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Giving context to accounting numbers: The role of news coverage

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ABSTRACT

Accounting numbers such as earnings per share are an important information source that conveys the value of firms. Previous studies on the return-earnings relation have confirmed that stock prices react to the information content in accounting numbers. However, other information sources such as financial news may also contain value-relevant information and affect investors' reaction to earnings announcements. We quantify news coverage about S&P 500 companies in the *Wall Street Journal* (WSJ) before earnings announcements and model its interaction with the return-earnings relation. Our empirical results show that news coverage decreases the information content of unexpected earnings and thus leads to a lower earnings response coefficient (ERC) for firms with higher news coverage. Statistically significant interaction between news coverage and unexpected earnings was observed. News coverage does not impact cumulated abnormal returns directly. We further document that this finding is not driven by firm size. The results suggest that financial news may play an important role in conveying value-related information to the markets.

1. Introduction

Accounting numbers are an important means for management to communicate firm performance to outside investors. Through regularized financial statements, investors receive creditable and useful firm-specific information, which helps them better evaluate the true value of firms. High quality accounting numbers not only reduce the information asymmetry between managers and outside investors, but also facilitate sound investment decisions and the efficiency of security markets.

The usefulness of accounting numbers has been an important issue for accounting researchers and general investors. Using the earnings response coefficient (ERC) to measure the magnitude of the relationship between stock returns and earnings, previous studies have concluded that the ERC is significantly positive [25] and numerical earnings information indeed conveys value-relevant information to the markets. The empirical results suggest that a favorable earnings surprise induces positive abnormal stock returns, while an unfavorable earnings surprise induces negative abnormal stock returns.

Accounting numbers, nonetheless, are not the only source of information conveying the fundamental value of firms. Other sources, such as financial news, trade association publications, and reports issued by analysts and brokerage houses may also contain useful information. These alternative information sources often provide timely updates between earnings announcements and may play an important role in shaping investors' beliefs. The magnitude of the ERC, as a result, may be influenced by these information sources.

While highly circulated financial news has been shown to impact short-term market returns [32], few studies have investigated how financial news impacts the return-earnings relation. Tetlock et al. [33] quantified sentiment in news articles by counting words associated with negative outlooks. Their empirical results showed that the fraction of negative words in firm-specific news stories forecasts low firm earnings. Previous studies on ERCs have identified four important determinates: earnings persistency, firm risk, firm growth, and interest rate [7,13,25]. However, these studies have not examined the interaction between the information content of earnings and news articles.

Given the limitations of previous studies, our research aims at investigating how financial news coverage impacts the return-earnings relation. To the best of our knowledge, this is the first study that documents how financial news coverage affects investors' reactions to accounting earnings. We used the *Wall Street Journal* (WSJ) as the representative source of financial news and collected news articles discussing S&P 500 companies from August 1999 to February 2007. Our collection contains 283,457 news articles and spans more than seven years. This testbed provides a solid ground for statistical inference. Firm-level news coverage computed from our news collection facilitates our investigations on the interaction between financial news coverage and return-earnings relation.

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The remainder of the paper is organized as follows. Section 2 provides a review of related literature followed by the discussion of the research objectives and hypotheses in Section 3. In Section 4, we describe our data sources and empirical models. The main findings of the study are presented in Section 5. Section 6 discusses the managerial implications of our results. We conclude with a summary and future research directions in Section 7.

2. Literature review

The seminal works of Ball and Brown [2] and Beaver [5] spawned the study of the information content of accounting numbers. Researchers study a wide range of topics via the return-earnings relation and the event study framework [14,25]. In this section we first summarize the earnings response coefficient research and then focus on two major aspects that are directly relevant to this study: lagged performance information in accounting earnings and asymmetry in the return-earnings relation.

