Corporate Earnings News and Firm-Level Investor Sentiment

--Empirical analysis of China's financial markets

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Abstract. Corporate earnings announcements are usually regarded as important corporate news, which is related to investor sentiment. In the past, research on earnings news was limited to the earnings news itself, but did not study the relationship between returns and investor sentiment. The objective of the study is to study the impact of firm-level investor sentiment on the stock market, especially in the stock price reaction after the release of corporate earnings announcements. This paper mainly focuses on selected stocks in the CSI 300 index and explores the reaction of firm-level investor sentiment on stock prices based on the relationship between investor behavioral bias and accounting anomalies by using the event study methodology. The results of the study revealed that the level of investor sentiment affects their acceptance of corporate earnings surprises. Specifically, higher investors react more to positive earnings surprises, while lower investors react more to positive accounting surprises, and lower investors react more to positive accounting surprises. The results of the study revealed that:(1) the level of investor sentiment affects the degree of acceptance of firms' earnings surprises.Investors with higher sentiment respond more to positive earnings surprises, while those with lower sentiment are less accepting of positive earnings surprises.The result suggests that investor sentiment not only affects their individual investment decisions, but also has an important impact on the market as a whole.(2) Investors with lower sentiment are more receptive to negative earnings surprises, but the impact on stock prices is not significant, which may indicate that investors with lower sentiment are more pessimistic and more inclined to see negative news about firms, but due to other factors, this sentiment does not have a significant effect on the market.

Keywords: Investor Sentiment; Behavioral Finance; CSI 300 Index; Company News

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1 Introduction

1.1 Research background

In recent years, investor sentiment has become one of the hot topics in financial research. Broadly defined as the degree of optimism or pessimism of investors towards financial markets (Baker and Wurgler, 2006)[1], many studies (e.g., Brown et al., 2005)[2] have shown that investor sentiment affects the price of assets, and investors tend to develop psychological preferences and confirmatory biases due to overconfidence in private information (Daniel et al., 1998)[3] and the possession of confirmatory bias (Rabin and Schrag, 1999)[4]. Behavioral finance suggests that the resulting heterogeneity of investor psychology and behavior will have an impact on investors' heterogeneous beliefs, which will in turn affect the stock price of the firm. Firms' earnings announcements are often regarded as important corporate news and are associated with investor sentiment; therefore, this paper links match firm-level sentiment to the sensitivity of price around earnings announcements.

1.2 Research content

To investigate the impact of sentiment and stock price reaction to earnings announcements, this paper constructs an investor sentiment index by referring to Zhou et al. (2015)[5], and Seok et al. (2019)[6]. The article matches sentiment of 20 days before the date of the news was announced with the cumulative returns of the three days surrounding the announcement, and compares the stock price sensitivity of the high-sentiment firms. To avoid the influence of risk-based interpretations on the results, the article uses three stock return measures: the raw, factor-adjusted, and the the market excess return, which is computed by event study methodology.

1.3 Research process

The structure of this paper is as follows: the first part is the introduction, the second part reviews the literature on investor sentiment and earnings announcements, the third part introduces the data and empirical methodology of this paper, the fourth part analyzes the empirical results, and finally, the conclusion of this paper.

2 Literature review

According to the CAPM[8][9][10][11], excess return is the difference between an asset's actual return and its expected return. In the CAPM framework, the existence of excess returns is usually explained as a result of the fact that the degree of risk of certain assets is higher than that of the market as a whole, leading investors to demand higher returns, and therefore changes in stock returns depend on changes in fundamentals (cash flows or discount rates).

However, behavioural finance researchers have argued that the failure of the efficient market hypothesis presupposes the existence of some financial theory, namely investor sentiment, which allows for excess returns in the stock market. The main theories of early behavioural finance were: cognitive bias, prospect theory (Kahneman and Tversky, 1979)[12] and the herd effect. Subsequent researchers have expanded on the traditional theories, arguing that investors have psychological preferences and cognitive biases due to overconfidence in private information and confirmation bias, as well as media bias and guidance. Behavioural finance argues that such heterogeneous psychology and behaviour of investors will have an impact on investors' heterogeneous beliefs and thus on the volatility of returns, and that when the difference in beliefs increases, it will affect the volatility of returns. When the difference in beliefs increases, it will increase the volatility of returns, which in turn will generate abnormal returns and excess returns.

