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Earnings Attributes that Contribute to Analyst Forecasting Errors: Empirical Evidence from Korea

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Abstract

Analysts' forecasts are important for providing useful guidance to investors, especially individual or small investors, and therefore it becomes critical to identify the elements which can potentially increase errors in analysts' forecasts. This study investigates potential factors which can lead to errors in forecasting by analysts, specifically in terms of the level and attributes of corporate earnings. Utilizing a sample of firms listed on the Korean stock markets, this study provides evidence that firms with more volatile and unpredictable earnings feature less accurate analyst forecasts. This study fills a void in the literature by conducting empirical tests for earnings attributes in terms of volatility and unpredictability that could potentially undermine the forecast accuracy. The negative association between the quality of earnings and forecast accuracy is more pronounced for firms with negative net income values. Additional analysis demonstrates that forecast accuracy is significantly lower for the fourth quarter than for other fiscal quarters and that fourth quarter earnings tend to be more volatile and unpredictable. This study contributes to the literature by providing new empirical evidence regarding the comprehensive effects of earnings quality and level on analysts' forecasting accuracy and further suggests potential factors contributing to the fourth quarter anomaly in analyst forecasts in terms of earnings attributes.

Keywords: Analyst Forecasts, Earnings Volatility, Earnings Predictability, Forecast Accuracy, Earnings Level

JEL Classification Code: H20, G14, M40, M41

1. Introduction

It is a well-known fact that accounting and financial experts can make contributions in reducing information asymmetry (Ryu & Chae, 2020). Particularly, analysts who collect various financial information to estimate earnings and provide investment recommendations play an important role in markets (Schipper, 1991). They gather a large scope of information on business entities such as firms, industries, and even entire economies to produce earnings forecasts. Considering the great demand for analysts' earnings forecasts in financial markets, many researchers are interested in investigating analysts' forecasting characteristics and their decision-making processes. Specifically, the literature focuses on forecast accuracy (i.e., the absolute difference between an analyst's forecast and actual earnings) and bias (i.e., the net difference between the forecast in excess of actual earnings). Forecast accuracy is one of the most important factors for assessing an analyst's performance (Gu & Wu, 2003). For example, more accurate forecasts are positively associated with greater stock price movements (Jackson, 2005). In addition, more accurate analysts receive more recognition (Stickel, 1992) and better career opportunities in their professional milieu (e.g., Hong & Kubik, 2003).

In spite of the many previous studies on analysts' earnings forecasts, relatively little attention has been given to the representative qualities of earnings that might affect forecast accuracy. Some researchers suppose that certain specific accounting items including intangibles, goodwill impairment, and restructuring charges might complicate the task of forecasting and thus increase errors (Barron et al. 2002; Chaney et al., 1999; Chen et al., 2015), and earnings

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quality could be related to forecast accuracy (Nam, 2019). However, whether or not the variability and predictability of earnings is directly associated with forecasting difficulty and ultimately accuracy is still uncertain.

Analysts' forecasts are important for providing useful guidance to investors, especially individual or small investors who might possibly be misled by inaccurate or systematically biased forecasts (Jackson, 2005). Thus, it is critical to identify the contributing elements which can potentially increase forecasting errors and present policy measures to encourage improvements. This study fills a void in the literature by conducting empirical tests for earnings attributes in terms of volatility and unpredictability that could potentially undermine the forecast accuracy. Further, earnings predictability and forecasting difficulty are known to be affected by the level of earnings, especially when the earnings are negative (Basu et al., 2005). Taking the above into consideration, this study examines whether the association between earnings attributes and forecast accuracy is mediated by a firm's losses.

The test results are summarized as follows. It was observed that analysts' forecast errors increase in quarterly earnings volatility and that it is positively associated with earnings unpredictability, which can be measured using management's estimation errors. In the second series of regressions, the indicator for financial losses shows a positive association with analyst forecast error independently and further has a positive interaction with earnings volatility and unpredictability to increase forecast error. To summarize, the empirical findings support that the attributes of earnings, such as volatility, decrease forecast accuracy and that the negative effect is more pronounced when the earnings level is significantly low. As a supplemental analysis, this study also tested for any extraordinary patterns in analysts' forecasting across fiscal quarters and the potential contributing factors to such an anomaly. The additional test results demonstrate that forecasting error are significantly higher in the fourth quarter than in other fiscal quarters. In addition, various factors including earnings volatility, earnings level, and forecast horizon for the fourth quarter are significantly distinguished from the others in such a way that they consistently increase analysts' forecasting error in the fourth quarter.

