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Firm-specific information variation and financial analysts' target price forecasts

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A B S T R A C T

We examine the relation between firm-specific information and financial analysts' target price forecast accuracy. The motivation for this study originates from the recent increased release of analysts' target price forecasts and the developing literature on the understandings of analysts' target prices forecasting.

Our study shows that as more firm-specific information exists, the degree of information asymmetry between insiders (i.e., management) and outsiders (i.e., investors) increases and as a result, firm-specific information affects analysts' target price forecast accuracy negatively. Specifically, we find that when firm-specific information is high, analysts' target price forecasts for firms with more firm-specific information are less accurate. These results suggest that there exists an inefficiency of financial analysts in reflecting the implications of firm-specific information into their target price forecasts.

Keywords: analysts, target price forecasts, stock return synchronicity

JEL classification: G14, M41

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1. Introduction

The stock price of an individual firm compounds common market and industry movements and firm-specific information. Roll (1988) documents the weak comovement between market- and industry-level information and an individual firm's stock returns. He conjectures that non-public firm-specific information is attributable to the residual component of an individual firm's stock returns. The ability of contemporaneous common information to account for individual firm-level stock returns is measured by stock return synchronicity. The unexplained component of stock returns is assumed to correspond to firm-specific information. Stock return synchronicity is positively related with the relative amount of market- and industry-level information and is higher as the price incorporates relatively more public news than the firm-specific information (Piotroski and Roulstone 2004).

Since Roll's (1988) study, several studies have adopted stock return synchronicity as a measure of a firm's information environment and validated it empirically. Morck et al. (2000) document that capital market openness and better property protection rights affect stock price synchronicity negatively in their cross-county setting. Piotroski and Roulstone (2004) investigate whether informed trading influences stock return synchronicity. Using insider and institutional trading activities as informed trading, they report that these activities facilitate the reflection of the firm-specific information component. Hutton et al. (2009) examine the effect of the opacity of financial statements on stock return synchronicity and find that ambiguity is negatively related with the revelation of firm-specific information. These results corroborate that as more firm-specific information accounts for firm-level stock returns, that firm's stock return synchronicity decreases.

Several studies have investigated the inefficiency of analysts in incorporating relevant information into their forecasts. Stober (1992) shows that financial analysts neglect necessary information and fail to integrate the pertinent information when they form their forecasts. Das et al. (1998) and Lim (2001) report that analysts tend to announce more optimistically biased forecasts if they experience difficulty in forecasting their target firms' earnings (i.e., when information asymmetry is high).

Target prices are the most concise and specific expression of the firm's hypothesized value and recently, financial analysts have increased their target prices forecasts. Brav and Lehavy (2003) document that the majority of analysts provide target price forecasts and the existence of a significant market response to the information in analysts' target price forecasts. Asquith et al. (2005) show an incremental response to target price forecasts at the existence of earnings forecasts and stock recommendations. Cho (2012 and 2013) finds accounting information such as short-term and unexpected (abnormal) accruals makes it difficult for analysts to analyze this information correctly and to incorporate the implication of them into their target price forecasts.

Using *IDIOSYN*, an inverse transformation of stock return synchronicity as a measure of firm-specific information, we examine the relation between firm-specific information and financial analysts' target price forecast accuracy. As more firm-specific information exists, the degree of information asymmetry between insiders (i.e., management) and outsiders (i.e., investors) widens and analysts' forecast difficulty increases. Consequently, their stock prices become less synchronous with the market. We posit that because more firm-specific information represents more information asymmetry, more firm-specific information affects analysts' forecast properties negatively. Our sample is composed of financial analysts' annual target price forecasts issued for publicly listed firms incorporated in U.S. during the13-year period, 2001-2013. Following Piotroski and Roulstone (2004), we calculate each firm's stock

return synchronicity to measure the market and industry-wide information components incorporated into a firm's stock price. Then, we transform stock return synchronicity into *IDIOSYN*, a firm-specific information measure, based on Hutton et al. (2009). We find that firm-specific information negatively affects analysts' target price forecasts and as a result, their target price forecasts are less accurate when firm-specific information is high. Specifically, as more firm-specific information exists, analysts' target price forecasts are prone to be less likely to beat the actual stock prices either during or at the end of the forecast period.