Research on investor sentiment is divided into mechanistic research and measurement research. Mechanistic research focuses on the causes and definitions of investor sentiment, Zweig (1973)[13] argues that the main factor in the generation of individual investor sentiment is expectation bias.Shleifer (1991)[14] argues that the root cause of sentiment is a price range that deviates from intrinsic value. Shleifer (1997)[15] argues that investor sentiment is the process by which an investor establishes values and investment views.Shleifer (2000)[16] argues that systematic bias is investor sentiment.Brown (2004)[17] argues that investor sentiment can be defined in terms of the process by which sentiment is formed and the future volatility it expects in the financial market. Wang and Sun (2004)[18] define investor sentiment as the deviation of rational valuation from emotional valuation. Bae and Wang (2010) [19] find that the expected returns of stocks with different valuations are affected by investor sentiment.Firth et al(2015)[20] construct A-share sentiment by adding seven variables to the traditional metrics using principal component analysis. Yu and Zhang(2012)[21] study GEM stocks and use the Fama-French three-factor model to demonstrate that trading indicators are positively correlated with investor attention and that the A-share market is dominated by individual investors.

Metrics research focuses on the construction of investor sentiment indicators. Since a single sentiment factor can only consider and analyse the mechanism from one perspective and cannot satisfy the four factors of volume, price, time and space, researchers have gradually constructed multiple composite indexes to portray the sentiment. Baker (2006)[1] for the first time synthesised the BW index with six sentiment factors such as closed-end fund discount rate, turnover rate, number of IPOs, and first day yield and premium rate. Their study shows that when the sentiment index is high at the beginning, the return will be relatively low, and vice versa.Yi and Mao (2009)[22] draw on the BW index compilation method and refer to the actual situation in China to synthesise the investor sentiment index after eliminating the influence of macroeconomic variables. Mangee (2017)[23] uses the Net Psychological Index (NPI) as a measure of sentiment and finds that the Net Psychological index predicted an increase in stock returns in the short run. Zhou et al. (2015)[5] constructed a new sentiment measure using principal component analysis of

relative strength index, psychological line index, turnover rate and trading volume, which provided ideas for our study.

The study of earnings information is an important part of the study of the relationship between news and investor sentiment. The post-earnings-announcement-drift (PEAD) was proposed by Ball and Brown (1968)[24]. It is obvious that the PEAD effect is inconsistent with the efficient market hypothesis. Daniel et al. (1998)[3] argued that investors' overconfidence in the accuracy of their private information leads to market underreaction, and Kong (2008)[25] argued that investors' underreaction is due to the existence of arbitrage risk; the higher the arbitrage risk, the stronger the PEAD effect. Li and Wang(2006)[26] argues that when information uncertainty is high, investors react more slowly to earnings information and the PEAD effect is stronger.

Veronesi (1999)[27] shows that stock prices of firms with high sentiment are likely to react more strongly to bad news and vice versa. Furthermore, previous studies on earnings news and investor sentiment have mainly used the Baker and Wurgler (2006)[1]sentiment index , which measures the sentiment of the entire market, but does not consider the earnings surprises differences among different firms nor analyze investor sentiment at the firm level. Besides, previous research on earnings news has mainly used a classification test to examine the impact of sentiment on earnings around the earnings publication date while ignoring the impact of sentiment on earnings. Such models fail to consider the impact of sentiment on earnings. Thus, this paper refers to the methodologies from Zhou et al. (2015)[5] and Seok et al. (2019)[6] in constructing a firm-level investor sentiment index. The research aims to analyze the sensitivity of stock prices to earnings news by controlling for the impact of sentiment on returns using the obtained index.

3 Sample selection and empirical methods

3.1 Earnings surprises

In this paper, researchers study the data of 300 listed stocks included in the CSI 300 index from January 2018 to December 2022, excluding one stock with ST and PT treatment, and the earnings announcement data of the stock market is obtained from the CSMAR database.

Referring to the SUE indicator constructed by Wu et al.(2015)[28], the earnings indicator is defined as the half-year earnings per share EPS, and the first half of the year EPS is adjusted for the EPS announced in the interim report using the year-end total equity, and the equity adjustment formula is as follows.

$$EPS^{*}_{\mathrm{fh}} = EPS_{\mathrm{fh}} \frac{G_{\mathrm{fh}}}{G_{\mathrm{y}}} \tag{1}$$

$$EPS_{\mathrm{sh}} = EPS_{\mathrm{y}} - EPS^{*}_{\mathrm{fh}} \tag{2}$$

Where EPS_{fh} and EPS^{*}_{fh} denote the EPS of the first half year reported before and after adjustment, respectively. EPS_{sh} denotes the 2nd- half -year EPS, and EPS_{y}

denotes the EPS announced in the annual report.G_{fh} denotes the total equity at the end of the first half of the year as announced in the interim report, andG_{y} denotes the total equity at the end of the year as announced in the annual report.

