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Differential Informativeness of Accrual Measures to Analysts' Forecast Accuracy

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ABSTRACT

This paper evaluates whether analysts incorporate formal measures of earnings quality into their earnings forecasts. It examines whether the accrual ratio and abnormal accruals, measured with the Modified Jones (1991) Model of discretionary accruals, differentially inform analysts' earnings forecasts. It uses the accuracy of analysts' forecast as a context in which to evaluate how well analysts incorporate effects of the information contained in accrual ratio and abnormal accruals. The results indicate that the accrual ratio is negatively related to the absolute value of analysts' forecast errors while the Modified Jones (1991) Model of discretionary accruals have virtually no economic effect on analysts' forecast error. The insignificant effect of discretionary accruals on analysts' forecast may be attributed to analysts having already incorporated the information therein in their earnings forecasts, effect of the accrual anomaly having been largely arbitraged away by market participants or both. This paper contributes to the research on analysts' earnings forecast and earnings quality and helps bridge the gap between practice and theory by demonstrating the differential impact of discretionary accruals (favored by academics) and the accrual ratio (favored by analysts) on analysts' forecast accuracy. This study informs researchers and policy makers interested in better understanding how analysts affects the financial markets including how they may have learned from previously documented market anomalies such as the accrual anomaly. This is important as ultimately, efficient economy-wide capital allocation decisions are based partly on outputs of analysts' forecasting processes.

Keywords: accrual ratio, analysts' forecast error, discretionary accrual, earnings quality

1. INTRODUCTION

This paper evaluates how influential discretionary accruals and the accrual ratio are to analysts' earnings forecast accuracy. A widely-accepted measure of Discretionary Accruals is the Modified Jones (1991) model-based discretionary accrual (Dechow et al., 1995). The accrual ratio is an accepted measure of earnings quality among analysts that gauges the size of the accrual portion of earnings. Details on how the accrual ratio is calculated is in the Appendix. This paper responds to Brown et al.'s (2015) call for more research into the "black box" of inputs to analysts' forecasts and to Richardson et al.'s (2010) call for research that can help improve the quality of earnings forecasts.

This study finds that the accrual ratio is consistently negatively related to the absolute value of analysts' earnings forecast error. That is, higher values of accrual ratio are associated with lower absolute analysts' forecast error, suggesting that higher accrual ratios may denote higher information content. Higher accruals designed to manage earnings denote lower earnings quality (e.g. Libby et al., 2007; Kaplan-Schweser, 2017; Sloan1996), thus one would expect analysts to rely less on information from firms with higher accrual ratios. However, if higher accrual ratio denotes useful information, this would explain the significant negative association to absolute earnings forecast errors. This is especially so because a negative association then suggests that analysts do use the accrual ratio as a gauge of earnings quality. This is plausible in a setting where analysts accept management comments about earnings expectations with minimal, if any, pushback and dubbed a "coziness explanation". Coziness between analysts and top management can result in superior information flow to the analyst, helping reduce earnings forecast error. A recent review of how analysts work lends credence to this view (Brown et al., 2015).

An alternative interpretation is that analysts are more diligent in evaluating firms with high accrual ratios, helping minimize the forecast errors of such firms. This scenario is referred to as a "diligence explanation". Sensitivity tests using optimistic analysts forecast errors as a proxy for coziness and pessimistic analysts' forecast errors as a proxy for diligence suggest that there is support for both explanations, though the "coziness explanation" has a stronger effect on analysts' forecast errors.

Discretionary accruals are either not related to earnings forecasts errors or when they are, their coefficients are too small, close to zero. This aspect of the results suggests that the information content of discretionary accruals are already impounded into analysts' earnings forecasts, the effect of excessive accruals has been arbitraged away (Collins et al., 2003; Ke and Petroni, 2004), or both.

Despite decades of academic work on sell-side analysts' forecasts, the decision-making processes of analysts generally and the inputs to their earnings forecasts particularly are still a relative "black box" to academic researchers (e.g., Brown, 2011; Brown et al., 2015). For example, Brown et al. (2015) report that analysts tend to take financial statements at face value as they have little incentive to identify egregious financial statement misreporting and outright fraud. This paper is important because since analysts are influential information intermediaries who have significant influence on the optimal functioning of the financial markets, it is essential for researchers and policy makers to understand the inputs to their forecasting processes. This is especially important since forecasted earnings are important inputs to equity valuation based on firm fundamentals.

Furthermore, extensive research on the accrual anomaly (Sloan, 1996; Dechow et al., 1995) has likely contributed to its reduced effect in the capital markets (e.g., Collins et al., 2003).

The diminished effect of the accrual anomaly in the capital markets, the fact that researchers cannot directly observe inputs to analysts' earnings forecasts, and the prominence of the accrual ratio in CFA review materials provides the motivation for the investigation of the relative importance of the accrual ratio and discretionary accruals to analysts' earnings forecast errors.

Finally, this paper's findings suggest that when forecasting future earnings, analysts rely more on information obtained from a firm's management and the accrual ratio than information from discretionary accruals as a measure of quality of the reported earnings. Coziness between analysts and top management and hence superior information flow to the analysts becomes more important for firms with low earnings quality as indicated by the negative relation between high accrual ratios and the absolute value of analysts' earnings forecast error.

