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ORIGINAL RESEARCH

'Other information' as an explanatory factor for the opposite market reactions to earnings surprises

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Abstract Positive (negative) earnings surprises do not necessarily generate positive (negative) market reactions. In our sample from 1990 to 2010, the market reacts negatively to 42 % of firms that meet or beat analyst forecasts and positively to 41 % of firms that miss analyst forecasts. We empirically tests whether 'other information', in part, accounts for the opposite sign between market reactions and earnings surprises. Our results indicate that 'other information' is a significant explanatory factor for the opposite market reactions to earnings surprises, and that its explanatory power is greater when investors become skeptical of the reliability of earnings information. We also find that other information facilitates investors' assessments for earnings information because the market under-reaction to earnings information decreases in the availability of other information disseminated to investors. Investors, however, do not fully comprehend other information and tend to overestimate the persistence of other information for future earnings.

Keywords Other information · Analyst forecast · Opposite market reaction

JEL Classification M41

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1 Introduction

The market reaction to firms' meeting or beating analyst forecasts has drawn significant attention in recent years from regulators and academic researchers. For example, Arthur Levitt, former chairman of SEC, expressed his concern about the increasing trend of managers' attempts to meet or beat analyst expectations.[1] He indicated that managers are under ever growing pressure to satisfy analyst expectations because the market is placing ever growing weight on whether firms can meet or beat analyst projections. Indeed, the extant literature finds that the market, *on average*, reacts positively to firms that meet or beat analyst forecasts and negatively to firms that fall short of analyst forecasts (Bartov et al. 2002; Kasznik and McNichols 2002; Skinner and Sloan 2002; Brown and Caylor 2005), which explains why managers strive to meet or beat analyst forecasts. Meeting or beating analyst expectations, however, is not always followed by positive market reactions. In fact, we find from our 1990–2010 sample of firms, 42 % of firms that meet or beat analyst forecasts are followed by negative market reactions and 40 % of firms that miss analyst forecasts are followed by positive market reactions.[2] We label this discordant market reaction to the sign of earnings surprise as "opposite market reaction".

Opposite market reactions to earnings news may not be all that surprising, given that the extant literature documents that price captures information beyond what is conveyed by accounting earnings (e.g., Beaver et al. 1980). Ohlson (2001) refers to this type of information as 'other information', since this information is not reflected in the financial statements (earnings and book value). In this study, we examine the extent to which 'other information' affects the opposite market reaction to earnings surprises. We focus on this setting in view of the evidence that a considerable percentage of firms that report positive (negative) earnings surprises received negative (positive) market reactions, a setting which allows us to understand the extent to which the market uses other information in interpreting earnings information in earnings announcement.

The extent to which investors incorporate 'other information' in equity valuation has been extensively studied in the literature. These studies have generally shown that 'other information' is useful to investors for assessing firms' values (e.g., Dechow et al. 1999; Bryan and Tiras 2007). While value-relevant, 'other information' may be less reliable, relative to earnings information, and thus simply add noise to investors' investment decisions (e.g., Atiase et al. 2005). As a result, the extent to which 'other information' provides incremental information for investors in the presence of earnings information remains an open question.

Dechow et al. (1999) and Bryan and Tiras (2007), in their respective studies on 'other information', both followed the Ohlson (2001) valuation framework and utilized analyst forecasts of next period's earnings as a proxy for the 'other information' available to market participants. Both studies find that market prices are significantly associated with information reflected by analyst forecasts, incrementally to the information reflected by the financial statements. Several studies focus on specific types of non-earnings information and, in general, find that other information provides implications for future earnings, even though not reflected in current earnings (e.g., Amir and Lev 1996; Ittner and Larcker 1998; Myers 1999; Francis et al. 2003). Collectively, unfavorable 'other information' could likely negate positive earnings surprises, and thus resulting in negative market reactions.

[1] See Levitt (1998) "The Numbers Game".

[2] Kinney et al. (2002), in a 22-day return window, find that only 62.2 % of firms with positive earnings surprises receive positive returns during the return period.

Similarly, favorable 'other information' could likely counter the effects of negative earnings surprises and lead to positive market reactions.

Counter to the evidence in favor of the market weighting 'other information' in valuation decisions is that the nature of 'other information' is less reliable since only earnings information undergoes the scrutiny of an audit. Atiase et al. (2005) provides evidence of this by documenting that the market reacts more strongly to earnings than to management earnings forecasts in earnings announcements, thus concluding that investors tend to trade *relevant* but *less reliable* information (i.e., other information) for *reliable* but *less relevant* information (i.e., earnings information). If earnings information dominates 'other information' due to the reliability concern, whether 'other information' delivers good or bad news is a secondary issue because the market uses earnings information as the primary source of information in reacting to earnings news. As a result, 'other information' may not be sufficiently reliable and thus unable to explain the opposite market reactions and earnings surprises when the signal of 'other information' is contradictory to that of earnings. It is this friction between value-relevant information and noise in accounting for the opposite market reactions to earnings surprises that is the focus of our study.

Using a sample from 1990 to 2010, we find that other information (beyond that reflected by earnings and book value, v, is an explanatory factor for opposite market reactions to earnings surprises. Additionally, we find that the effect of other information in explaining the opposite market reactions to earnings surprises is stronger in a sample of firms that report earnings surprises within 1¢ and in the post-SOX period in which investors are more skeptical of earnings management and thus increase scrutiny over firms' meeting or beating the market's earnings expectations.[3]

Our finding that investors incorporate other information in reacting to earnings news begs the question, however, whether other information provides useful information for investors to assess the implication of current earnings for future earnings. We thus test whether the extent of the availability of other information in the market would amplify or mitigate the market's mispricing for earnings information. We find that other information facilitates investors' assessments for earnings persistence in that the market's underreaction to earnings surprise disappears in the highest decile portfolio of other information, which, in turn, explains and complements as to why investors incorporate other information in assessing earnings information in earnings announcements. Further, other information is not fully impounded into stock prices and investors tend to overprice other information when assessing its persistence for future earnings.

This paper contributes to the literature in several ways. First, this study adds to the meet or beat earnings expectations (MBE) literature by providing evidence that the market values the 'other information' when assessing firms' meeting or beating earnings targets; that is, the market does not fixate on reported earnings and the consequences of meeting or beating analyst forecasts to market prices may have been overemphasized. Second, our study furthers our understanding as to how the market weighs 'other information' when reacting to earnings news. The prior accounting market-based studies focus primarily on the earnings information (e.g., earnings quality) with little attention being paid to other information. Our study contributes to the extant literature by providing evidence that (1) 'other information', is an important factor that explains, in part, the opposite (weak)

[3] Keung et al. (2010) indicate that the market sees a zero or small positive earnings surprise as a red flag because those firms that meet or slightly beat analyst forecasts are suspects of earnings manipulators and Koh et al. (2008) show that investors become more skeptical of firms' meeting or beating analyst forecasts in the post-SOX period.

earnings-return relation; and, (2) noise in market expectations does not seem to be an explanatory factor for the opposite market reaction. We also find that other information has a greater explanatory power for market reactions to earnings news when investors are more skeptical of the reliability of earnings news. Third, this paper contributes to the market anomaly literature by providing evidence that the extent of market mispricing for earnings depends, in part, on the extent to which 'other information' is available for investors to assess the persistence of current earnings for future earnings. Further, investors do not seem to fully comprehend other information and tend to overestimate the persistence of other information for future earnings.

The organization of this paper is as follows. Section 2 reviews the prior literature. Section 3 develops our hypothesis and empirical measures. Section 4 describes the sample and Sect. 5 provides the empirical evidence. Section 6 shows robustness checks and we conclude in Sect. 7.

2 Literature review

2.1 Meeting or beating analyst forecasts

Meeting or beating the market expectations has been considered one of management's most important tasks (Degeorge et al. 1999). Among earnings benchmarks (zero, past earnings and analyst earnings forecast), the literature has focused on analyst earnings forecasts as the most critical threshold of managers (Brown 2001; Dechow et al. 2003; Graham et al. 2005). The extant literature has documented that managers manage to meet or beat analyst forecasts for several reasons. Some argue that managers engage in the numbers game for self-serving purposes because managers are better off by satisfying analyst expectations. For example, Matsunaga and Park (2001) indicate that the compensation committee structures executive compensation based on whether actual earnings numbers meet or beat analysts' expectations. Thus, managers suffer losses in their compensations, once reported earnings numbers fall short of analyst expectations. Graham et al. (2005) claim that managers attempt to beat earnings targets due to job security concerns and McVay et al. (2006) demonstrate that meeting or beating analyst forecasts is positively associated with the chances of managerial stock sales.

Other studies demonstrate that the managers' motivations to meet or beat analyst forecasts are related to capital market concerns. Bartov et al. (2002) maintain that the market rewards firms that meet or beat analyst expectations regardless of how frequently firms meet the threshold and whether firms engage in earnings management to exceed the earnings benchmark. Skinner and Sloan (2002) point out that the magnitude of the market reactions to a negative earnings surprise is larger than that of the market reactions to a positive earnings surprise.