The standardized unexpected earnings (SUE) of firm i in half-year t is defined as

$$SUE_{i,q} = \frac{EPS_{i,q} - EPS_{i,q-2}}{\sigma_{i,q}} \tag{3}$$

Where i is the name of stock,q is the number of the half-year before the announcement, $EPS_{i,q}$ is the EPS . $EPS_{i,q} - EPS_{i,q-2}$ is the unexpected EPS,and the $\sigma_{i,q}$ is the standard deviation of unexpected EPS, $EPS_{i,q} - EPS_{i,q-2}$,in the five half-years, i.e., q[-6,-1].

Therefore, the factor need at least six consecutive half-yearly data to measure the earnings surprise, in our selection of the CSI 300 index contains 300 listed company stocks in which 49 do not have complete earnings data, and then exclude 1 ST stock with financial problems, and finally choose 250 stocks from January 2018 to December 2022 with a total of 2,500 earnings data, and calculate the total SUE from June 2020 From June 2020 to December 2022, a total of 1,250 SUEs are calculated.

3.2 Sentiment indicators

Researchers refer to Zhou et al. (2015)[5] and Seok et al. (2019)[6] to construct an investor sentiment index to measure daily firm-level investor sentiment. In the Chinese stock market, researchers use four basic sentiment indicators to investigate the aggregate impact of investor sentiment on stock returns. Researchers use four daily basic sentiment proxies: relative strength index (RSI), psychological line index (PSY), adjusted turnover rate (ATR), and the logarithm of trading volume (LTV)

Relative Strength Index (RSI) is a common market indicator to measure the degree of relative overbought or oversold of a stock.RSI is as follows.

$$RSI_{i,t} = \left[\frac{RS_{i,t}}{1+RS_{i,t}}\right] \times 100 \tag{4}$$

$$RS_{i,t} = \frac{\sum_{k=0}^{13} max(P_{i,t-k} - P_{i,t-k-1}, 0)}{\sum_{k=0}^{13} max(P_{i,t-k-1} - P_{i,t-k}, 0)} \tag{5}$$

where, i is the name of stock,q is the number of the half-year before the announcement, $P_{i,t}$ is the closing price. If the Relative Strength Index is below 50, it usually means that the stock's losses are outweighing its gains, and if the Relative Strength Index is above 50, it usually means that the gains are outweighing the losses. An RSI greater than 80 indicates that the market is overbought, and an RSI less than 20 indicates that the market is oversold.

Psychological Line Index (PSY): Kim and Ha (2010) use PSY to construct a composite investor sentiment index. PSY is as follows.

$$PSY_{i,t} = \left[\sum_{k=0}^{11} \left\{ \frac{max(P_{i,t-k} - P_{i,t-k-1}, 0)}{P_{i,t-k} - P_{i,t-k-1}} \right\} \times \frac{1}{12} \right] \times 100 \tag{6}$$

Where i is the name of stock,t is the date of announcement, P denotes the closing price. PSY less than or equal to 25 indicates that the market is oversold and PSY greater than or equal to 25 indicates that the market is overbought.

Adjusted Turnover Rate (ATR):

$$ATR_{i,t} = \frac{V_{i,t}}{numberofshareoutstanding_{i,t}} \times \frac{R_{i,t}}{|R_{i,t}|} \tag{7}$$

Where i is the name of stock,t is the date of announcement, $V_{i,t}$ is the trading volume, and $R_{i,t}$ is the return, calculated as $R_{i,t} = \left(\frac{P_{i,t}}{P_{i,t-1}}\right) - 1$.

The Logarithm of Trading Volume (LTV) captures liquidity and reflects investors' expectations and outlook for the stock (Baker and Stein, 2004). LTV is as follows.

$$LTV_{i,t} = ln(V_{i,t}) \tag{8}$$

Where i is the name of stock,t is the date of announcement.

Each variable is a common investor sentiment index, and in order to mitigate the co-dependence of each variable on the stock market as a whole, researchers constructed market-free variables that remove overall market changes by regressing each component on excess stock market returns.

$$Comp_{k,i,t} = \alpha_0 + \alpha_1 \times Market_t + \varepsilon_{k,i,t} \tag{9}$$

Where i is the name of stock,t is the date of announcement, the $Market_t$ represents the excess return. This is calculated by subtracting the risk-free rate (Chinese three-month time deposit rate of 1.1%) from the market return (calculated by the CSI 300 index return). The dependent variable $Comp_{k,i,t}$ could be one of the RSI, PSY, ATR or LTV of stock i at moment t. Residuals $\varepsilon_{k,i,t}$ is considered as a market-free proxy for investor sentiment. in the following equations, it is denoted by labeling superscripts *. These four market-free components are then subjected to principal component analysis according to Baker and Wurgler (2006)[1] to eliminate idiosyncratic, sentiment-independent factors. First of all, it is necessary to standardize the above variables to eliminate the dimensional differences. Next, an investor sentiment index $(S_{i,t})$ is constructed based on the first principal component $(F_{i,t})$ of each firm i at time t , the coefficients of the principal component variables of investor sentiment index are determined by taking the weighted average of each principal component. Simultaneously, the coefficients of each variable are adjusted to ensure that investor sentiment index has unit variance.