The remainder of the paper proceeds as follows. Next, we discuss our sample and research design. Then, we present the empirical results. The last section concludes our study.

2. Sample and research design

2.1 Sample

The initial sample is restricted to all 12-month-ahead forecast horizon target price forecasts for U.S. publicly listed firms. These forecasts are obtained from Thomson Financial I/B/E/S's detailed price target database for 2001-2013. From the Center for Research in Security Prices (CRSP), we derive closing share price and weekly stock return data. Firm-related financial statement data comes from the COMPUSTAT database. We retain most recent annual target price forecasts issued by at least two different analysts in the 45-day period subsequent to the previous year's earnings. If an individual analyst announces multiple forecasts, we select the most recent individual analysts' forecasts. To remove outliers with undue influence and eliminate the effects of improperly matched stock split factors, we require at least US$1 closing share price at the previous year's earnings announcement date and at the end of the forecast horizon. Then, we delete the observations whose Target price/Closing share price ratios are at the bottom 1st percent or greater than 2. To estimate firm-specific return variation, we require each sample firm be available on CRSP. For each fiscal year, we require each firm-year observation to have at least 45 non-missing weekly return observations. We also require each observation to have an identifiable two-digit Standard Industrial Classification (SIC) industry code with at least 10 firms within each two-digit SIC industry definition. We eliminate firm-years observations without requisite data for main and control variables and winsorize our sample of observations at top and bottom 1 percent of the variables. Our sample results in a total of 16,484 firm-years with 81,795 target price forecasts from fiscal year 2001-2013. The sample firm-years increase across our sample period reflecting an increase of analysts' target price forecast issuance.

2.2 Firm-specific return variation

Using the methodology outlined in Piotroski and Roulstone (2004) and Hutton et al. (2009), we measure firm-specific return variation measure. First, for each firm-year observation, we regress firm *i*'s weekly returns on the market's and the industry's weekly return to estimate stock return synchronicity (comovement). For each fiscal year, we require each firm-year observation to have at least 45 non-missing weekly return observations. We also require each two-digit Standard Industrial Classification (SIC) industry to have at least 10 firms.

$$R_{i,t} = \alpha + \beta_1 * R_{M,t-1} + \beta_2 * R_{M,t} + \beta_3 * R_{I,t-1} + \beta_4 * R_{I,t} + * \epsilon_{i,t} \quad , \qquad (1)$$

where R_i is firm *i*'s weekly returns, R_M, is the CRSP value-weighted weekly market returns, and R_I is two-digit SIC industry *I*'s returns where firm *i* belongs . Subscript *t (t-1)* represents the

current and prior week, respectively.

Then, using the methodology developed in Hutton et al. (2009), we define firm-specific return variation (deficiency of market comovement) as

$$IDIOSYN_i = \ln\left(\frac{1-R_i^2}{R_i^2}\right), \quad (2)$$

where $R^2{}_i$ from Eq. (1) indicates the degree of firm *i*'s stock price's comovement along with the market and its primary industry. $IDIOSYN_i$ assesses the component of firm *i*'s stock returns that can't be accounted for by market and industry information. The residual (unexplained) seizes firm-specific information, which is incorporated in firm *i*'s returns and not explained by market and industry movements. For the merit of an unbounded continuous variable, we log-scaled-transform $\frac{1-R_i^2}{R_i^2}$ into $IDIOSYN_i$, which is more normally distributed. The higher $IDIOSYN_i$, indicates more firm-specific information relative to contemporaneous market and industry movements.

Table1. Target price forecast selection (Number of firm-years)

All I/B/E/S firm-year observations with 12-month-ahead forecast horizon target price forecasts issued for fiscal year 2001 and 2013 by at least two different analysts after the release of the previous year's earnings announcement.	36,327
Less: Observations with stock prices missing or less than US$1	(2,446)
Less: Observations without target price forecasts issued within the 45-day period immediately after the release of the previous year's earnings announcement	(7,519)
Less: Observations with (Target price/Closing share price) ratio at the bottom 1st percentile or larger than 2.	(1,285)
Less: Observations without sufficient data for firm-specific return variation (*IDOSYNCH*) measure and control variables	(8,593)
Final sample	16,484