Although these studies document that the market generally rewards firms that meet or beat analyst forecasts and punishes firms that miss analyst forecasts, market reactions do not always follow this pattern. Pulliam (1999), for example, documents that the market reacted negatively to American Express and Pitney Bowes, even though they satisfied analyst forecasts. Pulliam attributed the negative reaction to the market judging the quality of earnings from these firms as poor. McCafferty (1997), on the other hand, finds that the market reacted positively to Sybase and Fruit of the Loom when they fell short of analyst forecasts. McGee (1997) interprets these and other examples as the market focusing more on earnings stability than on whether a firm meets or beats

analyst projections. In prior research, Kinney et al. (2002) find that the market reacted positively to less than two-thirds of firms that meet or beat analyst expectations. Similarly, they find that the market reacted negatively to no more than two-thirds of firms that miss analyst forecasts. They attribute this phenomenon to the weak earnings-returns relation, driven by non-monotonic dispersion of analyst forecasts and return variability across earnings surprise intervals. Overall, this line of research indicates that the market goes beyond the signal of meeting or beating analyst forecasts in assessing earnings news (e.g., earnings quality), which lead to the high percentages of firms that exhibit opposite market reactions to earnings surprises.

2.2 Other information

Prior research has shown that other information is value-relevant, incremental to accounting information. Beaver et al. (1980) indicate that stock prices capture information beyond accounting earnings because accounting information is backward-looking and not timely. Indeed, Dechow et al. (1999), based on Ohlson framework, extract other information from analyst forecasts and find that other information is descriptive of stock prices, incremental to earnings and book value. Bryan and Tiras (2007) further indicate that other information is more descriptive of stock prices than accounting information when information asymmetry is high. Several studies that focus on a specific piece of other information also find other information is associated with stock prices, incremental to accounting information. For example, Amir and Lev (1996) examine two non-financial measures, service area population and product market penetration in the cellular communication industry, and find that both measures are better than earnings and book value in explaining the variation of stock prices. Ittner and Larcker (1998) examine customer satisfaction at different levels and find that customer satisfaction explains market prices incrementally to accounting information. Francis et al. (2003) investigate preferred valuation metrics in different industries and find that revenue per passenger mile, cost per available seat mile, and load factor in the airline industry and same-store sales in the restaurants industry add incremental power to earnings in explaining stock returns.

Other studies indicate that other information is predictive of firms' future financial performance. For example, Behn and Riley (1999) find that customer satisfaction, available ton mile, load factor and market share provide predicting power for future profitability and Nagar and Rajan (2001) find that both financial quality (i.e., external failure costs) and non-financial quality measures (i.e., defect rates and on-time deliveries) predict future sales after controlling for past sales. Taken together, other information is value-relevant and predictive of firms' future performance, incremental to earnings information. Therefore, investors may rely on other information in reacting to earnings news. As favorable other information may negate unfavorable earnings news and unfavorable other information may counter against favorable earnings news, other information may explain the considerable percentages of firms that exhibit opposite market reactions to earnings surprises documented in Kinney et al. (2002) and in our study. These studies, however, do not investigate whether the noise innate in other information which Atiase et al. (2005) point out, offsets the value-relevant information that could explain the opposite market reactions to earnings surprises as we investigate in our study.

3 Model development

3.1 Other information and market reactions to earnings surprises

To test whether the opposite sign of market reactions to earnings surprises is attributable to other information, we partition our sample into: (1) firms that report positive earnings surprises (*PositiveES*); and, (2) firms that report negative earnings surprises (*NegativeES*). Within each partition, we develop dummy (1, 0) indicator variables to identify whether the market reactions were positive ($PositiveES^{+}$ and $NegativeES^{+}$) or negative ($PositiveES^{-}$ and $NegativeES^{-}$). $PositiveES^{-}$ and $NegativeES^{+}$ represent our firms of interest in that these firms exhibit the opposite sign of market reactions and earnings surprises.

With respect to model specification, we develop a logit regression model where the dummy variables are set to be one for $PositiveES^{-}$ and $NegativeES^{+}$ in our *PositiveES* and *NegativeES* partitions, respectively, otherwise zero. We regress the dummy variables on our metrics for 'other information' (v). The resulting logit regression is as follows:

$$\begin{aligned} Pr(Dummy = 1) = F(&\alpha_0 + \alpha_1 v_{it} + \alpha_2 SURP_{it} + \alpha_3 SPECIAL_{it} + \alpha_4 ABACC_{it} \\ &+ \alpha_5 FERROR_{it} + \alpha_6 MBEQ_{t-4it} + \alpha_7 DISP_{it} + \alpha_8 COVERAGE_{it} \\ &+ \alpha_9 LOSS_{it} + \alpha_{10} LTG_{it} + \varepsilon_{it}) \end{aligned} \quad (1)$$

Dummy, one, if a firm reports positive earnings surprises but generates negative cumulative abnormal returns (CAR_{it}) or, if a firm reports negative earnings surprises but generates positive cumulative abnormal returns, and zero otherwise; CAR_{it} is measured as the size-adjusted cumulative abnormal return, where the return interval is from 20-day before earnings announcement and 1 day after earnings announcement for quarter t;[4] v_{it}, 'other information'; $SURP_{it}$, earnings surprise, measured using the difference between actual earnings per share and the most recent analyst forecast prior to earnings announcement, divided by stock price at the end of quarter t; $SPECIAL_i$, special items, scaled by total assets at the beginning of quarter t; $ABACC_{it}$, abnormal accruals, estimated by the approach in Dechow et al. (1995); $FERROR_{it}$, forecast error, measured as the difference between the actual earnings per share and the earliest forecast for quarter t made subsequent to earnings announcement for quarter t − 1, scaled by price at the beginning of the quarter; $MBEQ_{t-4it}$, an indicator variable to capture whether actual earnings this quarter meet or beat actual earnings from same quarter of last year, coded as one if the difference between actual earnings per share in quarter t is greater than or equal to actual earnings per share in quarter t − 4 is positive, and zero otherwise; $DISP_{it}$, analyst dispersion of earnings forecasts; $COVERAGE_{it}$, log of the number of analyst following; $Loss_{it}$, accounting loss, an indicator variable, coded as one when a loss occurs, and zero otherwise; LTG_{it}, consensus analyst forecasts of long-run growth, measured in the month following earnings announcement.

v_{it} is our variable of interest as it represents the magnitude of the revision in other information. We do not make a directional prediction on α_1, since we are testing the open empirical question whether the market would trade relevant but less reliable information (i.e., other information) for reliable but less relevant information (i.e., earnings

[4] We follow Kinney et al. (2002) to use 22-day return window in our study. Kinney et al. (2002) indicate that the 22-day return window mitigates (1) the stale analyst forecast problem; and (2) information leakage problem, as in Soffer et al. (2000).

information). If investors rely on other information in reacting to earnings news, favorable other information would negate unfavorable earnings news and unfavorable other information would counter against favorable earnings news. Hence, other information would be an explanatory factor for considerable percentages of firms that exhibit opposite market reactions to earnings surprises ($\alpha_1 > 0$). However, the noise innate in other information may offset the value-relevance of other information such that investors do not rely other information in reacting to earnings news ($\alpha_1 = 0$).[5]

Related studies that investigate the opposite market reactions to earnings surprises find that the materiality of earnings surprises is negatively associated with the likelihood of the opposite sign of market reactions to earnings surprises (Kinney et al. 2002) and that the noise in earnings weakens the earnings-return relation (Kothari 2001; Johnson and Zhao 2012). We thus include the magnitude of earnings surprises (SURP) to proxy for the materiality of earnings surprises, and special items (SPECIAL) and abnormal accruals (ABACC) to proxy for transitory components of earnings.

As for other control variables, we include forecast error (FERROR), as in Bartov et al. (2002), to control for the magnitude and direction of analyst forecast revisions over the period. We also include a dummy variable, $MBEQ_{t-4}$, to control for the sign of earnings surprises in the same quarter from last year since Dopuch et al. (2008) show that market reactions to earnings surprises are associated with time-series earnings expectations. Two information environment variables, analyst dispersion (DISP) and analyst coverage (COVERAGE), are included because prior research finds the market does not react monotonically to earnings information, with respect to the degree of information asymmetry (e.g., Kinney et al. 2002; Bryan and Tiras 2007). Further, we include a dummy variable that indicates whether a firm incurs a loss, and a variable to indicate the analysts' long-run growth forecasts, because prior literature demonstrates these two variables affect earnings-price relation (e.g., Bryan and Tiras 2007).

3.2 Measurement of variables

3.2.1 'Other information'

Ohlson (1995) defines 'other information' as information that conveys future earnings that is not reflected by current earnings or book value. The prior literature has incorporated 'other information' into various valuation settings and empirically uses 1-year-ahead consensus analyst forecasts to estimate 'other information' (e.g., Dechow et al. 1999; Bryan and Tiras 2007). Thus the extant literature's measure for 'other information' is a measure of information about future earnings reflected by analyst forecasts but not reflected in the financial statements. While the specific tests and research objectives differ, the extant literature utilizes this fundamental measure of analyst forecast information to test how other information relates to market prices.

To derive our measure for the surprise of 'other information' (v) we modify the two-stage approach found in Bryan and Tiras (2007). Unlike Dechow et al. (1999), who estimate the abnormal earnings from 1-year-ahead analyst forecasts to measure the 'other information' reflected by analyst forecasts, Bryan and Tiras relax the restrictive

[5] Adding to this friction is the fact that earnings information is released to the public as a separate in earnings announcement, thus the market may still use earnings information as the primary source of information to assess earnings surprises, possibly resulting in other information having marginal or no effect on determining the market's reaction to earnings surprises.