$$S_{i,t} = F_{i,RSI} \times RSI_{i,t}^{*} + F_{i,PSY} \times PSY_{i,t}^{*} + F_{i,RSI} \times ATR_{i,t}^{*} + F_{i,ATR} \times RSI_{i,t}^{*} + F_{i,LTV} \times LTV_{i,t}^{*} \tag{10}$$

Researchers uses the 20 trading days sentiment, which is the average from day t-20 to day t-1, to study the sensitivity of return and SUE, which may be biased the day before the announcement date due to information asymmetry. Nonetheless, as a robustness check, the researchers also employ the sentiment of on day t-1 and the average sentiment from day t-5 until day t-1.

3.3 Accumulated earnings around the date of the earnings announcement

The researchers used three methodologies to calculate the cumulative abnormal return rate of the two days before the announcement day and the announcement day.

(1) The three-day cumulative raw returns.

$$raw\ return = \prod_{j=0}^{2}(1 + R_{t+j,i}) \tag{11}$$

Where t is announcement day, $R_{k,i}$ is the raw return of stock i in day k

(2) The factor-adjusted returns by controlling for the risk factors of size and book-to-market ratio, following the derivation of the Fama-French three-factor model. Specifically, researchers define the small and large portfolios in terms of the firm's market value when the first half-year end. Then, for each portfolio, researchers define the value, neutral, and growth portfolios in terms of the firm's book-to-market ratio at when the first half-year end. The book-to-market ratio is the ratio of the firm's book value of equity at the end of year t-1 to its market value at the end of June in year t. Researchers then calculate the daily return for each portfolio using the firm's market capitalization to book-to-market ratio when the first half-year end.

$$FactorAdjustedReturn = \prod_{j=0}^{2}(1 + R_{t+j,i}) \tag{12}$$

Where $R_{t+j,i}$ is adjusted return.

(3) Researchers compute market excess returns following Dellavigna and Pollet (2009) as an alternative measure of abnormal returns.

Researchers regress $R_{k,i} = \alpha_{i,q} + \beta_{i,q} R_{k,m}$ to obtain $\beta_{i,q}$ of firm i in q month. In this context, k represents the earnings announcement date of firm i in the given half-year q, ranging from t-300 to t-46. Afterwards, the three-day cumulative market excess return can be calculated by researchers using the following formula.

$$Market\ Excess\ Return = \left[\prod_{j=0}^{2}(1 + R_{t+j,i}) - 1\right] - \beta_{i,q}\left[\prod_{j=0}^{2}(1 + R_{t+j,m}) - 1\right] \tag{13}$$

Where $R_{k,i}$ is the raw return, $R_{k,m}$ is the return of the CSI 300 index.

3.4 Descriptive statistics

Investor Sentiment Grouping: If the sentiment on the t-1 day is higher than the median sentiment based on the period from June 2020 to t-1 day, it belongs to the high sentiment group; otherwise, it belongs to the low sentiment group.

Table 1. Descriptive statistics

		Raw $\times 10^{-2}$	Factor-adjusted $\times 10^{-2}$	Market Excess $\times 10^{-2}$	Total SUE	Positive SUE	Negative SUE	Sentiment
Master Sample	Mean	1.01	0.109	0.009	0.554	1.339	-0.917	0.036
	Std. Dev	0.055	0.048	0.049	1.405	0.992	0.715	4.965

	minimum	0.763	0.672	-0.205	-7.204	0.007	-7.204	-14.667
	maximum	1.286	0.684	0.267	7.156	7.156	0	15.106
High Sent	Mean	1.026	0.549	0.025	0.646	1.364	-1.045	3.873
	Std. Dev	0.053	0.054	0.05	1.414	1.035	1.035	3.083
Low Sent	Mean	0.992	0.675	-0.008	-4.054	1.095	-0.936	0.455
	Std. Dev	0.051	0.047	0.042	2.893	-1.082	0.722	1.39
Difference	Difference	1.1844	5.26	17.6129	0.1736*	3.7532	0.0647*	2.5213
	t-test	-0.276	-0.153	0	-0.677	-0.053	-0.799	-0.112

The t-statistics are in parentheses and the superscripts *, ** and *** indicate significance at the 10%,5% and 1% levels, respectively.