This study contributes to the literature in several ways. First, it adds new empirical evidence on the earnings attributes that affect analysts' forecasting accuracy. This study also provides new findings that the variances in earnings might increase the difficulty of, and therefore promote more errors in, forecasting future earnings. Moreover, this study shows that the quality and level of earnings each have an interacting effect on the forecast accuracy. Therefore, these findings might help researchers and policymakers to further explore measures to enhance the quality of analysts' forecasts. Further, this study confirms the existence of increased errors in forecasts for the fourth quarter, which is closely associated with systematic differences in the level and attributes of earnings between fiscal quarters. The findings also suggest practical implications for policymakers and investors, highlighting that users of analysts' reports should be more prudent in reviewing such forecasts for the fourth quarter and for loss-making firms.

The rest of this paper is organized as follows. Section 2 presents the research hypotheses and the related theories together with the literature review; Section 3 provides an explanation of the data and the sample construction; Section 4 describes the research methodology; and Sections 5 and 6 provide the empirical results and additional analysis. Finally, Section 7 presents the conclusion.

2. Literature Review and Hypotheses

Previous researches have examined various aspects of information quality that might potentially affect an analyst's behavior and ultimately the accuracy of his or her earnings forecasts. Researchers have reported that the availability of new information is positively associated with the forecast accuracy (e.g., Bowen et al., 2002; Dhaliwal et al., 2012; Hope, 2003). For example, selective disclosure of information, such as conference calls, improves analysts' forecast accuracy and reduces the forecast volatility (Bowen et al., 2002). Furthermore, the quality of corporate disclosure and financial information is an important factor that affects analysts' earnings forecasts (Barron et al., 1998; Lang & Lundholm, 1996; Lehavy et al., 2011; Oh & Ki, 2020). Lang and Lundholm (1996) reported that variations between analysts' forecasts decreases as annual report quality improves and analysts' forecast accuracy increases with the quality of corporate investor communications. Barron et al. (1999) discovered that the quality of corporate communications via management discussion and analysis disclosures is positively related to higher analyst forecast accuracy and lower forecast dispersion. Moreover, many researchers have suggested that the complexity of information and difficulty of earnings prediction deteriorates analysts' earnings forecasting accuracy. The accuracy of analysts' forecasts declines with restructuring charges (Chaney et al., 1999), higher levels of intangible assets (Barron et al., 2002), and goodwill impairment (Chen et al., 2015). Haw et al. (1994) found that forecast accuracy decreases after mergers and Duru and Reeb (2002) suggested that the international corporate diversification is positively associated with forecasting complexity and negatively with the forecast accuracy. Further, analysts' decision-making is known to be affected by the attributes of financial information, including financial account classification, accounting method, and recognition or disclosure choice (Hirst et al., 2004; Hopkins, 1996; Hopkins et al., 2000).

In spite of the previous studies on analyst forecast accuracy, relatively little attention has been paid to the attributes of the earnings subject to forecast. Researchers have examined certain elements of earnings that might lower analyst forecast accuracy; for example, intangible assets and goodwill impairment (Barron et al., 2002; Chen et al., 2015) and restructuring charges (Chaney et al., 1999). Others have determined that fair value measurement is positively associated with analyst forecast accuracy (Ayres et al., 2017; Magnan et al., 2015). The underlying idea of previous studies is that some features of earnings are likely to make analysts' forecasting more difficult. Although this hypothesis is reasonable, previous research has been limited in that specific earnings components do not represent all of the attributes of earnings and, thus, research outcomes might be misinterpreted due to the small range of extraordinary accounting items. Therefore, a more reliable approach would be to investigate the representative properties of the entirety of earnings (i.e., each line item) that could influence analysts' forecasting difficulty and, accordingly, their accuracy.

In this regard, earnings predictability should, theoretically, be a direct indicator of forecasting difficulty since less predictable earnings presumably makes analysts' ability to forecast future earnings more difficult (Das et al., 1998; Kross et al., 1990). However, the results of the empirical testing are mixed. Das et al. (1998) posited that low earnings predictability is positively associated with analyst forecasting optimism, while Eames and Glover (2003) found no significant association between earnings predictability and forecasting errors when they controlled the earnings level. In addition, earnings volatility is closely related to earnings predictability. Dichev and Tang (2009) posited that economic shocks might increase earnings volatility, making earnings less predictable, and that earnings volatility might possibly be linked to earnings unpredictability via accounting factors such as revenue-expense matching, earnings management, and accrual quality. High earnings volatility and low earnings predictability increases the difficulty of analysts' earnings forecasts and therefore lowers their accuracy. Accordingly, this study provides the following hypotheses:

H1: *The accuracy of analysts' forecasts is negatively associated with the earnings volatility and unpredictability.*