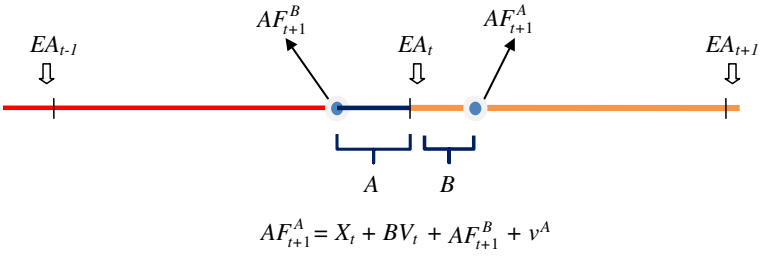

Fig. 1 Timeline of analyst forecasts surrounding prior period's earnings announcement, where *EA* earnings announcement, AF^{A}_{t+1}last consensus analyst forecast for t + 1 *after* earnings announcement in t; AF^{B}_{t+1}first consensus analyst forecast for t + 1 *before* earnings announcement in t, *v* captures change of other information from AF^{B}_{t+1}through AF^{A}_{t+1}

assumptions of information dynamics imposed by the Ohlson (1995, 2001) model and use accounting fundamentals to derive their measure. Bryan and Tiras's measure is the residual of a regression of consensus analyst forecasts of period t + 1 earnings on period t accounting earnings and book value, as follows.[6]

$$AF^{A}_{it+1} = \delta_0 + \delta_1 X_{it} + \delta_2 BV_{it} + v_{it} \tag{2}$$

where AF^{A}_{it+1}, median consensus analyst forecast for earnings in quarter t + 1, measured as 1 month *after* announcement of quarter t earnings; X_{it}, income before extraordinary items minus preferred dividends divided by shares outstanding in quarter t; BV_{it}, common equity divided by shares outstanding in quarter t; v_{it}, residual for sample firm i in quarter t (i.e., 'other information' reflected by analyst forecasts).

Since our goal is to measure other information, *v*, available in the 22-day return window surrounding earnings announcement, we modify model (2) by including the most recent consensus analyst forecast for quarter t + 1 *before* announcement of quarter t earnings to capture analysts' revision in other information. This revised model is as follows:

$$AF^{A}_{it+1} = \delta_0 + \delta_1 X_{it} + \delta_2 BV_{it} + \delta_3 AF^{B}_{t+1} + v_{it} \tag{3}$$

where AF^{B}_{t+1}, median consensus analyst forecast for earnings in quarter t + 1 released *before* announcement of quarter t earnings.

As with Bryan and Tiras (2007), all variables are deflated by market price at the beginning of the quarter and the regression for each year is conducted based on all prior quarter sample observations to obtain the predicted values. The predicted values are then used to derive the residual (v_{it}). Other information, v_{it}, is extracted from 1-quarter-ahead analyst forecasts and intuitively captures information beyond that conveyed by current earnings and book value. Higher v_{it} indicates more favorable non-accounting information.

To clarify our measures, Fig. 1 depicts the time horizon of other information captured in AF^{A}_{it+1}. *v* captures the revision of other information contained in analyst forecasts, from the

[6] Dechow et al. (1999) provide a mathematically equivalent measure of 'other information' to Bryan and Tiras's (2007) measure by estimating the persistence of consensus analyst forecasts. As a robustness check, we retest our hypotheses using the Dechow et al. approach and find results that are substantially identical to those we find using the Bryan and Tiras approach.

time of the last consensus forecast of quarter t + 1 earnings before to the announcement of quarter t earnings, through the announcement of quarter t earnings (window *A*).[7]

3.2.2 Abnormal accruals

Earnings consist of total accruals and cash flows. Total accruals tend to reverse by nature and thus are less persistent than cash flows (Sloan 1996). Of total accruals, abnormal accruals are less persistent than normal accruals (Xie 2001). Therefore, in addition to special items, we use abnormal accruals as another proxy for transitory component of earnings. To measure abnormal accruals, we employ the statement of cash flow approach to estimate total accruals in that it minimizes the measurement errors found in estimating total accruals. We thus define total accruals as the difference between income before extraordinary items and cash flow from operations. We then use the Jones (1991) model modified by Dechow et al. (1995) to estimate normal and abnormal components of accruals, where predicted values of the model are normal accruals and the residuals (e_{it}) a the abnormal accruals. This model is estimated by the following regression:

$$TACC_{it}/TA_{it-1} = \theta_0 + \theta_1(1/TA_{it-1}) + \theta_2((\Delta Rev_{it} - \Delta Rec_{it})/TA_{it-1}) + \theta_3(PPE_{it}/TA_{it-1}) + e_{it} \quad (4)$$

where $TACC_{it}$, total accruals for sample firm i in quarter t; TAi_{t-1}, total assets for sample firm i in quarter t − 1; ΔRev_{it}, change in net revenue for sample firm i in quarter t; ΔRec_{it}, change in gross accounts receivables for sample firm i in quarter t; PPE_{it}, gross property plant and equipment for sample firm i in quarter t; e_{it}, residual for sample firm i in quarter t.

We deflate all variables by total assets at the beginning of the period and run cross-sectional regressions for the modified Jones model, matched by two-digit SIC code and quarter. We require at least eight observations in a two-digit SIC code industry in the same quarter to run the regression. Higher e_{it} denotes higher abnormal accruals, which indicates earnings are more transitory, all else being equal.[8]

4 Sample selection and descriptive statistics

4.1 Sample selection

We collect quarterly data from daily return data from *CRSP*, and analyst forecasts and reported earnings from I/B/E/S, and financial statement data items from COMPUSTAT. We delete firms that are classified as financial institutions or utility companies and firm observations with negative book value and with the number of analyst following <3.[9] The

[7] Ball and Shivakumar (2008) demonstrate that the earliest forecast revision for future earnings following earnings announcement incorporates past news rather than producing new information. In other words, there is not much other information between earnings announcement for quarter t and the first consensus analyst forecast for quarter t + 1 made subsequent to earnings announcement for quarter t (window *B*).

[8] We also measure abnormal accruals using the performance-matched abnormal accruals model (Kothari et al. 2005). We found no significant differences in our findings from this additional set of tests.

[9] Financial institutions and utility firms are highly regulated and operate in a special business environment, which makes their accounting figures less comparable to firms in the other industries.

Table 1 Descriptive statistics of sample

Variable	PositiveES partitions					NegativeES partitions				
	$PositiveES^{+}$ (24,249 obs)		$PositiveES^{-}$ (17,441 obs)		Mean difference t-statistics	$NegativeES^{+}$ (6,672 obs)		$NegativeES^{-}$ (10,212 obs)		Difference in means
	Mean	STD	Mean	STD		Mean	STD	Mean	STD	
Panel A: Descriptive statistics										
CAR	0.0661	0.1168	−0.0380	0.1249	87.42***	0.0342	0.1161	−0.0750	0.1409	52.87***
X	0.0171	0.1214	0.0114	0.1559	4.16***	−0.0058	0.2039	−0.0134	0.2424	2.12**
v	0.0026	0.0097	−0.0001	0.0117	26.19***	0.0002	0.0122	−0.0029	0.0142	14.96***
SURP	0.0031	0.0104	0.0022	0.0102	8.76***	−0.0068	0.0217	−0.0073	0.0228	1.44
SPECIAL	0.0059	0.0566	0.0104	0.0976	−5.92***	0.0131	0.1688	0.0192	0.1522	−2.40**
ABACC	−0.0098	0.0843	−0.0046	0.0785	−6.41***	−0.0045	0.0777	0.0007	0.0786	−4.26***
FERROR	−0.0007	0.0084	−0.0029	0.0117	22.32***	−0.0002	0.0145	−0.0026	0.0176	9.20***
$MBEQ_{t-4}$	0.6202	0.4854	0.5554	0.4969	13.33***	0.4632	0.4987	0.3925	0.4883	9.14***
DISP	0.0013	0.0027	0.0017	0.0033	−11.75***	0.0024	0.0041	0.0029	0.0049	−7.39***
COVERAGE	1.9556	0.6705	1.9456	0.6770	1.49	1.8322	0.6840	1.7799	0.6965	4.82***
Loss	0.1381	0.3450	0.1730	0.3783	−9.8***	0.2586	0.4379	0.2735	0.4458	−2.13**
LTG	18.6286	10.4331	19.0611	11.4424	−4.01***	17.5132	11.0320	17.8521	10.8105	−1.98**

	CAR	X	*v*	SURP	SPECIAL	ABACC	FERROR	$MBEQ_{t-4}$	DISP	COVERAGE	Loss	LTG
Panel B: Correlation matrix												
CAR	1	−0.02	0.09	0.08	0.00	−0.01	0.04	0.06	0.01	0.02	−0.03	0.01
		0.0001	0.0001	0.0001	0.5074	0.0025	0.0001	0.0001	0.1095	0.0001	0.0001	0.0355
X	−0.04	1	0.14	0.21	−0.56	0.51	0.15	0.15	−0.37	0.05	−0.37	−0.09
	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
v	0.13	0.06	1	0.40	−0.07	−0.01	0.21	0.14	−0.32	0.08	−0.21	−0.06
	0.0001	0.0001		0.0001	0.0001	0.0007	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Table 1 continued