The results also suggest that analysts have alternative ways of evaluating earnings quality besides what academics perceive they should use. Importantly, the results indicate that analysts rely less on discretionary accruals, which suggests that they likely rely on a diversity of information about firms to form judgements on earnings quality rather than on a formal measure of earnings quality, consistent with the findings by Brown et al. (2015). Specifically, the results suggest that analysts rely more on the accrual ratio as a gauge of earnings quality. The Modified Jones (1991) Model discretionary accruals have little or no effect on analysts' forecast errors. This paper contributes to the research into analysts' decision-making processes (e.g., Sloan, 1996; Brown et al., 2015; Bradshaw et al., 2016).

The rest of the paper is organized as follows. Section 2 presents a brief literature and related research question. Section 3 contains the research design. Sections 4 and 5 include the results and conclusions, respectively.

2. LITERATURE AND RESEARCH QUESTION

Whereas early research on sell-side analysts paid more attention to statistical properties of analysts forecast (e.g., Brown et al., 1987; Sloan, 1996; Rangan and Sloan, 1998), more recent and contemporaneous research are increasingly focusing on deciphering the "black box" of the decision-making contexts of sell-side analysts (e.g., Brown, 1993; Ramnah et al., 2008; Bradshaw, 2011; Brown et al., 2015)

Dechow and Schrand (2004) define high quality earnings as those that annuitize the intrinsic value of the firm. That is, they (1) accurately reflects current performance, (2) accurately predict future performance (persistence), and (3) reflects underlying intrinsic value (i.e., reflected in stock prices).

Dechow (1994) and Dechow et al. (2003) report that **e**arnings are more predictable than cash flows because, (1) earnings have higher persistence, (2) earnings have less transitory components (3) earnings are less volatile than cash flows. In particular, earnings are more persistent than Free Cash Flow (FCF) and Cash Flow from Operations (CFO). Total cash flows too can be less effective in predicting earnings and cash flows because they tend to contain significant transitory components such as Cash Flow from Investing activities (CFI) and Cash Flow from Financing activities (CFF).

However, the persistence of earnings can be dampened by the component that is based on accruals because accruals can be easily "managed" and estimation errors in accruals mean that a portion of the accruals tend to reverse, increasing its volatility. The increased volatility in turn contributes to lowering the persistence of accruals. Alternatively, unmanaged accruals may provide more information that contribute to the persistence of earnings.

In the context of the aforementioned measures of earnings quality, numerous evidence in the accounting and finance literature suggest that investors misperceive the properties of earnings. For example, Debondt and Thaler (1985) find evidence that subsequent reversals of price reaction to earnings news are signs of investor overreaction. Subsequently, Sloan (1996) present evidence that the financial markets do not appreciate the lower persistence of the accrual component of earnings and overprices it. Using data from 1962 through 1991 Sloan (1996) finds that earnings are more persistent than cash flows. Furthermore, earnings that are backed by cash flows are more persistent than those backed by accruals. The difference in persistence is in part because accruals are more volatile because of reversals of over and underestimation of accruals (transitory components). Xie (2001) demonstrates that the overpricing of accruals that Sloan (1996) documents is primarily driven by the overpricing of abnormal accruals.

Bradshaw et al. (2001) find that analysts only partially adjust for the tendency of accrual-based earnings to be less persistent than those backed by cash flows. Collins et al. (2003) find that institutional investors trade on the accrual anomaly, effectively arbitraging it away, but only after the publication of Sloan (1996). Thus, the properties of accrual (particularly their size and persistence) have emerged as popular gauges of earnings quality in the accounting literature[1].

However, there is still scant evidence of what sell-side analysts use as inputs to their earnings forecasts generally and as gauges of earnings quality particularly (Brown et al., 2015.)

Furthermore, analysts tend to be optimistic in their earnings forecast, especially analysts of investment banks that do business with the firm being covered (Dechow et al., 2000; Beyer and Guttman, 2011). Gu et al. (2013) find that institutional ownership is associated with optimistic forecasts and higher trading commissions for the analyst's employer. Bradshaw et al. (2016) find that forecast difficulty interacts with analysts' incentives to create a wider span of outcomes that facilitates more optimistically biased forecasts and subsequent "walkdowns" of those forecasts making them easier to meet or beat.

This evidence contradicts to an extent, analysts' incentives to make accurate stock price forecast and recommendations since biased earnings forecasts (even if accurate) can result in erroneous stock price forecasts to the extent the earnings forecasts which are inputs to stock price forecasts are not backed up by the fundamental economics of the firm. For example, Brown et al. (2015) find that analysts have strong incentives to satisfy their institutional investor clients, who tend to be sophisticated and so can be rigorous judges of the quality of an analyst's work (earnings and stock price forecasts). Thus, analysts have incentives to seek more reliable source of information to make their forecasts more accurate. This information may be from management, especially in situations where analysts have a cozy relationship with the firm. Otherwise, analysts would need to exercise more diligence in the evaluation of the information content of high accrual ratios.