2.1. Earnings response coefficient

The information content of accounting numbers can be measured by the extent to which security prices change in response to the announcement of financial statements. One of the most commonly used measures is the Earnings Response Coefficient, ERC. Specifically, an ERC is estimated using the following model:

$$CAR_{it} = a + bUE_{it} + e_{it}$$

where e_{it} is white noise and CAR_{it} (Cumulated Abnormal Return; CAR) is the measure of risk-adjusted return for security i cumulated over an event window around the earnings announcement at time t. The ERC literature often adopts Fama and French three-factor model [15], which incorporates excess market returns (market returns minus risk-free interest rates), small minus large firm returns (SML), and high minus low book-to-market firm returns (HML) as main risk factors. Expected returns can be computed after the loadings of risk factors are estimated using historical data. Abnormal returns are the difference between actual stock returns and their expected returns computed with the three-factor model. It is a common practice to accumulate the abnormal returns over a period of time to capture the market reaction to earnings events.

UE_{it} is the unexpected earnings divided by security price at time t. Unexpected earnings capture the earnings variation that has not yet been incorporated into the investors' belief. There are two approaches commonly used to compute unexpected earnings. The first approach estimates expected earnings based on a time series model. The second approach uses analysts' forecasts as a proxy for market expectation. Empirical evidence suggests that analysts' forecasts are a better proxy for market expectation of earnings [27].

The estimated value of coefficient b is the ERC. While there is consensus that the ERC is significantly positive [25], the magnitude of the ERC may vary across firms. Collins and Kothari [7] suggested that the information environment, which can be broadly defined to include all sources of information relevant to firm value assessment, is an important determinant of ERCs. Their study, nonetheless, did not directly measure the information environment but instead looked at other determinants such as earnings persistency, firm risk, firm growth, and interest rates. Other studies that looked at the economic determinants of ERCs have identified various characteristics that affect ERCs. Notable determinants include: firm size [8,13], capital structure [11], earnings persistence [24], earnings quality [10,16], and similarity of investor expectations [1].

2.2. Lagged performance information in accounting earnings

Accounting earnings measurement emphasizes transaction-based revenue recognition. As a result, a large portion of the information embedded in earnings is historical in nature. Security prices, on the other hand, reflect both current earnings as well as future earnings information that are available to the market [26]. As a result, value-relevant information in accounting earnings may have been incorporated into stock prices before earnings announcements are issued. Only a small portion of the earnings information content can be captured by measuring the stock price reaction around earnings events. The "price lead earnings" viewpoint [6] provides a compelling explanation of why estimated earnings response coefficients are small in comparison to theoretical predictions [25].

The "price lead earnings" viewpoint has been verified by empirical studies that expand the return-earnings measurement window [12], include leading period return [22,26], and include future earnings and future returns [9]. However, most of these studies failed to explore other information sources that may have contained future earnings information. Financial news is one such information source [29,30]. Before being officially announced, information related to a firm's earnings is sometimes disclosed through various news reports. Investors could incorporate the information into their determination of reasonable security prices. The return-earnings relation can be better modeled if relevant information from financial news could be captured.

2.3. Asymmetry in the return-earnings relation

Previous studies have documented that security markets react to positive and negative earnings surprises differently. Positive earnings surprises were found to be associated with larger price responses [20,28]. One possible reason is that widely adopted accounting conservatism recognizes probable losses as they are discovered but defers revenue until it is verified [19]. This practice increases the speed that accounting numbers reflect economic losses compared to economic gains. Timely recognition of economic losses leads to lower autocorrelations of negative shocks in earnings time series. The consequence is that accounting losses during the current period are less likely to signal future losses while accounting gains are more likely to signal future gains. This time series property is often referred to as the lower persistency of accounting losses relative to accounting gains [4]. Lower persistency is known to decrease ERCs [24].

Studies on firm disclosure activities point out that firm management is motivated to disclose bad news earlier in fear of litigation risk [18]. This explanation suggests that information about a forthcoming negative earnings surprise may have been released earlier, which leads to lower ERC when the bad earnings are officially announced. The asymmetry in the return-earnings relation should be controlled in the empirical study so that valid results could be obtained.