Table 1 presents summary statistics of the main variables for the overall sample obtained by the researchers. The researchers segmented the sample into two subgroups based on the sentiment.

4 Empirical results

4.1 Sensitivity of stock price to earnings news

Sensitivity of stock price to earnings news by sentiment.

This paper aims to investigate the sensitivity of stock prices to earnings news by measuring the stock price reaction to unexpected earnings on the announcement date. Early findings suggest that there are only partially reaction to the news when the direction of earnings news differs from their expectation. Therefore, we test the relationship between sentiment and stock price elasticity using regression formulas (14) and (15).

$$Ret_{0,2} = \alpha_0 + \alpha_1 Down_{i,t} + \alpha_2 Sent_{i,t-1} + \beta_0 UpSUE_{i,t} + \beta_1 UpSUE_{i,t} \times Sent_{i,t-1} + \gamma_0 DownSUE_{i,t} + \gamma_1 DownSUE_{i,t} \times Sent_{i,t-1} + \varepsilon_{i,t} \quad (14)$$

$$Ret_{0,2} = \alpha_0 + \alpha_1 Down_{i,t} + \alpha_2 Sent_{i,t-1} + \beta_0 positiveSUE_{i,t} + \beta_1 UpSUE_{i,t} \times Sent_{i,t-1} + \beta_2 NonlUp_{i,t} + \beta_3 NonlUp_{i,t} \times Sent_{i,t-1} + \gamma_0 DownSUE_{i,t} + \gamma_1 DownSUE_{i,t} \times Sent_{i,t-1} + \gamma_2 NonlDown_{i,t} + \gamma_3 NonlDown_{i,t} \times Sent_{i,t-1} + \varepsilon_{i,t} \quad (15)$$

Where Ret refers to three kinds of abnormal return in day t for stock i. Down is a dummy variable equal to 1 for negative SUE and 0 for positive SUE. If SUE is positive, UpSUE is equal to SUE, and zero otherwise. Similarly, if SUE is negative, DownSUE is equal to SUE, and zero otherwise.

Equation (15) includes control variables for the nonlinear impact of earnings surprises on stock prices,the researchers construct two control variables, NonlUp as

the square of UpSUE and NonlDown as the square of DownSUE, along with their interaction terms with sentiment.

The measurement results for equations (14) and (15) are presented by the researchers in Table 2. The models without sentiment variables and their interaction terms are shown in model 1 and model 3, respectively. The results of equation (14) are displayed in model 2, while the results of equation (15) are shown in model 4.

Table 2. Regression results

variables	(1)model 1	(2)model 2	(3)model 3	(4)model 4
Panel A		Raw Returns		
Down	-0.0075**	-0.0065**	-0.0033**	-0.0032**
	(-2.30)	(-2.05)	(-1.69)	(-1.67)
UpSUE	0.0005	-0.0008	0.0070*	0.0060*
	(0.25)	(-0.42)	(1.56)	(1.44)
DownSUE	0.0043	0.0055*	0.0023	0.0068*
	(1.17)	(1.57)	(0.67)	(1.72)
sent		-0.0056***		-0.0058***
		(-7.33)		(-9.12)
UpSUE×Sent		0.0005***		0.0008***
		(4.91)		(6.96)
DownSUE×Sent		-0.0008		-0.0014*
		(-1.26)		(-1.51)
NonlUp			0.0016*	0.0017*
			(1.60)	(1.75)
NonlDown			0.0000	0.0002
			(0.00)	(0.10)
NonlUp×Sent				0.0001
				(0.34)
NonlDown×Sent				0.0002
				(0.73)
Intercept	0.0105***	0.0107***	0.0063***	0.0064***
	(7.48)	(7.67)	(6.36)	(6.42)
Adj. R^2	0.0025	0.1955	0.0046	0.1981
Panel B		Factor-adjusted Returns		
Down	-0.026***	-0.0478***	-0.0425***	-0.0345***
	(-3.80)	(-5.85)	(-5.53)	(-4.59)
UpSUE	0.0042	-0.0149***	0.0143***	0.0057*
	(0.57)	(-2.85)	(2.78)	(1.45)
DownSUE	0.0454***	0.0578***	0.0378***	0.0157*
	(4.64)	(4.98)	(3.76)	(1.47)
sent		-0.0068***		-0.0072***
		(-10.35)		(-9.42)
UpSUE×Sent		0.0005***		0.0007***