This research is similar to Bradshaw et al. (2001) in that it evaluates how analysts account for accruals in their earnings forecasts, but it differs from Bradshaw et al. (2001) in a number of ways. It differs from Bradshaw et al. (2001) in motivation. Research subsequent to Sloan (1996) documents that sophisticated investors have been exploiting the accrual anomaly (Collins et al., 2003; Ke and Petroni, 2004). Furthermore Graham, et al. (2005) and Dichev et al. (2013) document that managers use "real" earnings management transactions to meet investor expectations even if it destroys shareholder wealth in the long run. Ostensibly "real" earnings management transaction may not be picked up as motivated by earnings management since they

[1] Since the properties of accrual have emerged as a dominant measure of earnings quality, it is important to assess if and how analysts incorporate two of the top measures of accrual-based measures of earnings quality.

have been designed to appear like an ordinary business transaction. Thus, it is an empirical question whether two of the popular measures of earnings management, one representing managed earnings and the other representing both managed and unmanaged earnings, are differentially informative to analysts' forecast accuracy.

The Jones Model Discretionary Accruals is a popular model used to measure managed earnings and is preferred by academic researchers, while the accrual ratio, which is similar to Bradshaw et al.'s measure of accruals, appears to be favored by analysts (Kaplan-Schweser 2017). Note that the accrual ratio contains both managed and unmanaged earnings, and so would be more challenging for analysts to parse, especially in light of Graham et al. (2005) and Dichev et al. (2013)'s findings. Furthermore, Dechow and Schrand (2004) suggests that analysts may use total accrual as a proxy for discretionary accrual since the correlation between the two measures is over 80% (Dechow et al., 2003). Thus, while this study evaluates how very different accrual measures inform or influence analysts forecast accuracy, Bradshaw et al. (2001) examine how operating accruals influence analysts' earnings forecast levels.

Another motivation for this research is that though post-Sloan (1996) research has documented some arbitraging away of the accrual anomaly, it is not clear that exploitation of this information extends to analysts' earnings forecasts. If analysts, like other sophisticated market participants now incorporate information in accruals in their earnings forecasts, do they do so differently with respect to managed accruals (which is represented by discretionary accruals) and total accruals (which is represented by the accrual ratio). The accrual ratio[2] is an accepted measure of earnings quality in the analyst community and is a gauge of the size of the accrual portion of earnings. Details of how the accrual ratio is calculated are included in the appendix.

Finally, while Bradshaw et al. (2001) builds on Sloan (1996) to test if analysts reflect the information content of accruals and cash flows in their future forecasts, this research paper evaluates how two accrual measures compare in informing analysts' forecast accuracy. In particular, Bradshaw et al. (2001) tests to see if analysts incorporate the fact that earnings high in accruals would reverse in subsequent years compared to those high in cash. These differences in focus have implications for the research designs of the two studies. Like Sloan (1996), Bradshaw et al. (2001) tests persistence, with the latter's primary dependent variable being analysts' one year ahead forecasts. This paper's focus is on how two popular measures of accrual influence analysts' forecast accuracy.

Following the analysis of the literature, this study attempts to answer the following research question.

Research Question: What is the comparative informativeness of the discretionary accruals and the accrual ratio to sell-side analysts' earnings forecast errors?

3. RESEARCH DESIGN AND DATA

In this study the accrual ratio is used as a proxy of analysts' measure of earnings quality. The accrual ratio is a primary measure of earnings quality presented in review materials for the CFA exam and many financial accounting texts feature a similar ratio, the Quality of Income, which is cash flow from operations (CFO) divided by net income (e.g., Libby et al., 2007; Kaplan-Schweser, 2017). There are balance sheet-based and cash flow-based accrual ratios. This paper uses the cash flow-based accrual ratio because of Hribar and Collins' (2002) note of

[2] The CFA Institute study materials present the Accrual Ratio as a measure of earnings quality with firms with high accrual ratios having lower quality earnings.

caution for the potential of non-articulation events such as mergers and acquisitions to distort balance sheet-based accrual measures[3].

The analysts' earnings measure of accrual ratio is: Accrual Ratio^{CF} = (NI – CFO – CFI) / (NOA_{END} + NOA_{BEG}) / 2 where NOA = Net operating assets, defined as Total Assets – Total Debt. CFO = Cash Flow from Operations, and CFI = Cash Flow from Investing activities. As the formula shows the accrual ratio relates accrual to cash flows. Details of its derivation are in the appendix. The other measure of earnings quality (favored by academics) is discretionary accruals. This study uses the Modified Jones Model discretionary accruals. The details of estimation are also included in the appendix.

The accuracy of analysts' forecasts are influenced by several factors including the number of analysts following a firm, the proportion of shares outstanding held by institutional investors (e.g., Ajinkya et al., 2005), and growth prospects. The greater the number of analysts' following a firm, the more likely information about the firm would be disseminated among the analysts and by extension, investors (e.g., Lang and Lundholm, 1996; Lang et al., 2003). The variable NUMEST controls for the number of analysts following a firm. Institutional investors tend to exert a monitoring role on firms, likely improving the quality of information that firms with large institutional shareholders release to the markets (e.g., Gillan and Starks, 2003).