3. Hypotheses development

In this study, we aim to investigate the role of financial news coverage in determining the ERC. Financial news contains timely updates on firm value. The "price lead earnings" viewpoint suggests that investors would have incorporated the information from financial news into stock prices before the earnings announcements. The information content of earnings announcements, as a result, is reduced by news coverage. In other words, we expect a negative relationship between news coverage and ERCs:

H1. Firms with higher news coverage before their earnings announcements are associated with lower ERCs.

Fig. 1 schematically shows the hypothesized relationships in the research model. Measured by the ERC, the thick horizontal arrow

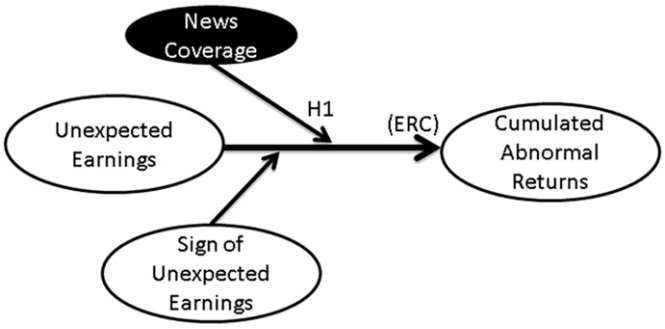

Fig. 1. Research model. Control variables: return momentum, size, book-to-market ratio, and share turnover.

indicates the relationship between unexpected earnings and cumulated abnormal returns. Hypothesis H1 asserts that news coverage moderates this relationship; higher news coverage reduces the ERC.

4. Research methodology

4.1. Research testbed

We used articles from the WSJ to develop our research testbed. News articles from August 1999 through February 2007 were collected from the ProQuest database. We retrieved 283,457 news articles in total for the 91-month period and developed a system for automatic analysis of firm news coverage. We focused on S&P 500 companies because financial news tends to cover large firms. The monthly S&P 500 companies list was obtained from the Center for Research on Security Prices (CRSP) database.

Daily stock prices were obtained from CRSP and analysts' forecasts were retrieved from the Institutional Brokers' Estimate System (IBES). While accounting numbers are publicly available from the EDGAR system [17], the data are not in a consistent format across firms or time period. We instead downloaded accounting numbers from the Compustat North American Annual and Quarterly database, which contained the same numerical data but in a structured format.

4.2. Firm-based news coverage analysis

We conducted firm-based news coverage analysis by creating a system that automatically extracts and standardizes firm names. We defined that a firm received news coverage in a news article if the firm's name was mentioned at least once in the article. One news article may be associated with zero, one, or more firms. Our procedure implicitly assumes that all firms mentioned in a news article are equally important.

Fig. 2 presents the system design for firm-based news coverage analysis. Our system performs named entity recognition and standardizes the recognized company names by consulting the "stocknames" table in the CRSP monthly stock price dataset (SM). Standardized firm IDs (PERMCO) are then attached to matched entities.

The design of our firm name matching process follows a tight-to-loose approach. Each recognized named entity goes through a three-stage matching process. The first stage matches the full named entity string against the firm names in the stocknames table. Since the company names in the stocknames table do not contain punctuation, all punctuation marks in the original named entity string are replaced with white spaces. Extra white spaces (two or more consecutive white spaces) are removed. The process stops if the named entity string matches with an entry in the stocknames table.

In the second stage, the named entity string is gradually truncated when matching against firm names in the stocknames table. Each time the last word in the named entity string is removed if the previous string does not match with any entries. A match is obtained if the truncated named entity string is identical to the beginning part of a firm name in the stocknames table. The process stops if the truncated named entity string matches with an entry or the truncated string contains fewer than 2 words.

The third stage handles possible complications that involve acronyms. If part of a company name is an acronym, the company names in stocknames table often contain additional white spaces (e.g., "U S AIRWAY GROUP INC"). We address this issue by detecting acronyms in the recognized named entity and inserting additional white space between characters of an acronym before the matching process.