	CAR	X	*v*	SURP	SPECIAL	ABACC	FERROR	$MBEQ_{t-4}$	DISP	COVERAGE	Loss	LTG
SURP	0.24	0.10	0.14	1	−0.19	0.09	−0.09	0.09	−0.14	0.05	−0.12	0.01
	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0029
SPECIAL	−0.01	−0.14	−0.06	0.01	1	−0.46	−0.07	−0.07	0.19	−0.03	0.15	−0.01
	0.0145	0.0001	0.0001	0.0648		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0047
ABACC	−0.03	0.26	−0.02	−0.03	−0.08	1	−0.05	0.07	−0.10	−0.02	−0.15	−0.05
	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
FEEROR	0.09	0.05	0.22	−0.03	−0.05	−0.02	1	0.12	−0.21	0.08	−0.13	−0.02
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001	0.0001	0.0001
$MBEQ_{t-4}$	0.08	0.27	0.15	0.15	−0.13	0.08	0.19	1	−0.15	0.06	−0.26	0.02
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		0.0010	0.0001	0.0001	0.0001
DISP	−0.03	−0.15	−0.17	0.00	0.16	−0.04	−0.13	−0.17	1	−0.13	0.37	−0.03
	0.0001	0.0001	0.0001	0.3208	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001	0.0001
COVERAGE	0.02	0.03	0.05	0.03	0.10	−0.04	0.10	0.06	−0.12	1	−0.10	−0.10
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001	0.0001
Loss	−0.04	−0.67	−0.19	−0.09	0.22	−0.20	−0.11	−0.26	0.33	−0.09	1	0.18
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		0.0001

Table 1 continued

	CAR	X	*v*	SURP	SPECIAL	ABACC	FERROR	$MBEQ_{t-4}$	DISP	COVERAGE	Loss	LTG
LTG	0.02	−0.27	−0.08	−0.02	−0.13	−0.08	−0.01	0.03	−0.15	−0.11	0.14	1
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.1923	0.0001	0.0001	0.0001	0.0001	

Each cell presents the correlation and associated *p* value. Cells above (below) the diagonal present the Pearson (Spearman) correlation

The sample covers 58,574 firm-quarter observations between 1990 and 2010

The variables are defined as follows:

PositiveES positive earnings surprise, if a firm's reported earnings per share is equal to or greater than the most recent analyst earnings forecast prior to earnings announcement in quarter t;

NegativeES negative earnings surprise, if a firm's reported earnings per share is lower than the most recent analyst earnings forecast prior to earnings announcement in quarter t;

$PositiveES^{+}$ firms that report *positive* earnings surprises with *positive CAR*;

$PositiveES^{-}$ firms that report *positive* earnings surprises with *negative CAR*;

$NegativeES^{+}$ firms that report *negative* earnings surprises with *positive* C*AR*;

$NegativeES^{-}$ firms that report *negative* earnings surprises with *negative* C*AR*;

CAR the size-adjusted cumulative abnormal return, where return interval is a 22-day return period from 20 days before to 1 day after earnings announcement for quarter t;

X income before extraordinary items, scaled by total assets at the beginning of quarter t;

v 'other information' captured by analyst forecasts, measured at the end of quarter t. Other information is the residual from the regression of analyst forecasts of next period's earnings on current period's earnings, book value, and the most recent consensus analyst forecast for quarter t + 1 *before* earnings announcement in quarter t;

SURP earnings surprise, measured as the difference between the actual earnings per share and the most recent forecast for quarter t made prior to the quarter's earnings announcement, scaled by price at the beginning of the quarter;

SPECIAL absolute value of special items, scaled by total assets at the beginning of quarter t;

ABACC abnormal accruals, estimated by the approach in Dechow et al. (1995);

FERROR forecast error, measured as the difference between the actual earnings per share and the earliest forecast for quarter t made subsequent to the last quarter's earnings announcement, scaled by price at the beginning of the quarter;

$MBEQ_{t-4}$ an indicator variable, coded as 1 if the difference between actual earnings per share in quarter t is greater than or equal to actual earnings per share in quarter t − 4 is positive; 0, otherwise;

DISP dispersion of analyst earnings forecasts, measured as the standard deviation of analyst forecasts in quarter t, scaled by price at the beginning of the quarter;

COVERAGE analyst coverage, measured as log of number of analyst following;

Loss accounting loss, an indicator variable, coded as 1 when a loss occurs; 0, otherwise;

LTG consensus analyst forecasts of long-run growth, measured as percentage in the month following earnings announcement in quarter t

Table 2 Tests of the explanatory power of other information for the opposite sign between market reactions and earnings surprises

$$Pr(Dummy = 1) = F\left(\begin{array}{c}\alpha_0 + \alpha_1 v_{it} + \alpha_2 SURP_{it} + \alpha_3 SPECIAL_{it} + \alpha_4 ABACC_{it} + \alpha_5 FERROR_{it} \\ +\alpha_6 MBEQ_{t-4_{it}} + \alpha_7 DISP_{it} + \alpha_8 COVERAGE_{it} + \alpha_9 LOSS_{it} + \alpha_{10} LTG_{it} + \varepsilon_{it}\end{array}\right)$$

	Predicted sign	Intercept ±	*v* ?	SURP −	*SPECIAL* +	*ABACC* +	*FERROR* −	$MBEQ_{t-4}$ −	*DISP* +	*COVERAGE* ?	*Loss* ?	*LTG* −	Pseudo R^2 (%)
Panel A: Logit regression for testing firms with positive earnings surprises													
(1)	Coefficient	−0.25		−17.36	−0.01	0.39	−11.87	−0.14	0.00	−0.01	0.19	−0.00	1.77
	p value	0.3527		0.0001	0.9566	0.0029	0.0001	0.0001	0.3758	0.5979	0.0001	0.2883	
(2)	Coefficient	−0.13	−12.62	−16.69	−0.02	0.34	−8.23	−0.13	−0.00	−0.01	0.17	−0.01	2.25
	p value	0.6361	0.0001	0.0001	0.9155	0.0117	0.0001	0.0001	0.5003	0.5680	0.0001	0.1128	
Panel B: Logit regression for testing firms with negative earnings surprises													
(3)	Coefficient	−0.97		1.48	0.14	−0.49	4.03	0.17	0.01	0.06	0.13	−0.01	1.99
	p value	0.0258		0.1020	0.2002	0.0240	0.0007	0.0001	0.2097	0.0499	0.0031	0.0834	
(4)	Coefficient	−1.01	7.22	0.92	0.15	−0.45	3.04	0.17	0.01	0.06	0.15	−0.01	2.23
	p calue	0.0203	0.0001	0.3026	0.1855	0.0384	0.0098	0.0001	0.0372	0.0435	0.0006	0.1131	

The sample covers 58,574 firm-quarter observations between 1990 and 2010

Year and industry dummies are included

The variables are defined as follows:

Dummy, in *Panel A*, is coded as one if a firm reporting *positive* earnings surprise receives *negative* CAR; and zero if a firm reporting *positive* earnings surprise receives *positive* CAR;

Dummy, in *Panel B*, is coded as one if a firm reporting *negative* earnings surprise receives *positive* CAR; and zero if a firm reporting *negative* earnings surprise receives *negative* CAR;

v 'other information' captured by analyst forecasts, measured at the end of quarter t. Other information is the residual from the regression of analyst forecasts of next period's earnings on current period's earnings, book value, and the most recent consensus analyst forecast for quarter t + 1 *before* earnings announcement in quarter t;

SURP earnings surprise, measured using the difference between actual earnings per share and the most recent analyst forecast *before* earnings announcement, divided by stock price at the end of quarter t;

SPECIAL absolute value of special items, scaled by total assets at the beginning of quarter t;

ABACC abnormal accruals, estimated by the approach in Dechow et al. (1995);

FERROR forecast error, measured as the difference between the actual earnings per share and the earliest forecast for quarter t made subsequent to the last quarter's earnings announcement, scaled by price at the beginning of the quarter;

$MBEQ_{t-4}$ an indicator variable, coded as 1 if the difference between actual earnings per share in quarter t is greater than or equal to actual earnings per share in quarter t − 4 is positive; 0, otherwise;

DISP dispersion of analyst earnings forecasts, measured as the standard deviation of analyst forecasts in quarter t, scaled by price at the beginning of the quarter;

COVERAGE analyst coverage, measured as log of number of analyst following;

Loss accounting loss, an indicator variable, coded as 1 when a loss occurs; 0, otherwise;

LTG consensus analyst forecasts of long-run growth, measured as percentage in the month following earnings announcement in quarter t

final sample consists of 58,574 observations from 1990 to 2010.[10] To ensure that extreme observations would not unduly influence our results, we winsorize all relevant variables at the upper and lower 1 ‰.

To determine the sign of earnings surprises, we use unadjusted analyst earnings forecasts. This approach avoids rounding errors in earnings due to stock-split adjustments (Payne and Thomas 2003). A firm is classified as having positive earnings surprises if its reported earnings per share is equal to or greater than the most recent analyst forecast prior to the earnings announcement.[11] To determine market reactions, we follow Kinney et al. (2002) to measure cumulative abnormal returns from 20 days before earnings announcement to 1 day subsequent to earnings announcement for quarter t.[12] For our market pricing tests, we estimate 30-, 60-, and 90-day size-adjusted cumulative abnormal returns starting from 1 day after consensus analyst forecast for quarter t + 1 made following announcement for quarter t earnings.