However, institutional ownership is also associated with biased earnings forecasts as they tend to use their allocation of trading commissions to exert pressure on analysts to issue optimistic forecasts on stocks in which they have long positions (e.g., Gu et al., 2013). IOR is a proxy for the ratio of shares outstanding owned by institutional investors. Not only is it more challenging to accurately forecast earnings and stock prices for growing firms and industries (e.g., Bhushan, 1989; Byard et al., 2006) but also prior research suggests that Earnings Response Coefficients (ERCs) tend to be stronger for growth companies (e.g., Collins and Kothari, 1989; Skinner and Sloan, 2002). Book-to-market ratio BKMKT controls for firms' growth prospects.

Because of the liquidation option, losses are relatively less persistent and so more difficult to forecast (Hayn, 1995). Firm years with losses are captured with the LOSS variable, which is 1 for loss years, 0 otherwise. Since certain industries may experience idiosyncratic shocks, discretionary accrual is estimated by controlling for the industry to which a firm belongs using two digit SIC codes. Zmijewski's ZSCORE controls for a firm's overall financial health (Zmijewski, 1984) because financially distressed firms face peculiar challenges that make forecasting their earnings challenging. Examples are meeting working capital needs and debt obligations. Larger Z-scores signify greater financial distress.

Timing of financial information flows to analysts.

Analysts get access to companies' financial information before the financial statements are formally published. This happens through their contacts with management, conference calls, press releases etc. (e.g., Brown et al., 2015). Also, analysts update their annual earnings forecasts as companies release quarterly financial information. These institutional processes underlie the choice of using contemporaneous accrual ratio as a gauge of analysts' measure of earnings quality.

[3] The balance sheet-based accrual ratio is: Accrual Ratio^{BS} = (NOA_{END} – NOA_{BEG}) / (NOA_{END} + NOA_{BEG}) / 2

The informativeness of the two earnings quality measures is tested by estimating the following models:

$$ABS\_FCSTERROR_t = \alpha + \delta_1 ACCRATIO + \delta_2 ACCRUAL\text{-}INCREASED + \delta_3 ROA + \delta_4 NUMEST + \delta_5 IOR + \delta_6 BKMKT + \delta_7 ZSCORE + \delta_7 LOSS + \varepsilon_t \quad (1)$$

$$ABS\_FCSTERROR_t = \alpha + \delta_1 DACC2 + \delta_2 ROA + \delta_3 NUMEST + \delta_4 IOR + \delta_5 BKMKT + \delta_6 ZSCORE + \delta_7 LOSS + \varepsilon_t \quad (2)$$

Next, this study decomposes earnings (ROA) into an accrual-based component (ACCRINC) and a cash component, cash flow from operations (CFO).

$$ABS\_FCSTERROR_t = \alpha + \delta_1 ACCRATIO + \delta_2 ACCRUAL\text{-}INCREASED + \delta_3 ACCRINC + \delta_4 CFO + \delta_5 NUMEST + \delta_6 IOR + \delta_7 BKMKT + \delta_8 ZSCORE + \delta_9 LOSS + \varepsilon_t \quad (3)$$

$$ABS\_FCSTERROR_t = \alpha + \delta_1 DACC2 + \delta_2 ACCRINC + \delta_3 CFO + \delta_4 NUMEST + \delta_5 IOR + \delta_6 BKMKT + \delta_7 ZSCORE + \delta_8 LOSS + \varepsilon_t \quad (4)$$

Where
ABS_FCSTERROR = Absolute value of analysts' forecast error, defined as actual EPS – mean analysts' EPS forecast for the firm for the year, scaled by ending share price for the fiscal year[4];
DACC2 = Absolute value of discretionary accrual estimated using the Modified Jones (1991) model and based on two digit industry level accrual in Dechow et al. (1995);
ACCRATIO = Accrual ratio for the firm-year estimated using cash flow numbers. Accrual $Ratio^{CF} = (NI – CFO – CFI) / (NOA_{END} + NOA_{BEG}) / 2$;
CFO = Cash flow from operations, scaled by average total assets;
ACCRINC = Accrual based income, defined as NI – CFO, scaled by average total assets;
ROA = Net income scaled by average total assets;
NUMEST = Number of forecast estimates for the company;
IOR = Percentage of the shares outstanding owned by institutional investors;
BKMKT = Book-to-market ratio;
ZSCORE = Zmijewski's Z-score.

All variables are calculated for each firm-year. All models include controls for 2-digit SIC industry codes and year fixed effects and except for the Modified Jones model discretionary accruals estimation which required some prior year variables, all variables are contemporaneous. This study does not use the performance-matched accrual measure of Kothari et al. (2005) because it can increase estimation errors as the matched firm itself could have its earnings managed (Dechow et al., 2010). This research uses absolute earnings forecast error to reduce the chances of firms with volatile forecasts appearing to have smaller forecast errors. This is important since the models are estimated cross-sectionally and individual analysts forecasts are not identifiable in the data.

[4] The forecasts are average forecasts for each firm and so there is no particular issue date. However, I/B/E/S' documentation suggests that most of the forecasts are within two quarters to more than a year removed from the year end of the fiscal year being forecasted.