To investigate the interaction between news coverage and return-earnings relation, the news frequency before earnings announcements was computed. We computed news frequency for each earnings announcement event using a $[-20, -1]$ trading day window relative to the earnings announcement date. This twenty-trading day window, which is roughly equal to one month, allows most firms to have news coverage before earnings announcements and facilitates the subsequent statistical inference. Using trading day instead of calendar day can mitigate coverage variations caused by trading holidays.

4.3. Empirical model specification

The basic abnormal return/unexpected earnings specification was used as a baseline model to evaluate all subsequent modifications [8]. The regression model takes the following form:

$$\begin{aligned} CAR_{it,[0,z]} = {} & a + b_1 UE_{it} + b_z Due_{it} UE_{it} + g_1 FFalpha_{it} + g_2 \log(Size_{it}) \\ & + g_3 \log(BM_{it}) + g_4 \log(STurnover_{it}) + h_1 FFalpha_{it} UE_{it} \\ & + h_2 \log(Size_{it}) UE_{it} + h_3 \log(BM_{it}) UE_{it} \\ & + h_4 \log(STurnover_{it}) UE_{it} + e_{it} \end{aligned} \quad (1)$$

where Due_{it} is 1 if UE_{it} is positive and 0 if UE_{it} is negative. $CAR_{it,[0,2]}$ is the cumulated abnormal return of firm i over the trading day window [0, 2] relative to an earnings announcement day t. The three-trading day window captures the immediate response of earnings announcements [28]. While a longer event window may increase the magnitude of ERC, the effects of other events during a longer window may interfere with the change of stock prices and bias the results [25].

We adopted the Fama–French three-factor model to control for common risk factors [15]. The values of the three risk factors (excess

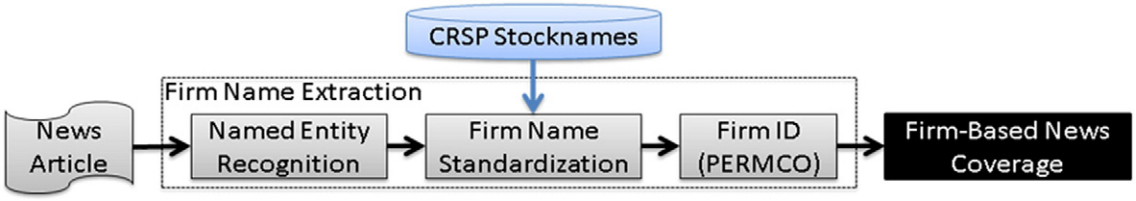

Fig. 2. System design for firm-based news coverage analysis.

market return, SML and HML) were downloaded from Dr. Kenny French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html). For each earnings event, the regression coefficients estimated over the trading day window [−252, −21] relative to an earnings announcement day were used to compute abnormal returns during the [0, 2] window. The sum of the abnormal returns during the [0, 2] event window is our dependent variable. Excluding 20 trading days before earnings announcements avoided the confounding of the estimated coefficient with earnings announcements. The last term e_{it} is white noise.

The covariate UE_{it} is the unexpected earnings computed based on the difference between the realized earnings and analysts' forecasts, divided by the stock price of firm i at day t. Both the realized earnings per share (EPS) and analysts' forecast were obtained from the IBES database. We retrieved the analyst's most recent monthly mean forecast before earnings announcements. $FFalpha_{it}$ is the estimated intercept in the Fama–French three-factor model used to compute abnormal returns. This variable is used to control the return momentum effect [23]. Other independent variables, including $\log(Size_{it})$, $\log(BM_{it})$, and $\log(STurnover_{it})$, are control variables for firms' market value at time t, book-to-market ratio at time t, and share turnover rate during the reporting quarter associated with time t. Firm size ($\log(Size_{it})$) has been shown to influence the ERC [28]. Book-to-market ratio ($\log(BM_{it})$) is related to future growth of a firm. A lower book-to-market ratio signals higher growth and vice-versa [31]. Previous studies reported that growth firms tend to have higher ERCs [28]. All interaction terms between control variables and UE_{it} are included to capture the potential moderating effect of control variables.