Additionally, previous research suggests that the quality of financial information is closely related to the corporate profitability or firm value (Rahman & Hasan, 2019; Dang et al., 2020), and has reported that the level of earnings is associated with the earnings predictability and analyst forecasting errors. For example, forecasting errors are negatively associated with the earning levels (Brown, 2001; Eames et al., 2002; Eames & Glover, 2003). Eames and Glover (2003) suggested that the earnings predictability is substantially reduced as earning levels deviate from their median values. Specifically, lower levels of earnings might reflect unexpected negative economic shocks or big bath of earnings, which can decrease earnings predictability and increase analysts' forecasting errors (Abarbanell & Lehavy, 2003). In this regard, Basu et al. (2005) argued that losses make earnings more variable and, accordingly, decrease earnings predictability, and presented supporting evidence that analysts' forecast errors are more pronounced for loss-making firms. It should be expected that a firm's loss status and its level of earnings have a positive mediating effect on the association between earnings volatility and unpredictability and the accuracy of analysts' forecasts. Therefore, the second hypothesis of this study is set forth as follows:

H2: *The negative association of earnings volatility and unpredictability with analysts' forecasting accuracy is more pronounced for firms reporting losses.*

3. Research Design

With respect to the empirical models, the main variables are defined as follows. First, analysts' forecasting error is measured by the absolute value of the difference between analysts' forecasts of net income and realized net income, which is scaled by equity market value as of the beginning of the quarter and denoted as ForErr. As for the independent variables, VOL_E indicates the volatility of net income for the most recent eight quarters, as deflated by lagged equity market value. UNP_E denotes earnings unpredictability, which is captured by the absolute value of the difference between a firm's preliminary announcement of net income and final net income, as scaled by lagged equity market value. UNP_E indicates the estimation error made by a firm manager who supposedly has all available internal information for earnings prediction and can therefore be used as an objective proxy for earnings unpredictability. Furthermore, *Loss* is an indicator variable that equals one if net income for the subject quarter is negative and zero otherwise.

Regarding H1, which relates the accuracy of analysts' forecasts and earnings attributes, ForErr is regressed on earnings volatility and unpredictability, VOL_E and UNP_E, respectively and collectively, as provided in Equation (1).

$$\begin{aligned}\text{ForErr} = {} & \beta_0 + \beta_1\text{VOL\_E} + \beta_2\text{UNP\_E} + \beta_3\text{SIZE} + \\ & \beta_4\text{LEW} + \beta_5\text{MTB} + \beta_6\text{Follow} + \beta_7\text{Horizon} + \\ & \beta_8\text{BIG}_4 + \beta_9\text{TraVol} + \beta_{10}\text{MajorSH} + \beta_{11}\text{ForSH} \\ & + \Sigma\beta_m\text{YEAR} + \Sigma\beta_n\text{IND} + \varepsilon \qquad (1)\end{aligned}$$

To further test for the mediating effects of a firm's loss-making financial status with respect to H2, the dummy variable, Loss, which indicates firms that have a negative net income for the subject fiscal quarter, is interacted with VOL_E and UNP_E, as shown in Equation (2).

$$\begin{aligned}\text{ForErr} = {} & \beta_0 + \beta_1\text{VOL\_E} + \beta_2\text{UNP\_E} + \beta_3\text{Loss} + \\ & \beta_4\text{Loss} \times \text{VOL\_E} + \beta_5\text{Loss} \times \text{UNP\_E} + \\ & \beta_6\text{SIZE} + \beta_7\text{LEW} + \beta_8\text{MTB} + \beta_9\text{Follow} + \\ & \beta_{10}\text{Horizon} + \beta_{11}BIG_4 + \beta_{12}\text{TraVol} + \\ & \beta_{13}\text{MajorSH} + \beta_{14}\text{ForSH} + \Sigma\beta_m\text{YEAR} + \\ & \Sigma\beta_n\text{IND} + \varepsilon \end{aligned} \quad (2)$$

The above equations control for firm characteristics that are known to be potentially associated with the analyst behavior and forecasting accuracy. Size is the log-transformed value of total assets as of quarter-end, which is known to have an impact on analysts' forecasts (Chen et al., 2015; Lehavy et al., 2011). LEV represents financial leverage, which potentially affect forecasting accuracy (Ayres et al., 2017). MTB indicates market-to-book ratio as of quarter-end and controls for the effect of firm growth potential. Follow captures the number of analysts following the subject firm. Another factor that might affect analysts' forecasting patterns is the timing of their forecasts. It is well-known that new and additional information is provided to analysts as the earnings announcement date approaches and therefore more recent forecasts are likely to be more accurate, all else being equal (Lys & Soo, 1995). Taking this into consideration, the equation controls for the forecast horizon, i.e., the time span between the average timing of analysts' forecasts for the subject firm's quarter to the timing of the earnings announcement, which is reconstructed into annual units and denoted as Horizon. Big4 is an indicator of firms that hire one of the big four accounting firms as their financial auditor and TraVol represents the volume of stock trading for the fiscal quarter as deflated by the number of outstanding shares. Additionally, to control for corporate ownership structure, the shareholding ratios of major shareholders (MajorSH) and foreigners (ForSH) are included. To mitigate any bias from extreme observations, all continuous variables are winsorized at the upper and lower by 1% and standard errors are firm-clustered (Petersen, 2009) for all regressions.