Firm-years included in the model have data available for all variables and exclude financial and utility firms. Company financial data are from Compustat while returns data are from CRSP. These data are merged with analyst data from I/B/E/S. Earnings information is decomposable into an accrual and cash flow components. The final data set has 60,842 firm-year observations, spanning 1988-2014 and sixty two SIC industry codes. Customarily regulated financial and utility sector firms are excluded. The data are winsorized at the 2.5% and 97.5% levels.

4. RESULTS

Descriptive Statistics

The descriptive statistics exhibit great variability in the data. For example, the mean and standard deviation of forecast errors are -$.01 and $.05 respectively. The negative mean forecast error is consistent with the literature that analysts tend to exhibit optimism bias (e.g., Easterwood and Nutt, 1999; Lim, 2001). Scaled mean absolute forecast error and standard deviation are .02 and .06 respectively, where the scaling is done by stock price at the end of the fiscal year. Mean ROA is 0 and the standard deviation is .19, and about a third of observations (.30) represent firm-years with losses. When income is decomposed into cash flow from operations (CFO) and accrual components, the average accrual scaled by average total assets (Avg TA) is -.07 with a standard deviation of .10 while the CFO / Avg TA is .06 with a standard deviation of .15. These results are in Table 1 while the corresponding correlations are in Table 2. All the correlation coefficients are significant at the .05 level though most are quite small. Of the few larger correlations the following are more interesting and expected: LOSS and ROA (-.70), LOSS and CFO (-.54). Institutional share Ownership Ratio (IOR) and Number of EPS Estimates, (.42), and Book-to-market and Absolute value of Forecast Error (.29). As indicated in Tables 1 and 2.

Multivariate Analysis Results

Analysts' forecasts.

Analysts tend to have better forecast accuracy the more a firm earns. In other words, there is a negative association between absolute forecast error and earnings, measured by ROA. When earnings are decomposed into their cash flow (CFO / Avg TA) and accrual (Total Accrual / Avg TA) components, this negative association with absolute forecast error persists (see Table 3)[5]. This is expected as it is more difficult to forecast earnings for loss making firms (Hayn, 1995). There is a negative association between absolute analysts' earnings forecast error and the Accrual Ratio. If the accrual ratio is a measure of both managed and unmanaged earnings quality, then higher accrual ratio can imply higher quality earnings. Part of this negative association may be due to "true" earnings (i.e., unmanaged earnings) as higher earnings tend to

[5] All regressions are estimated using robust standard errors, mitigating concerns about hetrosccedasticity. Using robust standard errors means that coefficient estimates are based on White Heteroscedasticity-Consistent estimators; this makes OLS-based inferences apt (Greene 2003). All regressions are also clustered by firm to help address any issues with serial correlations.

be associated with lower forecast errors and a significant portion of most firms' earnings are accrual-based (see tables 1, 2 and 3). As indicated in Table 3, 4 and 5.

Two interpretations of the negative association between earnings forecast error and analysts' measure of earnings quality (the Accrual Ratio) are offered. As part of their work, analysts necessarily must cultivate good working relations with top managers of companies. It is possible for these relations to become "cozy". Analysts who are cozy with management are more likely to have access to better information about the firm's earnings and prospects (thus better able to evaluate the information content of accruals), resulting in lower earnings forecast errors – a "coziness" explanation. Research and media reports on analyst-manager relations tend to support this view (e.g., Brown et al., 2015, Ng and Gryta, 2017). Another explanation is that the higher a firm's accrual ratio, the more diligent analysts are in evaluating and incorporating the quality of earnings into their forecasts. This increased diligence results in more accurate forecasts and smaller forecast errors – a "diligence" explanation.

The following thought experiment suggests the explanations are reasonable. An analyst who is evaluated on earnings forecast accuracy would be motivated to exploit all avenues to get her forecasts to be as accurate as possible. That would include having a collegial relation with top management of firms she covers and being diligent about inputs to her models and the related assumptions. While she would combine these features in her work, she may, at least on occasion, err towards relying more on one feature or the other (diligence about inputs to her forecasts or relations with top management). Extended to the universe of analysts covering publicly traded firms, this would result in some support for both features.

Two approaches are used here to evaluate these potential explanations. First, this study examines if analysts evaluate firms whose accrual have increased from the prior year differently, by including the variable ACCRUAL-INCREASED, which is 1 if accruals increase from the prior year, 0 otherwise and re-estimating equations1, 2, 3 and 4. The negative relation with absolute earnings forecast errors persists (see Table 3). If analysts relied less on the earnings-related information of firms with poor earnings quality as measured by the size of their accrual, then there will be a positive association between ACCRUAL-INCREASED and ABS_FCSTERROR as analysts increased their forecast range for firms with poorer quality earnings. That the association is negative lends credence to the "coziness" explanation.

Next, the sample is demarcated into observations with optimistic analysts' earnings forecasts (Actual EPS – Forecasted EPS < 0) and those with pessimistic forecasts. Though these are imperfect gauges of coziness and diligence respectively, the rationale is that "cozy" analysts are more likely to be optimistic and diligent analysts are less likely to be optimistic (see for example, Ng and Gryta, 2017).