Table 2. Distribution of number of firms

Year	No. of Firms	Percent
2001	404	2.45
2002	483	2.93
2003	868	5.27
2004	735	4.46
2005	1,192	7.23
2006	1,254	7.61
2007	1,456	8.83
2008	1,542	9.35
2009	1,621	9.83
2010	1,163	7.06
2011	1,727	10.48
2012	1,980	12.01
2013	2,059	12.49
Total	16,484	100.00

2.3 Analysts' target price forecast accuracy

Following Bradshaw et al. (2013), we use (i) ADIFF, (ii) HPASS, and (iii) EPASS to measure analysts' target price forecast results. To quantify the degree of the annual target price forecast accuracy, we calculate ADIFF as the absolute value of (ACTUAL - MTPF)/SP. ACTUAL is the actual share price at the end of the forecast period, MTPF is the mean value of 12-month-ahead target price forecasts within 45-day period, and SP is the closing share price at the previous year's earnings announcement date. We use the mean value of analysts' target price forecasts as a proxy for target price expectations. As a forecast accuracy measure, ADIFF, a continuous variable, measures the absolute difference between actual price and forecasted target price at the end of the forecast period, scaled by the closing stock price at time t-1. In this study, we investigate how firm-specific information affects analysts' target price forecast accuracy. Therefore, our interest is the magnitude, not the direction of analysts' forecast error. HPASS and EPASS indicate whether analysts' annual target price forecasts beat the actual share price either during or at the end of the forecast period. If ACTUAL is at or above MTPF at any time during the 12-month forecast period, HPASS equals 1 and equals zero otherwise. EPASS is another indicator variable taking the value of one if ACTUAL is beaten by MTPF at the end of the 12-month forecast period and zero otherwise.

2.4 Model specification

In our multivariate tests, we report a series of multiple regression analysis results. To investigate how firm-specific information affects analysts' target price forecast accuracy, we run the ordinary least squares (OLS) and logistic regressions. The following model is based on Bradshaw et al. (2013). We construct robust standard errors, two-way-clustered standard errors by firm and time, to avoid potential heteroscedasticity and correlation (Gow et al., 2010).

$$TPA_{i,t} = \alpha + \beta_1 IDIOSYN_{i,t-1} + \beta_2 PRERET_{i,t-1} + \beta_3 PRESTD_{i,t-1} + \beta_4 \ MARKETRET_{i,t} + \beta_5 SIZE_{i,t-1} + \ \varepsilon, \quad (3)$$

Our dependent variable, *TPA*, is the measure of the analysts' target price forecast accuracy. *ADIFF* measures the degree of target price forecast accuracy. *HPASS* indicates whether analysts' target price forecasts beat the actual stock price at least once during the forecast period. *EPASS*, another indicator variable, shows whether analysts target price forecasts are at or above the actual stock price at the end of the forecast period. Our main independent variable, *IDIOSYN*, scales the degree of the firm-specific information impounded into firms' stock returns. We adopt lagged *IDIOSYN* because analysts' target price forecasts are issued after they have knowledge of individual firms' stock return comovement in year *t-1*. We expect that when analysts form their forecasts, they face more difficulty in reliably interpreting firm-specific information than market and industry information. Therefore, we predict that *IDIOSYN* has an adverse effect on analysts' target price forecast accuracy.

To control for variables that have shown to affect analysts' forecasts accuracy, we include a set of the following variables for our multivariate analyses; (1) price momentum (*PRERET*), by using the six-month buy-and-hold raw return prior to the target price release month; (2) past stock price volatility (*PRCSTD*), by using the standard deviation of daily closing prices over the one-year period ending prior to the target price release month; and (3) *ex post* market return (*MARKETRET*), by using 12-month buy-and-hold value-weighted market return following the target price release. Lastly, we control for size effect (*SIZE*) using the

natural logarithm of price per share multiplied by the number of shares outstanding at time *t-1*.