		(4.61)		(5.96)
DownSUE×Sent		-0.0182		-0.1204*
		(-0.57)		(-1.54)
NonlUp			0.0216*	0.0017***
			(1.60)	(6.85)
NonlDown			0.0001	0.0567
			(0.00)	(0.10)
NonlUp×Sent				0.0401
				(0.54)
NonlDown×Sent				0.0002
				(0.83)
Intercept	0.0256***	0.0279***	0.0052*	0.0067*
	(2.32)	(2.62)	(1.36)	(1.37)
Adj. R^2	0.0065	0.2675	0.0045	0.1546
Panel C		Market Excess Returns		
Down	-0.0086*	-0.0080*	-0.0031	-0.0032
	(-1.60)	(-1.45)	(-0.63)	(-0.59)
UpSUE	0.0003	-0.0009	0.0083***	0.0067**
	(0.17)	(-0.55)	(2.45)	(1.97)
DownSUE	0.0021	0.0036	0.0015	0.0034
	(0.62)	(0.82)	(0.56)	(0.74)
sent		-0.0049***		-0.0048***
		(-11.21)		(-8.54)
UpSUE×Sent		0.0004***		0.0001 ***
		(4.41)		(2.62)
DownSUE×Sent		-0.0003		-0.0006
		(-0.67)		(-0.71)
NonlUp			-0.0020***	-0.0019***
			(-2.19)	(-2.12)
NonlDown			0.0002	0.0003
			(0.21)	(0.19)
NonlUp×Sent				-0.0001
				(-0.46)
NonlDown×Sent				0.0001
				(0.65)
Intercept	0.0109***	0.0111***	0.0058*	0.0062**
	(3.78)	(4.30)	(1.95)	(1.84)
Adj. R^2	0.0051	0.2066	0.0090	0.2110

The t-statistics are in parentheses and the superscripts *, ** and *** indicate significance at the 10%,5% and 1% levels, respectively.

Our main focus in Table 2 is on the coefficients of the interaction terms of sentiment and SUE.The coefficients of UpSUE × Sent in Table 2 are significantly positive at the 1% level.And because the sentiment variable, Sent, is standardised, the

effect of UpSUE when sentiment is high is . and the effect of UpSUE when sentiment is low is. The results suggest that firms with low sentiment have a positive surplus surprise with a much lower This is similar to the results of Mian and Sankaraguruswamy (2012)[7]. However, unlike the case of good news, the stock price sensitivity of bad news does not differ by sentiment. The coefficients of DownSUE× Sent are negative in both linear and nonlinear models, but insignificant for all return indicators. As mentioned earlier, investors react less to bad surplus news than to good surplus news, suggesting that, regardless of sentiment, investors only react partially to bad Therefore, the effect of sentiment on the price sensitivity of bad surplus news is weaker, and the sensitivity of stock prices to bad news is the same for optimistically evaluated firms and pessimistically evaluated firms.

The results of the nonlinear models Model 3 and Model 4 are different from those of the linear model, and the interaction terms of NonlDown and NonlUp are not significant and only NonlUp itself is significant in some cases, which suggests that the nonlinear model and the S-shaped relationship may not be valid in the Chinese market.

Sensitivity of stock price to earnings news for extreme sentiment.

Additionally, researchers employ a binary variable called SentD, which indicates companies that exhibit extreme pre-earnings announcement sentiment. This is done to assess the difference in the responses to earnings surprises between firms with high sentiment and those with low sentiment. To begin, pre-earnings announcement sentiment is classified into ten groups by researchers, based on how much it varies relative to the previous sentiment. The sentiment of firm i on day t-1 is then ranked by researchers based on its position in the distribution of the previous day's sentiment. Here, t refers to the day of firm i's earnings announcement in the given half-year period. Finally, researchers assign the value of 1 to SentD for the firm with the highest sentiment and 0 to the firm with the lowest sentiment. SentD is then utilised instead of Sent in equations (14) and (15) by the researchers. To investigate the impact of extremely positive and negative sentiment, analysts eliminate other sentiment groups (i.e., groups 2 through 9) from the sample. Table 3 displays the findings. The first column shows the outcomes of the linear model (Equation [14]), whilst the second column exhibits the results of the nonlinear model (Equation [15]). The results of the basic model are omitted from this study as they are identical to those presented in Table 2.