For the optimistic sub-sample (Table 4, Column a), the negative relation between ABS_FCSTERROR and Accrual Ratio and ACCRUAL-INCREASED respectively persists, meaning higher accrual ratios are associated with more accurate analysts' earnings forecasts. ACCRUAL-INCREASED becomes insignificant (Column c, Table 4) when income (ROA) is decomposed into its accrual and cash flow components because the accrual component of income reduces the "loading" on ACCRUAL-INCREASED. This is reasonable as the correlation between Accrual and ROA is .25 (see Table 3). Still the accrual component of income (NI-based Accrual / Avg TA) is negative and significant, continuing to support the coziness explanation for the optimistic subsample.

For the pessimistic sub-sample (Table 5, Columns a and c), the coefficient on ACCRUAL-INCREASED is positively associated with forecast errors, suggesting analysts who

don't have a cozy relationship with the firm tend to be less-informed about the content of high accrual firms, resulting in larger forecast errors

Though imperfect measures of coziness and diligence, the optimistic and pessimistic subsamples respectively, provide plausible support for both explanations. The negative coefficient on the Accrual Ratio persists in both subsamples, but it is much smaller in the pessimistic subsample[6].

The results suggest that the Accrual Ratio carries more information content about earnings quality than the Modified Jones (1991) Model discretionary accrual (Dechow et al., 1995). The insignificant effect of DACC on analysts' forecast may be attributed to analysts having already incorporated the information therein in their earnings forecasts, effect of the accrual anomaly having been largely arbitraged away by market participants or both.

Control variables.

The control variables in all the analyst forecast error regressions behave similarly. As expected, the number of analyst forecasts and the size of institutional share ownership are negatively associated with analysts' forecast error. Interestingly, Zmijewski's Z-scores are negatively related to analysts' forecast errors. This is likely because analysts pay closer attention to firms facing financial distress resulting in more diligent earnings forecasts. Though the signs are negative, the number of earnings estimates and weak financial condition (measured by Zmijewski's Z-score) are not economically significant determinants of forecast accuracy as the coefficients are close to zero in all estimates (Table 3).

The signs for loss years and book-to-market are positive, confirming that it is difficult to forecast earnings for loss-making and growing firms. The positive sign on book-to-market is also consistent with analysts trusting information about high growth firms more than those of low growth firms and also with analysts relying on market reaction to information about firms for gauges of earnings quality as opposed to solely on formal accounting measures**.** High growth firms will have low book-to-market ratios and vice versa. The positive sign on book-to-market suggests that analysts have smaller earnings forecast errors for high growth firms and larger errors for low growth firms (low growth firms will have larger book-to-market ratios). This suggests that analysts may have better information about high growth firms than low growth firms. This is reasonable to the extent that high growth firms may have greater analyst following and more information flows about them, helping improve analysts' forecasts.

Institutional share ownership is negatively associated with forecast error. This is consistent with institutional investors exerting a constraining effect through the size of their share ownership. These results are unchanged when the models for optimistic forecasts (Table 4) and pessimistic ones (Table 5) are estimated.

5. DISCUSSION AND CONCLUSION

The results provide some support for both the conceptual notions that some analysts "cozy up" to management to facilitate obtaining information that improves their earnings forecasts, though this may come at the expense of earnings quality while others are more diligent the larger a firm's prior year accrual, helping improve their earnings forecast accuracy.

[6] The correlation between accrual and income (ROA) is .25, Thus if high earnings are associated with lower forecast errors and accrual make up a significant portion of earnings, then some of the negative association between the accrual ratio and forecast errors is driven by an "unmanaged" earnings component of the Accrual Ratio.

Importantly, some analysts likely incorporate the accrual ratio into their earnings forecasts, using it as a gauge of earnings quality while others appear to rely less on it as a gauge of earnings quality.

Practically, an analyst can play both roles (be cozy with management or diligent) at different times with respect to the same firm or can be cozy with the management of one firm while diligent about her earnings forecast for another. Anecdotal and research evidences provide some support for the coziness explanation. The coziness explanation is supported by both Gu et al. (2013) and Brown et al. (2015) who find that analysts view their access to top management as the most important source of information they use in their forecasts and ultimately, stock recommendations. The view of analysts being biased toward management's viewpoint is consistent with their incentives to be more accurate in their forecasts and increase their reputations and compensations (e.g., Gu et al., 2013).

On the other hand, the Modified Jones Model discretionary accruals have close to zero association with analysts' forecast error, suggesting that the information content therein are already embedded in analysts' forecasts, for example, through learning about the accrual anomaly over time, dissipation of the accrual anomaly over time, or both.

This paper responds to recent calls for research on the context of analyst's forecasts generally and inputs to the "black box" of inputs t sell-side analysts' forecasts particularly (e.g. Brown et al., 2015), and for research that can help improve earnings forecasts (Richardson et al., 2010).

Since this study does not track specific analysts, it is possible that the same analyst can fall into the coziness and diligence explanation groups in different years for the same firm depending on the strategy for achieving earnings forecast accuracy for that firm-year. Further research that tracks analyst-specific forecast accuracy by firm temporally with respect to incorporation of the two accrual measures and tests the coziness and diligence explanations as strategies analysts use to improve their forecast accuracy can be improve understanding of an important segment of financial market participants.