3. Empirical results

3.1 Descriptive statistics

Descriptive statistics for the variables used in the analysis are presented in Table 3. Our sample firms have a mean (median) number of target price forecasts issued of 4.9621 (4.0000). The mean value of annual target price forecast is 18.68 % higher than the closing share price at the previous year's earnings announcement (MTPF/SP = 1.1868). On average 64.52% of firm-year observations meet target price forecasts at least once during the forecast period (*HPASS* = 0.6452). In addition, 29.43 % of firm-year observations beat target price forecasts at the end of the 12-month forecast period (*EPASS* = 0.2943). The mean and absolute forecast errors of target price (*ADIFF)* are 0.3336 and 0.2548. The mean value of R^2 from Eq. (1) is 0.4095 (median of 0.4016). This statistic shows that on average 40.95% of each firm's stock returns can be accounted for by contemporaneous market-wide and its primary industry-wide information. This also indicates that in our sample, about 59.05% of stock returns reflect firm-specific information. Therefore, the mean of the firm-specific return variation (*IDIOSYN*) is 0.4496 (median of 0.3987). Our firm-specific return variation measure shows considerable variation. While the 1st quartile *IDIOSYN* is -0.2258, the 3rd quartile is 1.0588.

The spearman rank correlation matrix among the variables of interest is presented in Table 4. As we expected, the more firm-specific information is, analysts' target price forecast accuracy declines. Analysts' target price forecast accuracy measures are negatively correlated with IDIOSYN, firm-specific return variation measure. IDIOSYN is significantly positively correlated with ADIFF, the absolute value of target price forecast error measure (0.0706, p-value<0.0001). There exists a significantly negative correlation between IDIOSYN and HPASS (-0.0394, p-value<0.0001). IDIOSYN and EPASS are negatively correlated, too (-0.0416, p-value<0.0001). These simple correlations posit that as more firm-specific information components exist, analysts' target price forecasts become less achievable and less accurate during the forecast horizon. Overally, the correlation results support our predictions.

3.2 Regression analysis

In Table 5 we present the results of regressing the measure of the analysts' target price forecast accuracy on the firm-specific return variation measure. In model 1 we investigate the relation between IDIOSYN and ADIFF, the absolute value of target price forecast errors. The coefficient of IDIOSYN is 0.0201, positive and significant at the 1 percent level. This result is consistent with our univariate analysis showing that firm-specific information is negatively associated with analysts' target price forecast accuracy. This suggests that analysts' target price forecasts for firms with more firm-specific information are more unpredictable and deviated more from the actual stock price.

In Model 2 and 3, our dependent variables are indicator variables, HPASS and EPASS. Therefore, we run the logistic regressions with the robust standard errors being clustered by both firm and time. The coefficient of IDIOSYN is negative for HPASS and EPASS, respectively. The IDIOSYN coefficient for HPASS is -0.1746 and significant at the 5 percent level. EPASS is also negative (-0.1569) and significant at the 10 percent level. Combined, these results indicate that analysts' forecasts for firms with more firm-specific information are less accurate and have a lower likelihood of beating the actual stock prices either during or at the end of their forecast period. The coefficients for the control variables are consistent with those

of the prior studies.

The empirical evidence confirms that target firms' firm-specific information is negatively associated with analysts' target price forecasts accuracy. Specifically, we find that as more firm-specific information component exists, analysts' target price forecasts become less achievable and less accurate in the forecast horizon.

Table 3. Descriptive statistics of firm characteristics (n=16,484)

Variable	Mean	Std. dev	Q1	Q2	Q3
# of TPs issued	4.9621	3.4340	2.0000	4.0000	6.0000
MTPF/SP	1.1868	0.1740	1.0768	1.1545	1.2620
HPASS	0.6452	0.4785	0.0000	1.0000	1.0000
EPASS	0.2943	0.4557	0.0000	0.0000	1.0000
ADIFF	0.3336	0.2878	0.1082	0.2546	0.4817
R^2	0.4095	0.1936	0.2575	0.4016	0.5562
IDIOSYN	0.4496	0.9523	-0.2258	0.3987	1.0588
PRERET	0.0860	0.3267	-0.1039	0.0655	0.2291
MAERKETRET	0.0375	0.1980	-0.0318	0.0935	0.1381
PRCSTD	4.5696	5.7021	1.8534	3.1003	5.2733
SIZE	14.3790	1.5501	13.2563	14.2379	15.3589

Variable definitions

TP: target price.

MTPF: mean value of 12-month-ahead target price forecasts

SP: closing share price at the prior year's earnings announcement date h.

ACTUAL: actual share price as of the end of the forecast horizon

HPASS = 1 if the mean value of target prices is met at any time during the 12-month forecast horizon and equals zero otherwise.