Note that by rearranging Eq. (1), it implies that the ERC of firm i at time t is $b_1 + b_2 Due_{it} + h_1 FFalpha_{it} + h_2 \log(Size_{it}) + h_3 \log(BM_{it}) + h_4 \log(STurnover_{it})$. That is, the ERC is a function of the sign of unexpected earnings as well as other control variables. Coefficient b_1 is the ERC of a firm with zero $FFalpha_{it}$, $\log(Size_{it})$, $\log(BM_{it})$, and $\log(STurnover_{it})$ when unexpected earnings are negative. Coefficient b_2 captures the difference in the ERC between positive and negative earnings surprises. Coefficient h_j (j = 1,2,3,4) captures the effect of control variables on the ERC. For example, h_1 can be interpreted as the change of the ERC when $FFalpha_{it}$ increases by one.

Hypothesis H1 predicts that firms with higher news coverage before earnings announcements are associated with a lower ERC. This hypothesis can be tested by including two terms that capture news coverage and the interaction between news coverage and an earnings surprise:

$$\begin{aligned} CAR_{it,[0,2]} = {} & a + b_1 UE_{it} + b_2 Due_{it} UE_{it} + c_1 NewsFrequency_{it} \\ & + c_2 NewsFrequency_{it} UE_{it} + g_1 FFalpha_{it} + g_2 \log(Size_{it}) \\ & + g_3 \log(BM_{it}) + g_4 \log(STurnover_{it}) + h_1 FFalpha_{it} UE_{it} \\ & + H_2 \log(Size_{it}) UE_{it} + h_3 \log(BM_{it}) UE_{it} \\ & + h_4 \log(STurnover_{it}) UE_{it} + e_{it} \end{aligned} \quad (2)$$

where $NewsFrequency_{it}$ is the number of news articles that have mentioned firm i during the trading day window [−20, −1] relative to the earnings announcement date t. We computed $NewsFrequency_{it}$ via the output of our firm-based news coverage analysis system. While our goal is to test the interaction between news coverage and unexpected earnings, $NewsFrequency_{it}$ is also included following the framework for testing moderator effects [3].

By adding news coverage into the empirical model, the ERC of firm i at time t becomes $b_1 + b_2 Due_{it} + c_2\, NewsFrequency_{it} + h_1 FFalpha_{it} + h_2 \log(Size_{it}) + h_3 \log(BM_{it}) + h_4 \log(STurnover_{it})$. The magnitude of c_2 can be interpreted as the change in the ERC if firm i is covered in one additional news article during the 20 trading-day pre-announcement window. Hypothesis H1 predicts that c_2 is negative.

5. Empirical results

We estimated Eqs. (1) and (2) via ordinary least square regression. The upper and lower 1% of UE_{it} and $CAR_{it,[0,2]}$ were winsorized (i.e., extreme values were replaced with the 1% or 99% percentile values) to guard against outliers. The upper 1% of $NewsFrequency_{it}$ was also winsorized. Winsorizing selected variables prevents the potential negative effects of extreme values when conducting regression analysis. Our main results would remain qualitatively the same if unwinsorized data were used. The final sample consists of 11,201 firm-quarter observations. Descriptive statistics of variables for Eqs. (1) and (2) are summarized in Table 1. The average cumulated abnormal return ($CAR_{it,[0,2]}$) during the [0, 2] trading day window relative to earnings announcements is 0.00370 but is not significantly different from zero. The average of unexpected earnings is quite small (0.00046) with a relative large dispersion (std. dev. = 0.00275) even after winsorization. The mean of $NewsFrequency_{it}$ indicates that on average each S&P 500 company is mentioned in 5.971 news articles during the 20 trading days before earnings announcements. Market value ($Size_{it}$), book-to-market ratio (BM_{it}) and share turnover ($STurnover_{it}$) were transformed using the logarithm function to correct their skewed distributions.