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Table 1: Descriptive Statistics - Primary Variables

	Mean	1st Quartile	Median	3rd Quartile	Std. Dev.
Scaled Mean Analysts' Forecast Error	-0.01	-0.01	0.00	0.00	0.05
Scaled Mean Absolute Analysts' Forecast Error	0.02	0.00	0.00	0.01	0.06
ROA	-0.00	-0.02	0.04	0.09	0.19
Number of EPS Estimates	9.58	3.00	7.00	14.00	8.69
Inst. Share Ownership Ratio	0.52	0.29	0.54	0.75	0.28
Zmijewski's Z Score	4.60	2.01	3.37	5.60	5.14
Book-to-Market	0.57	0.26	0.46	0.74	0.47
2 Digit Discretionary Accrual ($Millions)	$-65.48	$-47.92	$-0.34	$26.60	$284.06
Absolute Discretionary Accrual ($Millions)	$149.29	$10.40	$34.06	$115.50	$308.33
Cashflow-based Accrual Ratio	0.01	-0.02	0.01	0.05	0.14
NI-based Accrual/Avg TA	-0.07	-0.10	-0.05	-0.01	0.10
CFO / Avg TA	0.06	0.02	0.09	0.14	0.15
Loss Year	0.30	0.00	0.00	1.00	0.46
Net Income ($Millions)	$94.62	$-3.63	$10.55	$68.03	$251.73
Average Total Assets ($Millions)	$2,227.73	$105.20	$372.71	$1,580.78	$4,838.68
Market Value of Equity ($Millions)	$2,231.66	$112.52	$417.97	$1,678.21	$4,498.01
Total Assets ($Millions)	$2,314.10	$109.47	$390.06	$1,653.56	$5,017.71
N	60,842				

Table 2, Correlation Matrix of Primary Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
Mean Analysts' Forecast Error, 1	1												
Mean Absolute Analysts' Forecast Error, 2	-0.83**	1											
ROA, 3	0.27**	-0.35**	1										
Number of EPS Estimates, 4	0.16**	-0.21**	0.19**	1									
Inst. Share Ownership Ratio, 5	0.23**	-0.29**	0.27**	0.42**	1								
Zmijewski's Z Score, 6	0.17**	-0.25**	0.27**	0.06**	0.07**	1							
Book-to-Market, 7	-0.25**	0.29**	-0.02**	-0.19**	-0.14**	-0.26**	1						
Discretionary Accrual, 8	-0.02**	0.04**	0.01*	-0.40**	-0.14**	0.09**	0.06**	1					
Absolute Discretionary Accrual, 9	0.04**	-0.05**	0.06**	0.41**	0.18**	-0.11**	-0.02**	-0.73**	1				
Accrual Ratio, 10	0.15**	-0.19**	0.26**	0.05**	0.06**	0.16**	-0.08**	0.07**	-0.03**	1			
Total Accrual/Avg TA, 11	0.25**	-0.27**	0.49**	-0.01	0.06**	0.19**	-0.03**	0.20**	-0.09**	0.34**	1		
CFO / Avg TA, 12	0.17**	-0.26**	0.79**	0.24**	0.28**	0.21**	-0.01**	-0.13**	0.14**	0.10**	-.08**	1	
Loss Year, 13	-0.34**	0.39**	-0.70**	-0.18**	-0.24**	-0.20**	0.13**	-0.01**	-0.05**	-0.25**	-.41**	-0.54**	1

Forecast error variables are scaled by stock price at the end of the fiscal year. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Informativeness of Measures of Accrual to |Analysts' Forecast Error|

	Model 1a	Model 1b	Model 1c	Model 1d
Intercept	0.036***	0.035***	0.033***	0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
Cashflow-based Accrual Ratio	-0.026***		-0.016***	
	(0.000)		(0.000)	
Accrual-Increased	-0.002***		-0.000	
	(0.000)		(0.946)	
ROA	-0.038***	-0.042***		
	(0.000)	(0.000)		
Number of EPS Estimates	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Inst. Share Ownership Ratio	-0.033***	-0.033***	-0.032***	-0.032***
	(0.000)	(0.000)	(0.000)	(0.000)
Zmijewski's Z Score	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Loss Year	0.029***	0.030***	0.024***	0.024***
	(0.000)	(0.000)	(0.000)	(0.000)
Book-to-Market	0.023***	0.023***	0.024***	0.024***
	(0.000)	(0.000)	(0.000)	(0.000)
Absolute Discretionary Accrual		0.000**		0.000
		(0.032)		(0.528)
NI-based Accrual/Avg TA			-0.100***	-0.107***
			(0.000)	(0.000)
CFO / Avg TA			-0.045***	-0.046***
			(0.000)	(0.000)
Sector and Year Fixed-Effects	Yes	Yes	Yes	Yes
N	60842	60842	60842	60842
Adj R-squared	0.287	0.283	0.299	0.298

p-values in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Informativeness of Measures of Accrual to Optimistic Analysts' Forecast Errors