4. Data and Sample

The sample pool is comprised of all firm-quarters between 2011 and 2018 for firms listed on the Korean stock trading markets, including the Korea Composite Stock Price Index ("KOSPI") and Korea Securities Dealers Association Automated Quotation ("KOSDAQ"). Korea has a well-developed financial markets where various large-sized, global firms have been listed and accordingly substantial number of financial analysts follow. Accordingly, Korean sample firms are suitable to investigate the dynamics of financial information and analysts' activities especially in the Asian region. The testing period begins in 2011, which is when International Financial Reporting Standards were adopted in Korea, changing the accounting information environment drastically including fair value accounting, consolidated reporting financial reporting timing, and accounting conservatism (Noh & Kim, 2015). Thus, the sample in this study comprises the financial information on or after 2011 to maintain consistency in accounting environment. Accounting and financial data, including analysts' forecasts, are gathered from commercial databases including Dataguide Pro of the FNGuide and data on earnings announcement dates are obtained from Korea Investor's Network for Disclosure System. Further, the sample data is based on quarterly reports considering that quarterly financial reporting can provide more timely information to the market and financial analysts' forecasts are made usually on a quarterly basis. The sample firm-quarters were required to have analysts' forecasting consensus data and to exclude firms with non-December year-end dates and those without analyst followings for the interim quarters. Furthermore, observations with missing values and firms in an extreme financial status (e.g., firms for which total debts were greater than total assets) were excluded to mitigate potential bias from outlying observations. Consequently, the final sample was comprised of 4,934 firm-quarters.

5. Empirical Results

5.1. Descriptive Statistics and Correlations

Table 1 shows the descriptive statistics of the variables employed in the empirical tests. VOL_E and UNP_E are non-negative by construction since they are measured as absolute values. VOL_E has a mean value of 0.023 and a median value of 0.012, which means that earnings volatility is, on average, approximately 2.3% of the market value of equity as on the beginning of the quarter. The mean value of UNP_E is 0.001, or 0.1% of the lagged market value of equity. ForErr has a mean (median) value of 0.013 (0.005), which is substantially greater in comparison to firm managers' estimation error, UNP_E. The portion of firm-quarters with financial losses (Loss) is 15.8% on average and the financial leverage (LEV) of sample firms is moderately distributed around the mean (median) value of 0.434 (0.437). As for the other control variables, market-to-book ratio (MTB) exceeds one on an average, as expected, and firm-quarters have, on an average, follow about eight to nine analysts (Follow). The forecast horizon is, on an average, approximately 0.064 years (or 23 days) before a firm's earnings announcement. In addition, the majority of sample firms hire one of the big four auditors (the mean value of BIG4 = 0.876) and the average foreign shareholding ratio (ForSH) and majority shareholding ratio (MajorSH) are both below 0.5.

Table 2 presents a univariate correlation matrix (i.e., Pearson and Spearman) for the sample observations. ForErr is positively correlated with both VOL_E and UNP_E. Loss shows a positive correlation with not only ForErr but also

Table 1: Descriptive Statistics (*N* = 4,934)

Variables	Mean	STD.	5%	25%	Median	75%	95%
ForErr	0.013	0.024	0.000	0.002	0.005	0.013	0.050
VOL_E	0.023	0.035	0.002	0.006	0.012	0.023	0.085
UNP_E	0.001	0.003	0.000	0.000	0.000	0.000	0.002
Loss	0.158	0.365	0.000	0.000	0.000	0.000	1.000
SIZE	21.584	1.912	18.595	20.056	21.589	22.964	24.673
LEV	0.434	0.220	0.095	0.248	0.437	0.588	0.853
MTB	1.883	1.639	0.472	0.826	1.353	2.258	5.486
Follow	9.026	6.831	1.000	3.000	8.000	14.000	22.000
Horizon	0.064	0.120	0.003	0.011	0.025	0.058	0.252
BIG4	0.876	0.329	0.000	1.000	1.000	1.000	1.000
TraVoL	0.290	0.403	0.002	0.007	0.172	0.376	1.077
MajorSH	0.383	0.153	0.113	0.276	0.369	0.480	0.658
ForSH	0.212	0.164	0.019	0.092	0.168	0.286	0.545

Note: This table presents descriptive statistics of the variables used for the empirical tests. Definition of each variable is provided in the Appendix.

