	0.64	0.479	
Non-regulated industries	0.64	0.481	0.003
Regulated industries	0.61	0.489	