In our sample, 33% of firm-quarters did not have news coverage. The estimation results may therefore be driven by firm-quarters with and without news coverage instead of by the level of news coverage. To guard against this potential problem, we also report the estimation results using a subsample that contains firm-quarters with news coverage during the 20-trading-day window before earnings announcement. There were 7539 firm-quarters in this subsample.

Table 2 presents the summary statistics in the subsample with news coverage. The average of $CAR_{it,[0,2]}$ and UE_{it} is lower compared to the whole sample. The difference, nonetheless, is small compared to their standard deviations. The means and standard deviations of control variables are similar to those in the full sample. It is not surprising to see that the mean of $NewsFrequency_{it}$ increases from 5.917 to 8.790.

5.1. Baseline models

Table 3 reports the estimation results of the baseline model (Eq. (1)). The first two columns of Table 3 list a simplified version of Eq. (1) that excludes the interaction terms between unexpected earnings and control variables. The result shows that the ERC is 4.51

Table 1
Descriptive statistics of all firm-quarters.

Variable	Obs.	Mean	Median	Std. dev.	Min.	Max.
$CAR_{it,[0,2]}$	11,201	0.00370	0.00315	0.05890	−0.17951	0.17239
UE_{it}	11,201	0.00046	0.00033	0.00275	−0.01360	0.01057
$NewsFrequency_{it}$	11,201	5.917	1.000	14.026	0.000	93.000
$FFalpha_{it}$	11,201	0.00028	0.00023	0.00134	−0.00767	0.01200
$\log(Size_{it})$	11,201	23.053	22.963	1.186	16.633	27.128
$\log(BM_{it})$	11,201	−1.118	−1.049	0.760	−8.047	2.066
$\log(STurnover_{it})$	11,201	−0.986	−1.073	0.638	−2.986	2.369

Table 2
Descriptive statistics of firm-quarters with news coverage.

Variable	Obs.	Mean	Median	Std. dev.	Min.	Max.
$CAR_{it,[0,2]}$	7539	0.00270	0.00235	0.05892	−0.17951	0.17239
UE_{it}	7539	0.00044	0.00032	0.00290	−0.01360	0.01057
$NewsFrequency_{it}$	7539	8.790	3.000	16.341	1.000	93.000
$FFalpha_{it}$	7539	0.00027	0.00023	0.00135	−0.00767	0.01200
$log(Size_{it})$	7539	23.311	23.211	1.219	16.633	27.128
$log(BM_{it})$	7539	−1.128	−1.054	0.777	−8.047	1.474
$log(STurnover_{it})$	7539	−1.003	−1.095	0.635	−2.986	1.597

and is significantly positive. The result is consistent with previous studies on ERCs [8,26]. The estimated coefficient of UE_{it} is smaller using the with-news sample. Before moving to the results of the more complicated model, we note that this pattern is consistent with our intuition that firms with news coverage have smaller ERCs. Two control variables, $FFalpha_{it}$ and $log(Size_{it})$, are significant, indicating a systematic variation of cumulated abnormal returns with respect to momentum and firm size.

The last two columns of Table 3 report the estimation results using all covariates in Eq. (1). Consistent with previous studies on asymmetry in the return-earnings relation [20,28], the coefficient of $Due_{it}UE_{it}$ is significantly positive, which indicates that positive unexpected earnings are associated with larger ERCs compared to negative unexpected earnings. The estimated coefficient of $log(BM_{it})UE_{it}$ is significantly negative (−2.26). As discussed before, a lower book-to-market ratio signals higher growth and vice-versa [31]. The significant coefficient is consistent with previous studies that document higher ERCs for growth firms [28]. Firm size has also been identified to be a determinant of ERCs. The estimated coefficient of $log(Size_{it})UE_{it}$, nonetheless, is not significant, while the sign of the coefficient is consistent with previous studies [28]. The estimated coefficient of $log(STurnover_{it})UE_{it}$ is significant using the full sample but shows insignificant results when the subsample was used. $FFalpha_{it}UE_{it}$ is not significant in our baseline model.