Table 2: Pearson/Spearman Correlation Matrix (*N* = 4,934)

Variables	VOL_E	UNP_E	ForErr	Loss	SIZE	LEV	MTB	Follow	Horizon	BIG4	TraVoL
VOL_E		0.192	0.530	0.266	0.156	0.281	−0.277	−0.092	0.143	0.058	0.008*
UNP_E	0.093		0.306	0.141	0.000*	0.092	−0.052	−0.054	0.063	0.004*	0.035
ForErr	0.547	0.162		0.455	0.056	0.210	−0.203	−0.111	0.196	0.008*	0.012*
Loss	0.333	0.106	0.440		0.017*	0.167	−0.129	−0.058	0.085	−0.016*	0.046
SIZE	0.261	−0.388	0.056	0.027*		0.438	−0.403	0.582	−0.316	0.442	−0.325
LEV	0.377	−0.047	0.231	0.179	0.403		−0.175	0.036	−0.050	0.137	−0.121
MTB	−0.594	0.045	−0.365	−0.161	−0.527	−0.269		−0.009*	−0.048	−0.196	0.206
Follow	−0.053	−0.328	−0.144	−0.063	0.621	0.080	−0.040		−0.418	0.285	−0.077
Horizon	0.037	0.235	0.155	0.090	−0.444	−0.091	0.020*	−0.641		−0.172	0.032
BIG4	0.082	−0.202	0.012*	−0.016*	0.448	0.136	−0.214	0.318	−0.230		−0.187
TraVoL	0.056	0.087	0.052	0.061	−0.241	−0.091	0.224	0.008*	−0.035	−0.110	

Note: This table provides the Pearson/Spearman correlations among the test variables. The Pearson and Spearman correlation coefficients are displayed in the upper and the lower diagonals, respectively. * indicates a statistically insignificant correlation below the 5% level. Definitions of variables are provided in the Appendix.

with earnings volatility and unpredictability, VOL_E and UNP_E, respectively. Firm size is correlated with many other variables in general; analyst following is apparently negatively correlated with earnings volatility and analyst forecast error.

5.2. Regression Results

Table 3 details the result of regressions for H1, employing Equation (1). Columns (1) and (2) show VOL_E and UNP_E as independent variables and Column (3) includes both variables simultaneously. Column (1) in Table 3 shows that the coefficient estimate of VOL_E is positive (0.3158) and strongly significant from a statistical point of view (p-value < 0.001). Likewise, Column (2) indicates that the coefficient of UNP_E has a positive sign (2.4197) and is statistically significant at the 1% level. In Column (3), the variables for earnings volatility and unpredictability are listed and the coefficient estimates of VOL_E (coef. = 0.2943) and

Table 3: Relationship between the Accuracy of Analyst's Forecast and Earnings Volatility and Unpredictability

Independent Variables	(1) Dependent Variable = ForErr		(2) Dependent Variable = ForErr		(3) Dependent Variable = ForErr	
	Coefficient	*t*-stat.	Coefficient	*t*-stat.	Coefficient	*t*-stat.
Intercept	0.0059	0.71	−0.0195	−1.63	0.0033	0.43
VOL_E	0.3158	11.26***			0.2943	11.24***
UNP_E			2.4197	6.84***	1.9176	7.14***
SIZE	0.0000	−0.05	0.0015	2.61***	0.0000	0.14
LEV	0.0089	4.16***	0.0145	5.08***	0.0079	4.06***
MTB	−0.0010	−5.39***	−0.0020	−6.54***	−0.0009	−5.57***
Follow	−0.0001	−1.47	−0.0003	−2.93***	−0.0001	−1.33
Horizon	0.0225	4.89***	0.0313	5.23***	0.0215	4.81***
BIG4	0.0001	0.06	0.0004	0.28	−0.0001	−0.10
TraVoL	−0.0002	−0.21	0.0018	1.38	−0.0005	−0.49
MajorSH	−0.0059	−2.37**	−0.0089	−2.85***	−0.0046	−1.98**
ForSH	−0.0040	−1.72*	−0.0120	−3.49***	−0.0030	−1.31
Fixed effect	Year, Industry		Year, Industry		Year, Industry	
Adj. R^2	0.348		0.208		0.421	
Observations	4,934		4,934		4,934	

Note: This table presents the regression results for the association between analysts' forecast and the volatility and unpredictability of earnings. Column (1) and (2) use earnings volatility and unpredictability, individually, as the main explanatory variable, while Column (3) include both the explanatory variables collectively. The continuous variables are winsorized at the 1% and 99% levels of their respective distribution. The regressions include year and industry fixed effects and the standard errors are firm-clustered. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Definitions of variables are provided in the Appendix.

UNP_E (coef. = 1.9176) are both positive and statistically significant. The above results suggest that higher the earnings volatility and unpredictability leads to more errors in analysts' forecasts, which is consistent with H1. In regard to the other control variables, LEV shows a positive association with the forecast error consistently across regressions, supporting the notion that financial leverage makes earnings attributable to shareholders more volatile and therefore more difficult to predict. Furthermore, Horizon has positive coefficient estimates in the regressions as expected, which confirms previous research that recent forecasts are relatively more accurate than the older ones.