4.2 Descriptive statistics

Descriptive statistics are shown in Table 1 panel A. For the entire sample, we find that 71.17 % of firms report positive earnings surprises, 41.40 % generate the expected positive market reactions, and 29.78 % generate the unexpected negative market reaction. Of the 28.83 % of firms that report negative earnings surprises, 17.43 % generate the expected negative market reaction and 11.39 % generate the unexpected positive market reaction. In our temporal analysis (untabulated), we find that the probabilities of firms that receive the sign of market reactions opposite to earnings surprises remain stable across years, consistent with our contention that the market does not reward firms solely based on the sign of earnings surprises, but also considers other factors when reacting to earnings news.

For the partitions of positive market reactions with positive and negative earnings surprises ($PositiveES^{+}$ and $PositiveES^{-}$), we find significant differences in the means for abnormal returns, earnings, other information, earnings surprise, special items, abnormal accruals, forecast error, the sign of earnings surprise from the same quarter last year, forecast dispersion, accounting loss, and analysts' long-term growth forecast. We find significant differences across the partitions of negative market reactions with positive and negative earnings surprises ($NegativeES^{+}$ and $NegativeES^{-}$) in the means for abnormal returns, earnings, other information, special items, abnormal accruals, forecast error, the sign of earnings surprises from the same quarter last year, forecast precision, analyst coverage, accounting loss, and analysts' long-term growth forecast. In general, firms that receive positive market reactions have more favorable, higher levels of earnings and other

[10] The use of the statement of cash flow approach to estimate total accruals limits the data to be available after 1988, and the requirement of two consecutive years of data limits the start of our sample period to 1990.

[11] We also employ mean or median consensus analyst forecasts as the benchmark to avoid measurement errors of analyst forecasts. Our results are not sensitive to the various measures of analyst earnings expectations.

[12] As an alternative metric, we use cumulative market-adjusted returns (value-weighted and equally-weighted), buy-and-hold size-adjusted abnormal returns and buy-and-hold market-adjusted abnormal returns (value-weighted and equally-weighted) to conduct empirical tests. We also follow Skinner and Sloan (2002) by using announcement to announcement return windows in our tests. The resulting evidence remains similar. To ensure that our results are not affected by improper risk adjustment, we compute risk-adjusted returns using Carhart (1997) four-factor model and rerun our tests. The results with more refined risk adjustment are quantitatively similar.

information, and lower levels of special items, abnormal accruals, forecast error, forecast precision, and growth prospect estimated by analysts.

In Table 1 panel B, we present a correlation matrix among our key variables. We find a positive correlation between other information and abnormal returns, suggesting that investors indeed incorporate other information in assessing the earnings information at the time of earnings announcement. Further, other information is positively associated with earnings surprise and negatively related to special items and abnormal accruals.

5 Empirical results

5.1 Other information and the market's opposite reactions to earnings surprises

Table 2 reports our test results of whether other information is an explanatory factor for the opposite sign between market reactions and earnings surprises. In panel A, we present the regression results for those firms that report positive earnings surprises but generate negative market reactions. With regard to our variable of interest, other information, we find that the coefficient on v is <0 (at the 1 % level) in the model (2); and, the adjusted R^2 from the model (2) is almost 0.5 % higher relative to that of model (1). Other information is significant in explaining the opposite market reactions in that by including other information in the model (1), the adjusted R^2 increases by 27 %. Altogether, our findings indicate that other information is an important explanatory factor for negative market reactions to positive earnings surprises. Further, we find a negative coefficient on *SURP*, consistent with Kinney et al. (2002), who find that the greater the magnitude of earnings surprise, the lower the likelihood of an opposite sign between earnings surprise and market reactions. We also find that the coefficient on *ABACC* is positive and significant (at the 1 % level), consistent with the prior literature that the market adjusts for transitory components of earnings for earnings news in earnings announcement (e.g., Bartov et al. 2002; Johnson and Zhao 2012).

In panel B of Table 2, we present the regression results for those firms with negative earnings surprises but generate positive market reactions. With respect to other information, we find that the coefficient on v is significantly >0 (at the 1 % level), suggesting that other information, in part, explains the opposite sign between negative earnings surprises and positive market reactions and the explanatory power of other information is significant because adding other information in the model (3) increases the adjusted R^2 by 12 %. We find weak support that the market is more likely to reward firms with negative earnings surprises when the magnitude of earnings surprise is less negative as the coefficient on *SURP* is only marginally significant in model (3). As with panel A, we find *ABACC* continues to exhibit the predicted sign, which shows that the market assesses the transitory components of earnings in reacting to earnings news. Overall, the evidence in panel B confirms our findings in panel A, which indicates that other information provides significant incremental explanatory power to the existing materiality of earnings surprises and transitory earnings explanations for the opposite sign between market reaction and earnings surprise.[13] The rest of control variables in panels A and B are by and large exhibit predicted signs in line with those found in prior studies.

[13] We also consider whether the market incorporates accruals management in revising in its expectation. Specifically, we estimate discretionary accruals by the modified Jones model (Dechow et al. 1995) and deduct the earnings portion of discretionary accruals from our proxy for market expectations—the most recent analyst forecasts prior to earnings announcement. We repeat tests in Table 2, 4, 5 and 6, and the resulting evidence is quantitatively similar to our existing tables.

5.2 Earnings surprises by <1¢

Intuitively, the implications of beating or missing analyst projections by a small amount are likely to differ from beating or missing by a large amount. The extant literature provides evidence that firms engage in real activities or accrual management to meet or beat earnings targets and investors see just meeting or beating analyst forecasts by 1¢ as a red flag because those firms just meeting or beating by a small margin are suspects of earnings management (e.g., Roychowdhury 2006; Bhojraj et al. 2009; Keung et al. 2010). It is likely, therefore, that we will observe unequal percentages of opposite market reactions across different ranges of earnings surprises.

Table 3 reports the percentages of opposite market reactions across the 12 intervals. We find that 18.58 % of firms in our sample have positive earnings surprises by <1¢ while only 2.33 % of firms report negative earnings surprises by <1¢. The evidence is consistent with prior literature that finds a kink surrounding earnings benchmarks (e.g., Burgstahler and Dichev 1997; Dechow et al. 2003; Brown and Caylor 2005). Further, we find that the percentage of such opposite market reactions is higher for firms reporting small margins of earning surprises than for those reporting large margins. Specifically, 50.95 % of firms with earnings surprises in the [0, 1¢] range generated negative market reactions while such

Table 3 Frequency of positive and negative earnings surprises by intervals

Range	Full sample (%)	*PositiveES* partitions (%)		*NegativeES* partitions (%)	
		$PositiveES^{+}$	$PositiveES^{-}$	$NegativeES^{+}$	$NegativeES^{-}$
(8¢, ∞]	11.86	66.80	33.20		
(6¢, 8¢]	4.03	64.55	35.45		
(4¢, 6¢]	8.46	64.24	35.76		
(2¢, 4¢]	15.20	60.34	39.66		
(1¢, 2¢]	13.05	54.85	45.15		
[0, 1¢]	18.58	49.05	50.95		
[−1¢, 0)	2.33			42.66	57.34
[−2¢, −1¢)	6.47			43.85	56.15
[−4¢, −2¢)	6.34			39.01	60.99
[−6¢, −4¢)	3.51			37.62	62.38
[−8¢, −6¢)	2.02			35.98	64.02
[−∞, −8¢)	8.16			37.27	62.73

The sample covers 58,574 firm-quarter observations between 1990 and 2010

The variables are defined as follows:

PositiveES positive earnings surprise, if a firm's reported earnings per share is equal to or greater than the most recent analyst earnings forecast prior to earnings announcement in quarter t;

NegativeES negative earnings surprise, if a firm's reported earnings per share is lower than the most recent analyst earnings forecast prior to earnings announcement in quarter t;

$PositiveES^{+}$ firms that report *positive* earnings surprises with *positive CAR*;

$PositiveES^{-}$ firms that report *positive* earnings surprises with *negative CAR*;

$NegativeES^{+}$ firms that report *negative* earnings surprises with *positive* CAR;

$NegativeES^{-}$ firms that report *negative* earnings surprises with *negative* CAR;

CAR the size-adjusted cumulative abnormal return, where return interval is a 22-day return period from 20 days before to 1 day after earnings announcement for quarter t

percentage dropped to 33.20 % for firms with earnings surprises in the (8¢, ∞] range. Similarly, the percentage of such opposite market reactions is down from 42.66 % for firms in the [−1¢, 0) range to 37.27 % for firms in the [−∞, −8¢) range. This evidence is consistent with Kinney et al.'s (2002) argument that the "materiality" of the earnings surprise partly explains the opposite market reactions.

Keung et al. (2010) find that the market sees a firm that meets or beats analyst expectations by 1¢ as a red flag in that earnings response coefficient is significantly lower for firms that just meet or beat analyst forecasts by 1¢ than meet or beat by larger margins. The literature suggests this could be attributable to the market recognizing the managers' opportunistic behaviors. Fan and Wong (2002) find that earnings-return relation is low when investors perceive earnings as less credible for those firms that are likely to manage financial reporting opportunistically. Taken together, the market loses confidence in earnings from those firms that engage in opportunistic behaviors and thus may react more strongly to other information than to earnings information in firms that report earnings surprises by <1¢. As a result, we retest our regressions by including only those firms that fall within 1¢ of earnings targets.