EPASS = 1 if the actual closing stock price is at or above the mean value of target prices as of the end of the 12-month forecast horizon and equals zero otherwise.

ADIFF: absolute value of (ACTUAL-MTPF)/SP.

IDIOSYN: natural logarithm of $(\frac{1-R^2}{R^2})$ from $R_{i,t} = \alpha + \beta_1 * R_{M,t-1} + \beta_2 * R_{M,t} + \beta_3 * R_{I,t-1} + \beta_4 * R_{I,t} + * \epsilon_{i,t}$, where $R_{i,t\,(t-1)}$ is firm *i*'s returns in week *t (t-1)*, $R_{M,\,t\,(t-1)}$ is the CRSP value-weighted market returns in week *t (t-1)*, and $R_{I,\,t\,(t-1)}$ is two-digit SIC industry *I*'s return in week *t (t-1)*. For each fiscal year, stock return synchronicity is measured for each firm-year with at least 45 weekly return observations.

R^2: R^2 from the above equation.

PRERET: six-month buy-and-hold raw return excluding dividends prior to the target price release month.

MARKETRET: 12-month buy-and-hold value-weighted market return excluding dividends following the target price release.

PRCSTD: standard deviation of closing prices over the one-year period ending prior to the target price release month.

SIZE: natural logarithm of price per share multiplied by the number of shares outstanding at time t-1.

Table 4. Correlation of firm characteristics (n=16,484)

	IDIOSYN	*HPASS*	*EPASS*	*ADIFF*	*PRERET*	*MARKETRET*	*PRCSTD*	*SIZE*
IDIOSYN	1.0000							
HPASS	-0.0394***	1.0000						
EPASS	-0.0416***	0.4788***	1.0000					
ADIFF	0.0706***	-0.4087***	-0.3060***	1.0000				
PRERET	-0.0424***	0.0006	-0.0211***	-0.0684***	1.0000			
MARKETRET	0.0761***	0.1730***	0.3404***	-0.3294***	-0.0655***	1.0000		
PRCSTD	-0.1363***	-0.0306***	-0.0269***	0.1037***	-0.0246***	-0.0202***	1.0000	
SIZE	-0.3996***	-0.0134*	0.03679***	-0.1599***	0.0478***	-0.0217***	0.32261***	1.0000

*, **, and *** indicate statistical significance at the 10, 5, and 1% level, respectively.
All variables are defined in Table 3.

Table 5. IDIOSYN Regression analysis (n=16,484)

	Model 1		Model 2		Model 3	
Dependent Variable	ADIFF		HPASS		EPASS	
Variable	Coefficient	t-stat	Coefficient	Chi-Square	Coefficient	Chi-Square
Intercept	0.8128	16.39***	1.6058	2.93***	-1.7979	-3.56***
IDIOSYN	0.0201	3.00***	-0.1746	2.38**	-0.1569	-1.67*
PRERET	-0.0199	-0.44	-0.1144	-0.66	-0.1437	-0.58
PRCSTD	0.0082	4.10***	-0.008	-0.99	-0.0258	-2.13**
MARKETRET	-0.5841	-6.47***	1.7241	3.46***	4.8711	9.97***
SIZE	-0.0349	-11.57***	-0.0645	-1.95*	0.0527	1.82*
Adj. or Pseudo R^2	0.2173		0.2035		0.1105	

*, **, and *** indicate statistical significance at the 10, 5, and 1% level, respectively.
All variables are defined in Table 3.

3.3 Additional analysis

We explore the relation between IDIOSYN, the firm-specific information measure, and analysts' target price forecasts. To corroborate our results, we examine two additional firm-specific information measures. First, in untabulated results, we investigate the correlation between the information asymmetry measure and IDIOSYN. As more firm-specific information exists, the degree of information asymmetry between insiders and outsiders increases. We adopt the bid-ask spread (SPREAD) to measure information asymmetry prior to the prior year's earnings announcement. SPREAD is the median daily closing bid-ask spread during the 45-day period before the year t-1 earnings announcement date, scaled by the average of the closing bid and ask prices median. As we expected, a highly positive relation exists between firm-specific information and information asymmetry. The correlation between SPREAD and IDIOSYN is significantly positive (0.0810, p-value<0.0001). We also investigate the correlation between the information asymmetry measure and analysts' target price forecast accuracy measures. The correlation between SPREAD and ADIFF is positive (0.0635) and significant at the 1 percent level. In addition, the correlations between SPREAD and HPASS (EPASS), as indicator variables, is negative (-0.04143 and -0.04504) and significant at the 1 percent level, respectively.