Table 4 provides test results for H2 regarding the mediating effect of Loss on earnings volatility and unpredictability. In Column (1), wherein Loss is interacted with VOL_E, the coefficient for Loss is positive (0.0135), suggesting that forecast error is higher when a firm is in a loss status in the absence of the effect of VOL_E. Meanwhile, the coefficient estimate of Loss × VOL_E is also positive (0.2084) and statistically significant at a 1% level. This suggests that the negative association between earnings volatility and forecast accuracy is more pronounced when a firm experiences a net loss for the subject quarter. Similarly, Column (2) shows that the coefficient of Loss is positive (1.5364) and that the coefficient estimate of Loss × UNP_E is also positive (0.0230). Further, in a comprehensive test using both VOL_E and UNP_E, as shown in Column (3), the coefficient estimates for Loss × VOL_E and Loss × UNP_E are both positive and statistically significant. Taken together, the results support H2, indicating that the positive association between analyst forecast error and earnings volatility and predictability is strengthened in a loss-making firm.

6. Additional Analysis

Provided that analyst forecast accuracy is closely related to the quality and level of earnings as posited above, this additional analysis examines whether there exist systematic differences in the earnings attributes and forecast environments between fiscal quarters. In this regard, Collins et al. (1984) found that analysts' earnings forecasts were relatively less accurate for the fourth quarter than for other fiscal quarters. Basu et al. (2005) also identified the same phenomenon and attributed it to auditors' legal

Table 4: Effect of Financial Loss Status on the Association between the Accuracy of Analyst's Forecast and Earnings Volatility and Unpredictability

Independent Variables	(1) Dependent Variable = ForErr		(2) Dependent Variable = ForErr		(3) Dependent Variable = ForErr	
	Coefficient	*t*-stat.	Coefficient	*t*-stat.	Coefficient	*t*-stat.
Intercept	0.0032	0.42	−0.0220	−2.00**	0.0015	0.21
VOL_E	0.1998	6.49***			0.1886	6.36***
UNP_E			1.5364	4.94***	1.2657	4.97***
Loss	0.0135	6.89***	0.0230	12.98***	0.0122	6.73***
Loss*VOL_E	0.2084	3.23***			0.1951	3.15***
Loss*UNP_E			1.1211	2.32**	0.8648	2.11**
SIZE	0.0001	0.21	0.0014	2.72***	0.0001	0.36
LEV	0.0051	2.38**	0.0083	3.38***	0.0045	2.30**
MTB	−0.0008	−4.56***	−0.0014	−5.70***	−0.0008	−4.77***
Follow	−0.0001	−1.30	−0.0003	−2.63***	−0.0001	−1.17
Horizon	0.0194	5.00***	0.0279	5.41***	0.0189	5.06***
BIG4	0.0006	0.54	0.0011	0.87	0.0005	0.48
TraVoL	−0.0004	−0.35	0.0011	0.85	−0.0006	−0.55
MajorSH	−0.0063	−2.36**	−0.0081	−2.85***	−0.0052	−2.09**
ForSH	−0.0026	−1.05	−0.0090	−2.73***	−0.0018	−0.75
Fixed effect	Year, Industry		Year, Industry		Year, Industry	
Adj. R^2	0.421		0.334		0.452	
Observations	4,934		4,934		4,934	

Note: This table reports the results of regression tests for the mediating effect of financial loss status on the association between the analyst forecast's accuracy and the earnings attributes. Column (1) and (2) use earnings volatility and unpredictability, individually, as explanatory variable, while Column (3) include both the explanatory variables collectively. The continuous variables are winsorized at the 1% and 99% levels of their respective distribution. The regressions include year and industry fixed effects and the standard errors are firm-clustered. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Definitions of variables are provided in the Appendix.

liability, which leads them to make conservative decisions on earnings compared with earlier quarters. To confirm with the existence of idiosyncrasy in analysts' forecasts for the fourth quarter, the following regression model is adopted.

$$\begin{aligned} \text{ForErr} = {} & \beta_0 + \beta_1 Q_4 + \beta_2 \text{SIZE} + \beta_3 \text{LEW} + \\ & \beta_4 \text{MTB} + \beta_5 \text{Follow} + \beta_6 \text{BIG}_4 + \\ & \beta_7 \text{TraVol} + \beta_8 \text{MajorSH} + \beta_9 \text{ForSH} + \\ & \Sigma\beta_m \text{ YEAR} + \Sigma\beta_n \text{IND} + \varepsilon \end{aligned} \quad (3)$$