In Table 4, we test whether other information is an explanatory power for the opposite sign between market reactions and earnings surprises <1¢. We find similar results to those presented in Table 2 in that the coefficient on other information remains statistically significant, suggesting that other information continues to explain, in part, the opposite sign between market reactions and earnings surprise <1¢. It is important to note that the coefficient on other information in panel B of Table 4 is almost twice as much as that in panel B of Table 2, suggesting that investors seem to place a greater weight on other information when they suspect potential earnings management. Overall, our finding provides evidence that other information provides incremental explanatory power to the literature's explanation of the opposite sign between market reactions and earnings surprises <1¢, in that the market reacts more strongly to other information when its skepticism of earnings management is high.

5.3 Sarbanes–Oxley (SOX) Act 2002

Reforms of corporate governance occurred because investors lost confidence in the integrity of corporate financial reporting (e.g., Healy and Palepu 2003; Eng and Lin 2012). As such, Congress passed the Sarbanes–Oxley Act (SOX) in 2002, in an attempt to restore investors' confidence in the financial reporting system. Koh et al. (2008) find that the market reacts less strongly to firms' meeting or beating analyst forecasts in the post-SOX period; specifically, the market's reward to firms' meeting or beating analyst forecasts by <1¢ disappeared and assigned a lower premium to firms' that beat analyst forecasts by more than 1¢. Their results indicate that the market views those firms that meet or slightly beat forecasts as suspects of earnings manipulation or expectation guidance. Since the investor scrutiny of financial reporting has been heightened since the introduction of SOX, this implies investors rely on information sources other than earnings to assess firms' meeting or beating analyst forecasts in the post-SOX period. We test whether the passage of SOX affects the explanatory power of other information for the opposite sign between market reactions and earnings surprises.

To test whether the passage of SOX affects the explanatory power of other information, we define the post-SOX period as periods after the fourth quarter of 2002 and the pre-SOX period as periods prior to the third quarter of 2001 (Koh et al. 2008). We include a dummy variable, *SOX*, in the regression model where the dummy variable is coded one if a firm-

Table 4 Tests of the explanatory power of other information for the opposite sign of market reactions to earnings surprises (earnings surprise within 1¢)

$$Pr(Dummy = 1) = F\left(\begin{array}{c}\alpha_0 + \alpha_1 v_{it} + \alpha_2 SURP_{it} + \alpha_3 SPECIAL_{it} + \alpha_4 ABACC_{it} + \alpha_5 FERROR_{it} \\ +\alpha_6 MBEQ_{t-4_{it}} + \alpha_7 DISP_{it} + \alpha_8 COVERAGE_{it} + \alpha_9 LOSS_{it} + \alpha_{10} LTG_{it} + \varepsilon_{it}\end{array}\right)$$

	Predicted sign	Intercept ±	*v* ?	SURP ?	*SPECIAL* +	*ABACC* +	*FERROR* −	$MBEQ_{t-4}$ −	*DISP* +	*COVERAGE* ?	*Loss* ?	*LTG* −	Pseudo R^2 (%)
Panel A: Logit regression for testing firms' meeting or beating analyst forecasts													
(1)	Coefficient	−0.00		28.64	−0.62	0.28	−30.52	−0.10	−0.01	0.01	−0.02	−0.00	2.30
	p value	0.9945		0.0003	0.1107	0.3389	0.0001	0.0168	0.4462	0.6979	0.9767	0.6842	
(2)	Coefficient	0.10	−12.92	25.44	−0.61	0.27	−25.18	−0.09	−0.01	0.01	−0.02	−0.01	2.70
	p value	0.8113	0.0001	0.0013	0.1307	0.3567	0.0001	0.0270	0.1803	0.8045	0.7420	0.4518	
Panel B: Logit regression for testing firms' missing analyst forecasts													
(3)	Coefficient	−11.44		83.96	−1.41	−1.44	6.83	0.07	0.01	−0.13	0.34	−0.05	8.49
	p value	0.9529		0.1537	0.1761	0.0700	0.4535	0.5556	0.8466	0.2116	0.0392	0.0395	
(4)	Coefficient	−11.67	11.55	66.54	−1.35	−1.36	3.22	0.06	0.01	−0.13	0.35	−0.05	8.77
	p value	0.9516	0.0896	0.2638	0.1984	0.0878	0.7313	0.6382	0.8189	0.2082	0.0341	0.0534	

The sample covers 12,244 firm-quarter observations between 1990 and 2010

Year and industry dummies are included

The variables are defined as follows:

Dummy, in *Panel A*, is coded as one if a firm reporting *positive* earnings surprise receives *negative* CAR; and zero if a firm reporting *positive* earnings surprise receives *positive* CAR; CAR is the size-adjusted cumulative abnormal return, where return interval is a 22-day return period from 2 days before to 1 day after earnings announcement for quarter t;

Dummy, in *Panel B*, is coded as one if a firm reporting *negative* earnings surprise receives *positive* CAR; and zero if a firm reporting *negative* earnings surprise receives *negative* CAR;

v 'other information' captured by analyst forecasts, measured at the end of quarter t. Other information is the residual from the regression of analyst forecasts of next period's earnings on current period's earnings, book value, and the most recent consensus analyst forecast for quarter t + 1 *before* earnings announcement in quarter t;

SURP earnings surprise, measured using the difference between actual earnings per share and the most recent analyst forecast *before* earnings announcement, divided by stock price at the end of quarter t;

SPECIAL absolute value of special items, scaled by total assets at the beginning of quarter t;

ABACC abnormal accruals, estimated by the approach in Dechow et al. (1995);

FERROR forecast error, measured as the difference between the actual earnings per share and the earliest forecast for quarter t made subsequent to the last quarter's earnings announcement, scaled by price at the beginning of the quarter;

$MBEQ_{t-4}$ an indicator variable, coded as 1 if the difference between actual earnings per share in quarter t is greater than or equal to actual earnings per share in quarter t − 4 is positive; 0, otherwise;

DISP dispersion of analyst earnings forecasts, measured as the standard deviation of analyst forecasts in quarter t, scaled by price at the beginning of the quarter;

COVERAGE analyst coverage, measured as log of number of analyst following;

Loss accounting loss, an indicator variable, coded as 1 when a loss occurs; 0, otherwise;

LTG consensus analyst forecasts of long-run growth, measured as percentage in the month following earnings announcement in quarter t

Table 5 Tests of the explanatory power of other information for the opposite sign of market reactions to earnings surprises (pre- vs. post-SOX period)

$$Pr(Dummy = 1) = F\left(\begin{array}{c}\alpha_0 + \alpha_1 v_{it} + \alpha_2 SURP_{it} + \alpha_3 SPECIAL_{it} + \alpha_4 ABACC_{it} + \alpha_5 FERROR_{it} \\ +\alpha_6 MBEQ_{t-4_it} + \alpha_7 DISP_{it} + \alpha_8 COVERAGE_{it} + \alpha_9 LOSS_{it} + \alpha_{10} LTG_{it} + \varepsilon_{it}\end{array}\right)$$

	Sign	Intercept ±	*v* ?	*SOX* ?	*v* × *SOX* ?	SURP −	*SPECIAL* +	*ABACC* +	*FERROR* −	$MBEQ_{t-4}$ −	*DISP* +	*COVERAGE* ?	*Loss* ?	*LTG* −	Pseudo R^2 (%)
Panel A: Logit regression for testing firms' meeting or beating analyst forecasts															
(1)	Coefficient	−0.17		−0.08		−17.37	−0.01	0.39	−11.86	−0.14	0.00	−0.01	0.19	−0.00	1.77
	p value	0.5404		0.4495		0.0001	0.9481	0.0030	0.0001	0.0001	0.3777	0.5900	0.0001	0.2889	
(2)	Coefficient	−0.09	−8.81	−0.02	−8.72	−16.83	−0.01	0.34	−8.38	−0.13	−0.00	−0.01	0.17	−0.01	2.31
	p value	0.7410	0.0001	0.8531	0.0001	0.0001	0.9164	0.0113	0.0001	0.0001	0.5042	0.5601	0.0001	0.1131	
Panel B: Logit regression for testing firms' missing analyst forecasts															
(3)	Coefficient	−1.08		0.12		1.49	0.14	−0.48	4.04	0.17	0.01	0.06	0.13	−0.01	2.00
	p value	0.0211		0.5168		0.1005	0.1973	0.0252	0.0006	0.0001	0.2092	0.0486	0.0030	0.0828	

Table 5 continued

$$Pr(Dummy = 1) = F\left(\begin{array}{c}\alpha_0 + \alpha_1 v_{it} + \alpha_2 SURP_{it} + \alpha_3 SPECIAL_{it} + \alpha_4 ABACC_{it} + \alpha_5 FERROR_{it} \\ +\alpha_6 MBEQ_{t-4_{it}} + \alpha_7 DISP_{it} + \alpha_8 COVERAGE_{it} + \alpha_9 LOSS_{it} + \alpha_{10} LTG_{it} + \varepsilon_{it}\end{array}\right)$$