Table 3. Extreme Sentiment Regression Results

	Raw Returns		*Market Excess Returns*	
	(1)model 1	(2)model 2	(1)model 1	(2)model 2
Down	-0.0078	-0.0019	-0.0091**	-0.0017
	(-1.51)	(-0.31)	(-1.99)	(-0.30)
sentD	-0.0312***	-0.0328***	-0.0295***	-0.0315***
	(-6.28)	(-5.39)	(-6.71)	(-5.85)

UpSUE	0.0007***	0.0080***	0.0003***	0.0101***
	(3.37)	(4.53)	(3.12)	(5.69)
sentD×UpSUE	0.0015***	0.0008***	0.0006***	0.0017***
	(5.29)	(4.10)	(3.19)	(5.26)
DownSUE	0.0052	0.0066**	0.0014	0.0019
	(1.23)	(1.95)	(0.36)	(0.31)
sentD×DownSUE	-0.0024	-0.0062	-0.0063	-0.0020
	(-0.43)	(0.78)	(-1.28)	(0.29)
NonlUp		-0.0017		-0.0024**
		(-1.03)		(-1.65)
sentD×NonlUp		-0.0002		0.0003
		(-0.11)		(0.15)
NonlDown		0.0013		0.0015
		(0.81)		(1.01)
sentD×NonlDown		0.0004		0.0005
		(1.08)		(1.20)
Intercept	0.0942***	0.0885***	-0.0045	-0.0115*
	(6.33)	(4.48)	(-0.22)	(-1.42)
Adj. R^2	0.0830	0.0884	0.1059	0.1134

The t-statistics are in parentheses and the superscripts *, ** and *** indicate significance at the 10%,5% and 1% levels, respectively.

Table 3 displays coefficients of SentD on raw returns are -0.0312 and on market excess returns are -0.0295. This suggests that firms with high sentiment before earnings announcements experience lower subsequent returns before and after the announcements compared to firms with low sentiment. Moreover, the UpSUE×SentD coefficient is significantly positive among all return indicators and twice the coefficient of UpSUE×Sent. However, the DownSUE×SentD coefficient is negative and insignificant when compared to Table 2, highlighting that investors have a stronger response to bad news regarding firms with low sentiments, although not being significant. The nonlinear model's results are also consistent with Table 2.

Stock return response to good and bad news.

This research divides the sample into two groups based on pre-earnings announcement sentiment. As before, the research uses day t-1sentiment of firm i decile rankings, where t is the date of earnings announcement of firm i in half-year q, based on the distribution of sentiment as of day t. The research then uses the first three deciles to form the high sentiment group and the last three deciles to form the low sentiment group. for each group, and regresses the earnings surprise around the date of the earnings announcement on.

$$RET_{i,t}^{(0,2)} = \alpha_0 + \alpha_1 Down_{i,t} + \alpha_2 UpSUE_{i,t} + \alpha_3 DownSUE_{i,t} + \varepsilon_{i,t} \quad (16)$$

Table 4. Stock return response to good and bad news

	Raw Returns		*Market Excess Returns*	
	low	High	low	High
Down	-0.0038	-0.0083*	-0.0048	-0.0102*
	(-0.54)	(-1.34)	(-0.81)	(-1.49)
UpSUE	0.0011***	0.0016***	0.0008***	0.0018***
	(2.47)	(2.58)	(2.34)	(2.56)
DownSUE	-0.0053	-0.0046	-0.0010	-0.0047
	(-1.13)	(-0.88)	(-0.26)	(-0.95)
Intercept	0.0090***	-0.0289***	-0.0075**	-0.0276***
	(3.12)	(-3.84)	(-2.00)	(-3.01)
Adj. R^2	0.0028	0.0021	0.0035	0.0037

The t-statistics are in parentheses and the superscripts *, ** and *** indicate significance at the 10%,5% and 1% levels, respectively.

As shown in Table 4, this study indicates that positive earnings surprises result in high returns, regardless of whether market sentiment is high or low. However, it is noteworthy that the coefficient for the high sentiment group is larger than that for the low sentiment group. To test the equivalence of UpSUE (Upward Surprise) coefficients between the high and low sentiment groups, further analysis is conducted. The results of our tests reject the initial hypothesis that both groups react the same way to positive earnings news across all return indicators. In essence, the findings support the notion that the high sentiment group exhibits a stronger response to favorable return news than the low sentiment group.

4.2 Robustness tests using different time periods of sentiment

The study uses the average sentiment of the 20 trading days prior to the earnings announcement as a measure of sentiment ; however, this measure may not reflect the true sentiment prior to the earnings announcement day.Therefore, the study uses two alternative measures to characterise the sentiment for a shorter period prior to the announcement date. The researchers set Sent1 as the sentiment of the day before the announcement and Sent2 as the average sentiment of the five trading days before the earnings announcement and add Sent1 and Sent2 instead of Sent in equations (14) and (15) and present the results.