	Model 1a	Model 1b	Model 1c	Model 1d
Intercept	0.045***	0.042***	0.041***	0.040***
	(0.000)	(0.000)	(0.000)	(0.000)
Cashflow-based Accrual Ratio	-0.042***		-0.025***	
	(0.000)		(0.000)	
Accrual-Increased	-0.004***		-0.001	
	(0.000)		(0.281)	
ROA	-0.052***	-0.058***		
	(0.000)	(0.000)		
Number of EPS Estimates	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Inst. Share Ownership Ratio	-0.043***	-0.043***	-0.042***	-0.042***
	(0.000)	(0.000)	(0.000)	(0.000)
Zmijewski's Z Score	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Loss Year	0.035***	0.036***	0.029***	0.030***
	(0.000)	(0.000)	(0.000)	(0.000)
Book-to-Market	0.027***	0.027***	0.028***	0.028***
	(0.000)	(0.000)	(0.000)	(0.000)
Absolute Discretionary Accrual		0.000***		0.000*
		(0.000)		(0.063)
NI-based Accrual/Avg TA			-0.137***	-0.148***
			(0.000)	(0.000)
CFO / Avg TA			-0.050***	-0.052***
			(0.000)	(0.000)
Sector and Year Fixed-Effects	Yes	Yes	Yes	Yes
N	29999	29999	29999	29999
Adj R-squared	0.338	0.332	0.355	0.354

p-values in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Informativeness of Measures of Accrual to Pessimistic Analysts' Forecast Errors

	Model 1a	Model 1b	Model 1c	Model 1d
Intercept	0.024***	0.025***	0.025***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
Cashflow-based Accrual Ratio	-0.011***		-0.011***	
	(0.000)		(0.000)	
Accrual-Increased	0.002***		0.001***	
	(0.000)		(0.001)	
ROA	-0.025***	-0.026***		
	(0.000)	(0.000)		
Number of EPS Estimates	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Inst. Share Ownership Ratio	-0.021***	-0.021***	-0.020***	-0.020***
	(0.000)	(0.000)	(0.000)	(0.000)
Zmijewski's Z Score	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Loss Year	0.009***	0.010***	0.007***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)
Book-to-Market	0.011***	0.011***	0.012***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
Absolute Discretionary Accrual		-0.000**		-0.000*
		(0.012)		(0.074)
NI-based Accrual/Avg TA			-0.029***	-0.032***
			(0.000)	(0.000)
CFO / Avg TA			-0.041***	-0.041***
			(0.000)	(0.000)
Sector and Year Fixed-Effects	Yes	Yes	Yes	Yes
N	30843	30843	30843	30843
Adj R-squared	0.175	0.174	0.181	0.180

p-values in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX

1. The Accrual Ratio measure is calculated as follows:
Total Operating Assets = Total Assets – Cash – Marketable Securities – Cash Equivalents
Total Operating Liabilities = Total Liabilities – Long Term Debt – Short Term Debt
Net Operating Assets = Total Operating Assets – Total Operating Liabilities
Total Accrual^{CF} = Net Income – Cash Flow from Operations – Cash Flow from Investing Activities
Total Accrual^{BS} = Net Operating Assets$_t$ – Net Operating Assets$_{t-1}$

Accrual Ratio^{CF} = $$Accrual\ Ratio^{CF} = \frac{Total\ Accrual^{CF}}{(NOA_{END} + NOA_{BEG})\ /\ 2}$$

$$Accrual\ Ratio^{BS} = \frac{Total\ Accrual^{CF}}{(NOA_{END} + NOA_{BEG})/2}$$

Where
NOA_{END} and NOA_{BEG} are ending and beginning Net Operating Assets respectively,
Total Accrual^{CF} is Total Accrual calculated from the Statement of Cash Flow,
Total Accrual^{BS} is Total Accrual calculated from the Balance Sheet,
The Statement of Cash Flow based Accrual Ratio is used.
2. Discretionary Accrual are derived by estimating the following model (Dechow et al. 1995)

$$TACC_t = \alpha/TA_{t-1} + \beta_1(\Delta REV_t - \Delta REC_t) + \beta_2 PPE_t + \varepsilon_t$$

Where
TA_{t-1} = Total Assets in year t-1
$TACC_t$ = Total Accrual for year t, which is Net Income – Cash Flow from Operations, scaled by TA_{t-1}
ΔREV_t = Change in Revenue between year t and year t-1, scaled by TA_{t-1}
ΔREC_t = Change in Accounts Receivables between year t and year t-1, scaled by TA_{t-1}
The residuals from the regression model are the measure of discretionary accrual. This study requires there to be at least nine firms per two-digit SIC industry.

Richardson, Tuna and Wysocki, 2010

The questionnaire attempts to capture the important opinions of the creators and users of research on accounting anomalies and fundamental analysis. The findings suggest that many of the conventions and techniques used in academic research differ from those in the investment community.

Both the practitioners and academics who completed the opinion survey placed high importance to future academic research on: (i) empirical tests of investor behavior; (ii) empirical tests of asset pricing, risk and factor models; (iii) empirical research on forecasting firm and industry fundamentals; and (iv) empirical discovery and investigation or new "anomalies" or signals.

The empirical analysis shows that the negative relation between accruals and future stock returns has greatly attenuated over time.