5.2. The effect of news coverage

Table 4 reports the estimation results of Eq. (2). As listed in the last two columns, our main concern is the interaction between news coverage and unexpected earnings ($NewsFrequency_{it}UE_{it}$). The estimated coefficient of $NewsFrequency_{it}UE_{it}$ is significantly negative. The estimation result suggests that, other things being equal, the ERC decreases −0.064 if a firm appears in one additional news article. A lower ERC indicates smaller market reactions given the same unexpected earnings and other firm characteristics. Our empirical result supports hypothesis H1, which predicts a negative coefficient for $NewsFrequency_{it}UE_{it}$. It is interesting to note that the estimated coefficient for news coverage ($NewsFrequency_{it}$) is not significant. It means that $NewsFrequency_{it}$ does not influence CAR directly; the influence is through moderating the return-earnings relation.

Table 3
Regression results of the baseline model.

	Baseline: Eq. (1) (omit interaction)		Baseline: Eq. (1) (full model)	
	Full sample	With news	Full sample	With news
Intercept	0.052***	0.043***	0.042***	0.035**
UE_{it}	4.51***	4.18***	8.76**	7.50
$Due_{it}UE_{it}$			1.046***	1.054***
$FFalpha_{it}$	−3.48***	−4.04***	−3.32***	−3.89***
$log(Size_{it})$	−0.0022***	−0.0018***	−0.0019***	−0.0016***
$log(BM_{it})$	−0.00061	0.000073	−0.00056	−0.00012
$log(STurnover_{\downarrow it})$	−0.00076	−0.0014	−0.0012	−0.0023**
$FFalpha_{it}UE_{it}$			23.55	142.60
$log(Size_{it})UE_{it}$			−0.30	−0.23
$log(BM_{it})UE_{it}$			−2.26***	−1.87***
$log(STurnover_{\downarrow it})UE_{it}$			−0.84***	−0.35
Adj. R-square	0.049	0.049	0.057	0.056

***, **, * indicate statistical significance at the 0.01 0.05 and 0.1 levels respectively.

Table 4
The effect of news coverage on ERC.

	News coverage: Eq. (2) (omit interaction)		News coverage: Eq. (2) (full model)	
	Full sample	With news	Full sample	With news
Intercept	0.043***	0.038**	0.049***	0.043***
UE_{it}	8.82**	7.69	−3.40	−6.87
$Due_{it}UE_{it}$	1.040***	1.040***	1.11***	1.12***
$NewsFrequency_{it}$	0.0000081	0.000019	0.000062	0.000070
$NewsFrequency_{it}UE_{it}$			−0.064***	−0.065***
$FFalpha_{it}$	−3.31***	−3.88***	−3.27***	−3.84***
$log(Size_{it})$	−0.0019***	−0.0017**	−0.0022***	−0.0020***
$log(BM_{it})$	−0.00057	−0.00016	−0.00078	−0.00034
$log(STurnover_{it})$	−0.0012	−0.0023**	−0.0015	−0.0026**
$FFalpha_{it}UE_{it}$	23.48	142.40	−32.16	85.16
$log(Size_{it})UE_{it}$	−0.30	−0.24	0.29	0.46*
$log(BM_{it})UE_{it}$	−2.26***	−1.87***	−1.97***	−1.56***
$log(STurnover_{it})UE_{it}$	−0.84***	−0.35	−0.53*	0.054
Adj. R-square	0.056	0.055	0.059	0.058