If analysts' earnings forecasts show a certain pattern in any specific fiscal quarter, one potential factor could be differences in accounting complexity between quarters. For example, a substantial volume of accounting adjustments can be made over the course of closing books, including accruals and tax expenses for the final quarter. In addition, auditors can make further revisions on final earnings, which increases earnings complexity. As a result, it is possible that the earnings for the fourth quarter are more volatile and unpredictable in comparison with other quarters. Another reason could be that loss-making firms are more frequently observed in the fourth quarter than the other quarters, which causes forecasts for that quarter to be less accurate. Further, it might take more time to determine fourth quarter earnings, considering that closing annual financial figures require complicated procedures such as yearly tax returns and audit processes. Therefore, it is likely that final earnings may be completed relatively long after analysts' forecasts have been made for the fourth quarter. This leads to a longer forecast horizon for the final quarter, which, in turn, might have a negative impact on the accuracy of the forecast. In this connection, potential contributors to the idiosyncratic patterns in earnings forecasts are regressed on

Table 5: Test for the Idiosyncrasy in Analysts' Forecasts for the Fourth Quarter and the Potential Contributing Factors

Panel A. Test for Idiosyncrasy in Analyst's Forecast Accuracy for the Fourth Quarter		
Independent Variables	**Model 1: Dependent Variable = ForErr**	
	Coefficient	***t*-stat.**
Intercept	−0.0150	−1.10
Q4	0.0117	10.38***
SIZE	0.0013	2.01**
LEV	0.0160	4.89***
MTB	−0.0023	−6.89***
Follow	−0.0006	−4.27***
BIG4	0.0003	0.18
TraVoL	0.0034	2.39**
MajorSH	−0.0092	−2.60***
ForSH	−0.0139	3.53***
Fixed effect	Year, Industry	
Adj. R^2	0.170	
Observations	4,934	

Panel B. Test for Idiosyncrasy in Volatility and Unpredictability of Earnings for the Fourth Quarter				
Independent Variables	**Model 1: Dependent Variable = VOL_E**		**Model 2: Dependent Variable = UNP_E**	
	Coefficient	***t*-stat.**	**Coefficient**	***t*-stat.**
Intercept	−0.0658	−2.30**	0.0001	0.11
Q4	0.0023	3.02***	0.0010	8.02***
SIZE	0.0045	3.41***	0.0000	0.40
LEV	0.0238	3.26***	0.0007	2.26**
MTB	−0.0039	−5.32***	−0.0001	−1.96*
Follow	−0.0010	−4.20***	0.0000	−2.13**
BIG4	0.0015	0.40	0.0001	0.69
TraVoL	0.0082	2.65***	0.0003	1.66*
MajorSH	−0.0153	−1.63	−0.0007	−2.49**
ForSH	−0.0327	−3.87***	−0.0009	−2.79***
Fixed effect	Year, Industry		Year, Industry	
Adj.R^2	0.225		0.057	
Observations	4,934		4,934	

Panel C. Test for Idiosyncrasy in Loss Status and Forecast Horizon for the Fourth Quarter				
Independent Variables	**Model 1: Dependent Variable = Loss**		**Model 2: Dependent Variable = Horizon**	
	Coefficient	***t*-stat.**	**Coefficient**	***t*-stat.**
Intercept	0.0488	0.28	0.3495	5.39***
Q4	0.2024	13.38***	0.0029	0.88

Table 5: Continued

SIZE	0.0026	0.28	−0.0114	−3.68***
LEV	0.2656	4.86***	0.0066	0.34
MTB	−0.0275	−5.25***	−0.0083	−4.13***
Follow	−0.0028	−1.44	−0.0053	−8.75***
BIG4	−0.0265	−0.96	−0.0121	−0.96
TraVoL	0.0574	2.33**	−0.0092	−1.03
MajorSH	−0.0279	−0.34	0.0167	0.61
ForSH	−0.1272	−1.16	−0.0151	−0.63
Fixed effect	Year, Industry		Year, Industry	
Adj. R^2	0.136		0.201	
Observations	4,934		4,934	

Note: This table provides the results of additional tests for difference in analyst's forecast behaviors and earnings attributes between the fourth fiscal quarter and the other quarters. Panel A tests for the difference in analyst's forecast accuracy, Panel B for earnings volatility and unpredictability, and Panel C for financial loss status and forecast horizon. The continuous variables are winsorized at the 1% and 99% levels of their respective distribution. The regressions include year and industry fixed effects and the standard errors are firm-clustered. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Definitions of variables are provided in the Appendix.

the indicator of the fourth quarter, Q_4, controlling for other firm characteristics, as follows:

$$\text{Dependent}(*) = \beta_0 + \beta_1 Q_4 + \beta_2 \text{SIZE} + \beta_3 \text{LEW} + \beta_4 \text{MTB} + \beta_5 \text{Follow} + \beta_6 \text{BIG}_4 + \beta_7 \text{TraVol} + \beta_8 \text{MajorSH} + \beta_9 \text{ForSH} + \Sigma \beta_m \text{YEAR} + \Sigma \beta_n \text{IND} + \varepsilon \quad (4)$$

Note(*): As for the dependent variable, ForErr, VOL_E, UNP_E, Loss, and Horizon are each used individually.