Second, we investigate the effect of firms' R&D investment (TI) on security analysts' target price forecast accuracy. Firms invest in order to enhance their values. However, the

success of R&D investments is highly unpredictable. Thus, the increased amount of investments could generate uncertainty and more firm-specific information. We expect that firms' R&D investment complicates analysts' target price forecasts. Following extant research on investments (e.g., Richardson 2006; Ramalingegowda et al. 2013), we calculate TI as R&D expenditure and capital acquisition expenditure less disposal of property, plant, and equipment (PPE), scaled by total assets. The (untabulated) correlation between TI and IDIOSYN is positive and significant (0.1534, p-value<0.0001). Using TI at year t-1 as a main independent variable, we again run the Eq. (3) regressions with the same dependent variables to study the effect of firms' investment on analysts' target price forecast accuracy. The findings are consistent with our predictions. With ADIFF as our dependent variable, the coefficient of TI is positive (0.1367) and significant at the 1 percent level. The coefficients of HPASS and EPASS are both negative and only HPASS is significant at the 5 percent level. Overall, these findings indicate that higher level R&D investment means more firm-specific information. These findings shown in Table 6 also corroborate that firm-specific information negatively influences analysts' target price forecasts accuracy.

Table 6. R&D investment Regression analysis (n=15,068)

	Model 1		Model 2		Model 3	
Dependent Variable	ADIFF		HPASS		EPASS	
Variable	Coefficient	t-stat	Coefficient	Chi-Square	Coefficient	Chi-Square
Intercept	0.8363	18.23***	1.1247	2.53**	-2.2669	-8.01***
TI	0.1367	2.96***	-0.6999	2.68**	-0.3059	-0.80
PRERET	-0.0304	-0.73	-0.0442	-0.23	-0.1144	-0.41
PRCSTD	0.0075	4.30***	-0.0068	-0.83	-0.0236	-1.94**
MARKETRET	-0.5760	-6.54***	1.6472	2.97***	4.9333	10.44***
SIZE	-0.0368	-11.10***	-0.0317	-1.17	0.0812	4.78***
Adj.or Pseudo R^2	0.2192		0.2011		0.1115	

*, **, and *** indicate statistical significance at the 10, 5, and 1% level, respectively.
Variable definitions
TI: sum of R&D expenditure, capital expenditure, and acquisition expenditure less sale of property, plant, and equipment, scaled by total assets
All other variables are defined in Table 3.

4 Conclusions

Target prices are the most concise and specific expression of the firm's hypothesized value and recently, financial analysts have increased their target prices forecasts. Using financial analysts' annual target price forecasts issued for publicly listed firms incorporated in the U.S. during 2001 to 2013, we investigate the effect of firm-specific information on analysts' target price forecast accuracy. In this investigation, we utilize the methodology developed in Hutton et al. (2009) to define firm-specific information and quantity using three analysts' target price forecast measures to seize their forecast accuracy, based on Bradshaw et al. (2013).

Our study shows that target firms' firm-specific information is negatively associated with analysts' target price forecast accuracy. Specifically, analysts' target price forecasts for firms with more firm-specific information are more unpredictable and more deviated from the actual stock price at the end of the forecast period. In addition, we find that as more firm-specific information exists, analysts' target price forecasts are prone to be less likely to beat the actual stock prices either during or at the end of the forecast horizon.

To further explore the relation between firm-specific information and analysts' target price forecasts we examine two additional firm-specific information measures, the bid-ask spread and firms' R&D investments. As more firm-specific information exists, the degree of information asymmetry between insiders and outsiders increases and higher level R&D investments means more firm-specific information. Consistent with our predictions, there exists a highly positive relation between firm-specific information and information asymmetry. We also find that higher level R&D negatively influences analysts' target price forecasts.

Overall, we find that as more firm-specific information component exists, analysts' target price forecasts become less achievable and less accurate in the forecast period. These results suggest that there exists the inefficiency of financial analysts in reflecting the implications of firm-specific information into their target price forecasts.

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