	Sign	Intercept ±	*v* ?	*SOX* ?	*v* × *SOX* ?	SURP −	*SPECIAL* +	*ABACC* +	*FERROR* −	$MBEQ_{t-4}$ −	*DISP* +	*COVERAGE* ?	*Loss* ?	*LTG* −	Pseudo R^2 (%)
(4)	Coefficient	−1.14	4.28	0.11	7.05	0.96	0.17	−0.43	3.16	0.17	0.01	0.06	0.15	−0.01	2.30
	p value	0.0155	0.0130	0.5333	0.0067	0.2860	0.1389	0.0446	0.0074	0.0001	0.0399	0.0427	0.0006	0.1198	

The sample covers 54,375 firm-quarter observations between 1990 and 2010

Year and industry dummies are included in the regressions

The variables are defined as follows:

Dummy, in *Panel A*, is coded as one if a firm reporting *positive* earnings surprise receives *negative* CAR; and zero if a firm reporting *positive* earnings surprise receives *positive* CAR; CAR is the size-adjusted cumulative abnormal return, where return interval is a 22-day return period from 20 days before to 1 day after earnings announcement for quarter t;

Dummy, in *Panel B*, is coded as one if a firm reporting *negative* earnings surprise receives *positive* CAR; and zero if a firm reporting *negative* earnings surprise receives *negative* CAR;

v 'other information' captured by analyst forecasts, measured at the end of quarter t. Other information is the residual from the regression of analyst forecasts of next period's earnings on current period's earnings, book value, and the most recent consensus analyst forecast for quarter t + 1 *before* earnings announcement in quarter t;

SOX an indicator variable, coded as 1 if the firm-quarter falls in the quarter after the fourth quarter of 2002, and 0, if before the third quarter of 2001;

SURP earnings surprise, measured using the difference between actual earnings per share and the most recent analyst forecast *before* earnings announcement, divided by stock price at the end of quarter t;

SPECIAL absolute value of special items, scaled by total assets at the beginning of quarter t;

ABACC abnormal accruals, estimated by the approach in Dechow et al. (1995);

FERROR forecast error, measured as the difference between the actual earnings per share and the earliest forecast for quarter t made subsequent to the last quarter's earnings announcement, scaled by price at the beginning of the quarter;

$MBEQ_{t-4}$ an indicator variable, coded as 1 if the difference between actual earnings per share in quarter t is greater than or equal to actual earnings per share in quarter t − 4 is positive; 0, otherwise;

DISP dispersion of analyst earnings forecasts, measured as the standard deviation of analyst forecasts in quarter t, scaled by price at the beginning of the quarter;

COVERAGE analyst coverage, measured as log of number of analyst following;

Loss accounting loss, an indicator variable, coded as 1 when a loss occurs; 0, otherwise;

LTG consensus analyst forecasts of long-run growth, measured as percentage in the month following earnings announcement in quarter t

Table 6 Tests of the market's reactions to earnings surprises in decile portfolios of other information

v	SURP	30-Day CAR	60-Day CAR	90-Day CAR
VP1	P1	0.003	0.009	0.025
	P10	0.021	0.047	0.057
	P10–P1	0.018	0.038	0.032
	p value	0.0798	0.0158	0.0780
VP10	P1	0.006	0.025	0.016
	P10	0.010	0.016	0.023
	P10–P1	0.003	−0.009	0.007
	p value	0.7217	0.4602	0.6485

The sample covers 58,574 firm-quarter observations between 1990 and 2010

The variables are defined as follows:

CAR the size-adjusted abnormal returns, starting from 1 day after consensus analyst forecast for quarter t + 1 made following earnings announcement for quarter t, adjusted for 3-day return surrounding earnings announcement in t + 1 for 30-, 60-, and 90-day;

v 'other information' captured by analyst forecasts, measured at the end of quarter t. Analyst forecast information is calculated by regressing analyst forecasts of next period's earnings on current period's earnings, book value, and the most recent consensus analyst forecast for quarter t + 1 before earnings announcement in quarter t. The residual from that regression serves as our proxy for analyst forecast information;

SURP earnings surprise, measured using the difference between actual earnings per share and the most recent analyst forecast before earnings announcement, divided by stock price at the end of quarter t;

P1 the lowest decile portfolio sorted by *SURP*;

P10 the highest decile portfolio sorted by *SURP*;

VP1 the lowest decile portfolio sorted by *v*;

VP10 the highest decile portfolio sorted by *v*

quarter falls in the post-SOX period and zero, otherwise. We also add an interaction term, $v \times SOX$, which captures the extent to which other information explains the opposite market reactions to earnings surprises in the post-SOX period.

Table 5 reports the empirical results. The coefficient of SOX on panel A does not load, which indicates that the percentages of the opposite sign between market reactions and positive earnings surprises are not different between the pre- and post-SOX periods. The coefficients on other information and its interaction term with SOX, however, are negative with statistical significance, suggesting that other information is one of the factors that explain the opposite market reactions and has a greater explanatory power for the opposite market reactions to earnings surprises in the post-SOX period. In panel B, we again find that the prevalence of opposite market reactions to negative earnings surprises in the post-SOX period does not change relative to that in the pre-SOX period. The coefficients on other information and its interaction term are positive and statistically significant, which again confirms the role of other information in explaining the opposite signs between market reactions and earnings surprises and the market's increasing influence of other information other information as an explanatory factor for the opposite market reactions. Overall, our findings suggest that investors assess firms' meeting or beating analyst forecasts in a more careful manner and other information plays an increasingly important role in the post-SOX period.

5.4 'Other information' and investors' assessments of earnings information

Prior literature that studies the market's mispricing of earnings information mostly investigates whether the market fully comprehends the time-series property of earnings and/or implications of transitory earnings for future earnings (e.g., Ball and Bartov 1996; Sloan 1996; Xie 2001). However, little attention has been paid to whether other information would possibly affect investors' assessments about current earnings for future earnings. We, therefore, test whether the extent of the availability of other information in the market would exacerbate or mitigate the market's mispricing for earnings information.

To conduct our test, we first sort other information (v) and earnings surprise ($SURP$) into decile portfolios, respectively, with P1 (VP1), indicating the portfolio with the lowest value for earnings surprise (other information) and P10 (VP10), indicating the portfolio with the highest value for earnings surprise (other information). We calculate 30-, 60-, and 90-day size-adjusted abnormal returns for each decile and then compare the size-adjusted abnormal returns between P1 and P10 of earnings surprise. We expect the difference of size-adjusted returns between P1 and P10 to be positive, based on prior studies that consistently indicate that the market under-reacts to earnings news such that an investment strategy based on buying long the portfolio with highest earnings surprise and selling short the portfolio with the lowest earnings surprise is expected to yield positive abnormal returns (e.g., Bernard and Thomas 1989, 1990; Ball and Bartov 1996). However, we expect abnormal returns generated from the investment strategy based on earnings surprise to differ in the magnitude of other information. If other information provides incremental information for investors to assess the persistence of current earnings for future earnings, we would expect other information to mitigate or eliminate the market's underpricing for earnings information. In such a case, we would expect to see abnormal returns derived from the earnings surprise-based investment strategy to be lower in VP10 than in VP1 formed by other information. Conversely, if other information increases the level of noise, investors would have more difficulties valuing current earnings for future earnings. In such a case, we would expect other information to amplify the market's under-reaction to earnings information and abnormal returns derived from the earnings surprise-based investment strategy to be higher in VP10 than in VP1.

The empirical results are reported in Table 6. Consistent with the prior literature, we find the abnormal returns generated from the earnings surprise-based investment strategy (P10–P1) are positive; however, we find that the positive abnormal returns from 30- to 90-days are not statistically significant in the VP10, which suggests that the market does not seem to under-react to earnings news when the amount of other information is high. In contrast, we find abnormal returns are positive and statistically significant in the VP1, which indicates that the market under-reacts to earnings news when the amount of other information is low. Overall, the evidence suggests that other information helps investors gauge the persistence of current earnings for future earnings and the degree of mispricing for earnings news partly depends on the amount to which other information is available to investors.

5.5 Market pricing of 'other information'

Given investors employ other information in assessing firms' meeting or beating analyst forecasts, we investigate whether they fully incorporate the implications of other information for future earnings into stock prices.

In testing whether the market adjusts its reaction to earnings news based on the 'other information' reflected by analyst forecasts, we develop a model that tests for mispricing of analyst forecast information, controlling for risk factors and the possible overpricing of abnormal accruals and underpricing of SUE that have been previously documented by the prior literature (e.g., Basu 1977, Bernard and Thomas 1989, 1990; Fama and French 1992; Ball and Bartov 1996; Xie 2001). We follow Rajgopal et al. (2003) and Kraft et al. (2007) to conduct market mispricing test by using the Fama and MacBeth (1973) hedge portfolio approach.