***, **, * indicate statistical significance at the 0.01 0.05 and 0.1 levels respectively.

Given the empirical support for the interaction between news coverage and unexpected earnings, it is important to know whether the significant result is driven by firm size. As reported in the first two columns of Table 4, the estimated coefficient of $log(Size_{it})UE_{it}$ is negative when the interaction between news coverage and unexpected earnings ($NewsFrequency_{it}UE_{it}$) is excluded. The estimated coefficient of $log(Size_{it})UE_{it}$ becomes positive when $NewsFrequency_{it}UE_{it}$ is included in the empirical model. Moreover, $NewsFrequency_{it}UE_{it}$ is significant at a 99% confidence level across both samples while $log(Size_{it})UE_{it}$ is only significant at a 90% confidence level in the "with news" subsample. The results suggest that the interaction between news coverage and unexpected earnings is not a size effect despite relatively high correlation between the size of a firm and its news coverage (correlation coefficient = 0.468; p-value <0.01). Previous studies have documented lower ERCs for larger firms [8,13], but the lower ERCs may have been affected or caused by news coverage that was omitted in the empirical models.

6. Discussion

Our empirical results have several important implications for managers and investors. First, if managers prefer higher CARs around earnings events, then only when the unexpected earnings are negative should managers release information regarding forthcoming earnings during the pre-announcement period. The reason can be explained by taking expectation to Eq. (2) and differentiating with respect to $NewsFrequency_{it}$:

$$\frac{\partial E\left(CAR_{it,[0,2]}\right)}{\partial NewsFrequency_{it}} = c_1 + c_1 UE_{it} \equiv NN_{it}$$

where NN_{it} is the expected change of $CAR_{it,[0,2]}$ given one additional news coverage. From Table 4 the estimated values for c_1 and c_2 are 0.000062 and −0.064. Since c_1 is not significantly different from zero, it is omitted in this analysis (i.e., setting $c_1 = 0$). Substituting the estimated value of c_2 back to the above equation gives $NN_{it} = -0.064UE_{it}$. In other words, the marginal effect of additional news coverage on expected change of CAR is positive only if the unexpected earnings are negative. Having more news coverage before positive unexpected earnings actually hurts expected CAR. Given that firm management prefers

higher CAR, the results suggest that the management should not release news if a positive earnings surprise is expected.

Second, if investors want to profit from the price movement around earnings announcements, they should avoid firms with a high level of news coverage. Financial instruments such as call, put, and straddle options [21] can be used to profit from significant stock price movements. While the investment strategies may vary depending on available information and investors' belief, stock prices need to move significantly in the expected direction in order to offset the costs associated with these financial instruments and profit from the investment strategies. Given the fact that news coverage reduces the ERC, investors should avoid firms with high news coverage if they are betting on large stock price movements.

Finally, our empirical results are based on news coverage computed from the WSJ. The WSJ is a mainstream newspaper that reaches a broad range of readers. Other news sources may reach a different group of readers and have different impacts on stock prices. For instance, newswires are usually subscribed by institutional investors and delivers firm-specific information with small delay. While it may be difficult for small firms to be covered by the WSJ, it is relatively easy for the management to transmit news through newswire. Similar effects may be achieved through newswires.

7. Conclusions and future research directions

This study investigates the influence of news coverage on the ERC, which measures the information content of earnings. We collected news articles in the *Wall Street Journal* from August 1999 through February 2007 to construct measures for news coverage on S&P 500 companies. Combined with data from classical financial databases such as IBES, Compustat and CRSP, we were able to study the effect of news coverage on earnings surprise.

Our empirical results indicate that news coverage has a significantly negative effect on the ERC; higher news coverage decreases the information content of earnings and reduces market responses to unexpected earnings. While news coverage is correlated with firm size, the empirical evidences suggest that our findings are not a size effect. In addition, news coverage is not subsumed by book-to-market ratio, share turnover rate, and return momentum.

Our study highlights the importance of financial news in conveying value-related information to the markets. We plan to include more information sources such as newswires, blogs and forum discussions to further investigate the interaction and relative importance of different sources. We are also interested in studying the interaction between news sentiment and return-earnings relations. Sophisticated firm-based sentiment measures may reveal the underlying relationship among various textual information sources and how investors interpret the sentiment under the context of firm valuation.

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