Additional test results are summarized in Table 5. Panel (A) of Table 5 presents the results of regressing analyst forecast error (ForErr) on the indicator for the fourth quarter, Q_4. This shows that the coefficient of Q_4 is significantly positive (0.0117), which means that analysts' earnings forecasts are less accurate for the last quarter than for the other quarters, which is consistent with the prior research. To further elaborate on potential contributors to the extraordinary pattern regarding the fourth quarter, Panels (B) and (C) of Table 5 provide test results on whether or not there is specific pattern in earnings attributes and forecast horizons for the last quarter. It shows that the coefficient estimates for Q_4 for all dependent variables related to earnings attributes, including VOL_E, UNP_E, and Loss, are positive and statistically significant at the 1% level, while the coefficient of the forecast horizon is insignificant. This indicates that the fourth quarter earnings are more volatile, unpredictable, and unprofitable than those of other quarters.

The results also imply that the features of fourth quarter earnings are substantially different from those for other fiscal quarters, which is the main reason why analyst forecast accuracy for the fourth quarter earnings declines. However, this fourth quarter forecasting idiosyncrasy should not be entirely attributed to the aforementioned factors. Other factors might be at work, such as special accounting items, final audit processes, tax filings, and other aspects of the forecast environment that might affect fourth quarter forecasting difficulty. In sum, users need to pay closer attention when interpreting analysts' forecasts for the fourth quarter. Further research is required to clarify the drivers of the relatively low accuracy of fourth quarter forecasts.

7. Conclusion

Researchers and practitioners have long been interested in determining the conditions that affect analysts' decisions and forecasting reliability. Analysts' earnings forecasts are one of the most important pieces of financial information that guide professional investors' market-related decisions. Therefore, it is desirable to detect any anomalies in the forecasting patterns and their main contributing factors to improve the usefulness of such forecasts. This study conducts tests to empirically answer an interesting research question: is there a systematic association between the accuracy of analysts' earnings forecasts and the various attributes of earnings? The results demonstrate that analysts' forecasts are less accurate for firms with more volatile or highly unpredictable earnings. Furthermore, the negative association between earnings attributes and forecast accuracy is more pronounced for firms with financial losses. Additional analysis show that analysts exhibit relatively less accurate forecasts for fourth quarter

earnings. The fourth quarter exhibits more earnings volatility and unpredictability and a higher incidence of negative net income than do the other quarters, which presumably might increase analysts' forecasting errors for that quarter.

This study's findings contribute to the literature by providing new empirical evidence regarding the comprehensive effects of earnings variability and levels. Furthermore, this study tests for contributing factors to the fourth quarter anomaly in analysts' forecasts, focusing on earnings attributes and the timing of corporate disclosures. These key findings fill a gap in the literature by exploring new area of earnings attributes that could potentially undermine the forecast accuracy but overlooked by the previous studies. Further, this study provides practical implications for investors and other users of such information, highlighting why a cautious review of analysts' forecasts is necessary, especially for firms characterized by highly volatile earnings and losses, as well as for fourth quarter forecasts generally. Accordingly, this study provide future researchers with useful suggestions to further explore the potential elements of increasing or reducing the analysts' forecast accuracy from the perspective of various corporate environments.

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Appendix 1: Definition of Variables

Variable	Definition
ForErr	Absolute value of the difference between an analyst's forecast of net income and the actual value of net income, divided by the market value of equity at the beginning of the quarter.
VOL_E	Standard deviation of net income for the most recent eight quarters, as deflated by the lagged market value of equity.
UNP_E	Absolute value of the difference between net income under a preliminary earnings announcement and the actual value of net income, which is scaled by the lagged market value of equity.
Loss	Binary variable that equals one if the actual net income for the subject quarter is negative and zero otherwise.
Follow	Number of analysts following the subject sample firm.
SIZE	Natural log-transformation of total assets at quarter-end.
LEV	Ratio of total liabilities to total assets at quarter-end.
MTB	Ratio of market value-to-book value of net equity at quarter-end.
Horizon	Time span from the average time point of an analyst's forecast for the subject firm-quarter to the date of its earnings announcement, measured annually.
TraVoL	Number of shares traded for the fiscal quarter, as deflated by the number of outstanding shares at quarter-end.
BIG4	Binary variable that equals one if a sample firm hires one of the big four accounting firms as its financial auditor and zero otherwise.
MajorSH	Ratio of shareholding by largest major shareholder with its related parties at quarter-end.
ForSH	Ratio of shareholding by foreigners at quarter-end.
Q4	Binary variable that equals one if the fiscal quarter is the fourth quarter and zero otherwise.