We construct the Fama and MacBeth (1973) hedge portfolio as follows. First, we rank the magnitude of surprise of other information into deciles from 0 to 9, by year and quarter. Second, we divide the decile number by nine so each decile number now takes a value from 0 to 1. To ensure that the overpricing of analyst forecast information is distinct from that of abnormal accruals and not sensitive to risk adjustment, we follow the same procedure above to form deciles based on abnormal accruals, firm size, earnings-to-price ratio, and book-to-market ratio.[14] As a result, the following equation serves as our test model for mispricing:

$$Ret_{it+1} = \gamma_0 + \gamma_1 v_{it}^{dec} + \gamma_2 ABACC_{it}^{dec} + \gamma_3 Size_{it}^{dec} + \gamma_4 EP_{it}^{dec} + \gamma_5 BTM_{it}^{dec} + \gamma_6 SUE_{it}^{dec} + \varepsilon_{it} \quad (5)$$

where Ret_{it+1}, the size-adjusted abnormal returns, starting from 2 days after earnings announcement in t, adjusted for 3-day return surrounding earnings announcement in t + 1 for 30-, 60-, and 90-day; v_{it}^{dec}, a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by other information; other information is the residual from the regression of consensus analyst forecasts for quarter t + 1 subsequent to earnings announcement in quarter t on book value, earnings in quarter t, and the most recent consensus analyst forecast for quarter t + 1 before earnings announcement in quarter t; $ABACC_{it}^{dec}$, a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by abnormal accruals; abnormal accruals are estimated by the approach in Xie (2001); $Size_{it}^{dec}$, a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by size; size is measured as stock price at the end of the quarter t times shares outstanding at the end of quarter t adjusted by stock splits; EP_{it}^{dec}, a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by earnings-to-price ratio where earnings-to-price ratio is measured as earnings per share divided by stock price at the end of quarter t; BTM_{it}^{dec}, a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by book-to-market ratio where book-to-market ratio is measured as book value per share divided by price at the end of quarter t; SUE_{it}^{dec}, a value between 0 and 1, calculated as the decile number divided by 9, where decile is ranked by surprise of unexpected earnings, measured using the difference between earnings in quarter t and t − 4, divided by stock price at the end of quarter t.

The coefficient (γ_1) on v_{it}^{dec}notes abnormal returns generated from a zero-investment hedge portfolio that assumes a long position for firms in the highest decile and a short position for firms in the lowest decile. If other information is overpriced, we would expect γ_1 to be negative. If other information is underpriced, however, we would expect γ_1 to be positive. We cannot provide a directional prediction on mispricing of analyst forecast

[14] As a robustness check, we test Eq. (5) by regressing total accruals rather than abnormal accruals. We also perform this additional test by measuring abnormal accruals using the modified Jones model (Dechow et al. 1995) as well as the performance-matched abnormal accruals model (Kothari et al. 2005). We found no significant differences in our findings from this additional set of tests.

Table 7 The relation between other information and future returns: tests of market pricing for other information

$Ret_{it+1} = \gamma_0 + \gamma_1 v_{it}^{dec} + \gamma_2 ABACC_{it}^{dec} + \gamma_3 Size_{it}^{dec} + \gamma_4 EP_{it}^{dec} + \gamma_5 BTM_{it}^{dec} + \gamma_6 SUE_{it}^{dec} + \varepsilon_{it}$

	Predicted sign	Intercept ±	v^{dec} ±	ABACC^{dec} −	Size^{dec} −	BTM^{dec} +	EP^{dec} +	SUE^{dec} +	Adj. R^2 (%)
30-Day	Coefficient	0.007	−0.005	−0.009	−0.004	0.008	0.007	0.005	0.84
	p value	0.0089	0.0101	0.0001	0.0295	0.0001	0.0006	0.0115	
60-Day	Coefficient	0.014	−0.008	−0.019	−0.013	0.004	0.015	0.009	0.80
	p value	0.0003	0.0020	0.0001	0.0001	0.1505	0.0001	0.0021	
90-Day	Coeff.	0.022	−0.011	−0.028	−0.013	0.003	0.019	0.006	0.79
	p value	0.0001	0.0006	0.0001	0.0001	0.3983	0.0001	0.0557	

The sample covers 58,574 firm-quarter observations between 1990 and 2010

Standard errors estimated in the regressions are clustered by firms

The variables are defined as follows:

Ret_{t+1} the size-adjusted abnormal returns, starting from 2 days after earnings announcement in t, adjusted for 3-day return surrounding earnings announcement in t + 1 for 30-, 60-, and 90-day;

v^{dec} a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by other information, measured as the residual from the regression of consensus analyst forecasts for quarter t + 1 subsequent to earnings announcement in quarter t on book value, earnings in quarter t, and the most recent consensus analyst forecast for quarter t + 1 *before* earnings announcement in quarter t;

$ABACC^{dec}$ a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by abnormal accruals, estimated by the approach in Xie (2001);

$Size^{dec}$ a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by size, measured as stock price at the end of the quarter t times shares outstanding at the end of quarter t adjusted by stock splits;

EP^{dec} a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by earnings-to-price ratio, measured as earnings per share divided by stock price at the end of quarter t;

BTM^{dec} a value between 0 and 1, calculated as decile number divided by 9 where decile is ranked by book-to-market ratio, measured as book value per share divided by price at the end of quarter t;

SUE^{dec} a value between 0 and 1, calculated as the decile number divided by 9 where decile is ranked by surprise of unexpected earnings (SUE), measured using the difference between earnings in quarter t and t − 4, divided by stock price at the end of quarter t

information, however, since the extant literature provides evidence of both overpricing and underpricing of 'other information'.

We base our test model on a zero-investment hedge portfolio, and test whether a trading strategy based on analyst forecast information generates abnormal returns. Our return measurement periods range from 30 to 90 days, starting from 2 days after earnings announcement for quarter t.[15] Table 7, panel A reports results of our test for market mispricing. We find that v is significantly negatively associated with 60- and 90-day size-adjusted abnormal returns, which suggests that, in aggregate, the market misprices the 'other information' reflected by analyst forecasts, and that the mispricing results from the market's *overpricing* 'other information'.[16] As a calibration check of our model, we also find that abnormal accruals, SUE, and other risk factors generally exhibit the predicted signs across all of our regressions, consistent with the expectations of the prior literature. Collectively, our findings suggest that that while other information is helpful in assessing the persistence of earnings information, investors do not fully gauge the persistence of other information for future earnings, which leads to overpricing of other information.

6 Sensitivity tests

6.1 Firms that just meet analyst forecasts

Although prior literature has shown a positive market reaction to a firm that meets or beats analyst forecasts and a negative market reaction to a firm that misses analyst forecasts (e.g., Bartov et al. 2002; Kasznik and McNichols 2002; Skinner and Sloan 2002), it is still unclear as to why the market would reward a firm that just meets and a firm that beats the market's expectation for its reported earnings in the same manner. As a result, we retest our regressions by excluding a sample of firms that just meet analyst forecasts. We find that the results (untabulated) are similar in terms of magnitude and statistical significance. For example, compared with the findings in Table 2, the magnitude of the coefficient on v is -12.40 (p value $= 0.0001$) after excluding firms that just meet analyst forecasts.

6.2 Three-day returns tests

We also conduct our analyses using a short 3-day returns window to allow for comparability to market response studies (e.g., Johnson and Zhao 2012). We retest our regressions that test analyst forecast information as an explanatory factor for the opposite reactions of the market to the earnings news. To the extent that other information captured by the proxy for the 'other information' reflected by analyst forecasts decreases in the length of time window, the shortened window will likely reduce the power of our tests. Indeed, the untabulated results from testing a 3-day window are similar but weaker relative to our findings using the 22-day window tabulate in Table 2. The magnitudes of coefficients on

[15] To avoid the situation where earnings information in subsequent periods contaminates our measure of the market's reaction to analyst forecast information, we set the 90-day window as being the shorter of: the 90-day period starting from 2 days after earnings announcement for quarter t; or, the period starting from 2 days after earnings announcement for quarter t to 2 days before earnings announcement for quarter t + 1.

[16] Regressions are adjusted for firm-clustering. We also run regressions by year and take average of coefficients from 21 annual cross-sectional regressions. The results are quantitatively similar.

v from the three-day window are -10.45 (p value $= 0.0001$) and 7.18 (p value $= 0.0001$), respectively.

7 Conclusions

In this study, we find that 42 % of firms with positive earnings surprises generate negative market reactions and 40 % of firms with negative earnings surprises receive positive market reactions. We find that the opposite market reactions to earnings surprises is explained, in part, by the market incorporating information beyond that of earnings. We do not find evidence, however, supporting the argument that other information injects noise into market expectations. Further, our findings indicate that the influence of other information on market reaction to earnings news is greater when earnings surprises are <1¢ and during the post-SOX period. With respect to the extent to which the market mispricing of earnings information, we find that the extent to which other information is available to the market mitigates the miss-estimation of earnings persistence. However, investors do not fully comprehend the implication of other information for future earnings and tend to overestimate the persistence of other information.

This paper further our understanding about capital market consequences of meeting or beating analyst forecasts and how it relates to managers' incentives for managing earnings to top analyst forecasts. This study also enhances our understanding about how the market weighs other information in reacting to earnings news, especially when earnings information is viewed as less credible by investors. While regulators' concerns focus on whether earnings information is priced rationally by the market, our study indicates that the market prices earnings information rationally would also depend partly on the availability of 'other information' to investors. Our study is important because investors recently have heightened their scrutiny over corporate financial reporting in response to the string of accounting scandals, and thus seem to rely more on other information in assessing earnings news. However, we show that the subjective and complex nature (i.e., reliability) of other information, relative to earnings information, may lead to market mispricing for other information. Further efforts on how to increase the reliability of other information may be necessary to improve the efficiency of price discovery for other information.

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