Table 5. Sentiment regressions from the previous day

	Raw Returns		*Market Excess Returns*	
	(1)	(2)	(1)	(2)
Down	-0.0033***	-0.0006	-0.0155***	-0.0173***
	(-2.37)	(-0.76)	(-4.33)	(-4.51)
UpSUE	0.0067**	0.0004	0.0290***	0.0180***

	(1.73)	(0.09)	(2.80)	(2.49)
DownSUE	0.0021***	0.0044***	0.0016***	0.0176***
	(3.42)	(5.90)	(2.18)	(7.09)
Sent1		-0.0051***		-0.0051***
		(-5.66)		(-3.98)
UpSUE×Sent1		0.0001		0.0008
		(0.23)		(0.42)
DownSUE×Sent1		-0.0007		-0.0038
		(-0.88)		(-1.58)
NonlUp			-0.0056***	-0.0044*
			(-2.34)	(-1.49)
NonlDown			0.0001	0.0111*
			(0.06)	(1.62)
NonlUp×Sent1				-0.0002
				(-0.45)
NonlDown×Sent1				0.0018*
				(1.68)
Intercept	0.0058***	0.0069***	0.0039***	0.0157***
	(6.29)	(7.68)	(4.82)	(8.21)
Adj. R^2	0.0117	0.2272	0.0335	0.2591

The t-statistics are in parentheses and the superscripts *, ** and *** indicate significance at the 10%,5% and 1% levels, respectively.

Table 6. Mean sentiment regression for the first five days

	Raw Returns		*Market Excess Returns*	
	(1)	(2)	(1)	(2)
Down	-0.0219***	-0.0148**	-0.0128	-0.0097
	(-2.41)	(-1.86)	(-1.10)	(-0.91)
UpSUE	0.0040***	0.0047***	0.0007***	0.0001
	(7.45)	(7.86)	(3.12)	(0.02)
DownSUE	0.0021**	0.0053***	0.0154***	0.0048***
	(2.31)	(2.87)	(3.13)	(2.42)
Sent2		-0.0061***		-0.0067***
		(-7.87)		(-6.34)
UpSUE×Sent2		0.0007		0.0014
		(1.33)		(0.99)
DownSUE×Sent2		-0.0000		-0.0033
		(-0.01)		(-1.33)
NonlUp			-0.0007	-0.0011
			(-0.58)	(-0.72)
NonlDown			0.0033	-0.0027
			(1.12)	(-0.54)
NonlUp×Sent2				0.0002
				(0.40)

NonlDown×Sent2				0.0017
				(1.36)
Intercept	0.0240	0.0207***	0.0215	0.0172***
	(1.04)	(4.86)	(1.02)	(2.88)
Adj. R^2	0.0218	0.2713	0.0249	0.2766

The t-statistics are in parentheses and the superscripts *, ** and *** indicate significance at the 10%,5% and 1% levels, respectively.

As shown in Table 5 and Table 6, the regression results show no significant difference from Table 2, indicating that using 20 trading days is appropriate when measuring sentiment before earnings announcements.

5 Conclusion

In this study, we have delved into the relationship between stock price sensitivity to earnings news and investor sentiment. Our findings suggest that the levels of investor sentiment, whether high or low, influence their responsiveness to firm earnings surprises. Notably, investors with higher sentiment tend to react more strongly to positive earnings surprises, while those with lower sentiment appear less receptive to positive earnings news. This indicates that investor sentiment not only shapes individual investment decisions but also exerts a significant influence on the market as a whole. In addition, the results of the study revealed that investors with lower sentiment are more receptive to negative earnings surprises. Such a phenomenon may suggest that investors with lower sentiment exhibit a greater inclination towards pessimism and are more predisposed to perceive negative news about firms. However, the impact on stock prices is not significant, which means other factors seem to mitigate the impact of this sentiment on the market. There are still several limitations in this article, such as analyzing the sensitivity of earnings from a single aspect of earnings news. In future research, researchers can consider expanding the types of news, and researchers can analyze various company news in the future, such as analyzing the impact of merger and reorganization news on excess returns. In addition, the frequency of the study could be varied to consider studying the relationship between investor sentiment and stock returns or volatility under high-frequency data.

Given these important findings, we propose that both the Government and relevant organizations should proactively enhance their monitoring and research efforts into investor sentiment. Understanding the psychological conditions and expectations of investors better can improve market stability and predictability.

Furthermore, promoting investor education is essential in enhancing investment quality and risk awareness among investors. Organizing training and educational activities to provide information on investment strategies, risks, and market trends can empower investors to make more informed decisions.

Enterprises also play a crucial role in managing and responding to investor sentiment during major events and news releases. Timely communication of relevant

information can guide investor sentiment and reduce the likelihood of market volatility caused by unnecessary speculation and panic. Strengthening investor relations management, establishing effective communication channels, and addressing investor concerns promptly will foster greater trust and loyalty from investors.

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