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Social Media Attention and Corporate Earnings Management: Perspective from Baidu Post Bar

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Abstract:

Corporate earnings management encompasses the strategies employed by corporate leaders to manipulate or adjust a company's financial performance, with the ultimate goal of enhancing its market valuation, which may cause the distortion of accounting information. As investors give increasing emphasis to earnings management practices in modern capital market, social media attention has also become a possible factor affecting earnings management. This paper uses the theoretical framework of linear regression analysis, combines Python and other software to conduct an in-depth examination of the relationship between social media attention and the practices of corporate earnings management. and analyzes relevant cases by taking Baidu Tieba data as an example. The outcome reveals that: (1) The investor sentiment consistency has a positive correlation with corporate earnings management; (2) There exists a positive link between social media attention and the management of corporate earnings. The findings of this research offer a fresh perspective on mitigating corporate earnings manipulation, and serve as a valuable reference for investors in sifting through information to a certain degree.

Keywords: Social media attention; Earnings management; Financial decisions; Information disclosure; Investor relations.

1. Introduction

With the rapid development of emerging media in the Internet era, social media has emerged as a vital conduit for enterprises to establish communication channels with the external world. Many media platforms are not only important tools for enterprises to carry out marketing and brand promotion, but also main sources for the public to obtain corporate information and express opinions. Recently, the impact of social media on corporate decision-making has attracted more scholars' attention. Among them, corporate earnings management strategy has attracted scholars' attention.

Earnings management is a series of earnings manipulation behaviors implemented by enterprises in order to achieve specific interest demands. Controlling performance fluctuations to keep it consistent with market expectations. Since earnings management itself is the result of managers' negative moral arouses, the masking behavior of managers after earnings management can be directly related to the company's financial health and investors' trust [1,2]. Through purposeful intervention or influence on financial reporting, enterprises can adjust their own earnings, and then affect the interests and decisions of relevant stakeholders. In today's highly transparent and open information, any financial operation of enterprises is likely to trigger public attention and discussion on social media. This social media pressure and influence may induce firms to be more cautious in earnings management or even change their financial strategies.

The existing scholarly works pertinent to the research topic of this paper primarily concentrate on the influence of social media on the disclosure of corporate financial information. Through social media, enterprises disclose financial information, reducing information asymmetry and enhancing disclosure flexibility, while facilitating instant communication. This practice leverages informal interactions to deepen relationships with investors, boosting trust, effectively shaping market image, and enhancing corporate value [3]. In contrast to the extensive research conducted on the disclosure of corporate financial data, there is a comparative scarcity of studies exploring the quality of such financial data. and there is a close relationship between earnings management and corporate financial data. Earnings management directly affects the process of generating and reporting financial data by adjusting the authenticity of accounting earnings information, changing the distribution of financial data, and affecting the decision-making usefulness of financial reports. Hence, when assessing a company's financial standing and operational outcomes, it is imperative to take into account the implications of earnings management on the veracity and reliability of its financial data. Therefore, it is necessary to study earnings management through social media.

In this context, this study selects Baidu Tieba as the research data. As a globally leading Chinese community, Baidu Tieba users can participate in the interaction and create heat by Posting, replying, liking and other ways. This openness and interactivity make the information on Tieba spread fast and influential. The distinctive mode of community engagement and extensive user base of this platform render it a pivotal vantage point for examining the interplay between enterprises and social media. To some extent, the public attention of an enterprise on Tieba reflects the public's attention and evaluation of the enterprise, which may have a certain impact on the management decision-making of the enterprise [4].

In terms of research methods, this paper will use the relevant data of Baidu Post Bar and a number of enterprises to build a research model between enterprise earnings management and social media attention through empirical analysis. By comparing and analyzing the relationship between different enterprises' attention on Baidu Post Bar and their earnings management behaviors, we hope to reveal the specific impact mechanism of social media on enterprises' earnings management, and provide reference for enterprises' financial decision-making.

To sum up, the relationship between the attention degree of social media, especially Baidu Post Bar, and corporate earnings management is not only a theoretical issue worthy of in-depth discussion, but also has important practical significance [5]. As information technology advances and social media usage proliferates, research in this domain is poised to intensify further, exerting profound influences on both the theoretical foundations and practical applications of enterprise management.

2. Hypothesis Formulation and Research Design

In essence, corporate earnings management intervenes or influences financial reports purposefully, and then influences the interests and decisions of relevant stakeholders. For investors, corporate earnings management will affect investors' decision-making, damage investors' interests, and reduce the information transparency between enterprises and investors. In today's information age, social media is an significant channel for enterprises to understand public sentiment and market trends. Given the escalating influence of social media, the potential sway of its public sentiment on corporate decision-making, notably earnings management tactics, has garnered significant attention. Drawing upon prior scholarly endeavors, this paper postulates four hypotheses.

Zheng Jianming et al. believed that in the context of rapid development of social media," market pressure "plays a dominant role, and enterprises with high attention from social media are more inclined to engage in earnings management because of their more prominent princiption-agent conflicts [6]. Thus, this paper makes the first hypothesis:

H1: When companies encounter negative public opinion on social media, they will use more conservative or trans-

parent earnings management strategies to restore corporate reputation and investor confidence.

Ma Zhuang et al. believed that the media, as an external governance mechanism, can strengthen the supervision function of accounting supervision subjects and constrain enterprises' earnings management behaviors by influencing them [7]. From this, this paper makes the second hypothesis:

H2: Positive social media public opinion may enhance the public image and market confidence of enterprises, make enterprises more transparent and open in financial reporting, and reduce earnings management.

Chen Luoqin et al. argued that different media have different impacts on the information quality and earnings management of the company. Under the measurement perspective, the increase of financial media attention will effectively inhibit the earnings management behavior of corporate management [8]; Based on this theory, this paper proposes the third hypothesis:

H3: Firms display different earnings management strategies in the face of different public opinions.

Finally, if enterprises perceive the influence of social media public opinion as insufficient to significantly alter their financial performance, we may discern that the actual effect of such opinion on earnings management is constrained.

H4: The real effect of social media public opinion on earnings management is limited.

3. Empirical Research

3.1 Sample Selection and Data Sources

The explanatory variable in this paper uses the posting data of A-share listed companies on Baidu Tieba in 2023, while the explanatory variable uses the earnings management estimated by the Jones model. By constructing a linear regression method to explore. This paper uses Python and other research software for data analysis and mathematical modeling. The primary data sources utilized in this study include the China Stock Market & Accounting Research Database (CSMAR), along with supplementary sources for additional information.

This study takes all A-share listed companies as the research sample, including comprehensive industry affiliation. The selected enterprises' application and positive attitude towards social media show the high level and large research scope of enterprises in various industries in China. The timeframe of this research spans from January 1st, 2023 to December 31st, 2023. The pertinent financial and social media data pertaining to enterprises were sourced from the CSMAR database. Commencing on January 1, 2023 and concluding on December 31, 2023, this study initially incorporates the initial dataset comprising 5340 A-share listed companies. excluding companies with abnormal financial conditions (ST and ST*), listed companies transferred to the Beijing Stock Exchange and newly listed companies in 2023. The final sample size is 4669 enterprises.

3.2 Description of Variables

In this paper, the enterprise earnings management index is used as the explanatory variable, and we choose the value obtained by the modification of Jones model as the variable [9].

$$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \beta_2 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) + \varepsilon_{i,t} \quad (1)$$

$$NDA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \frac{\Delta REV_{i,t} - \triangle REC_{i,t}}{A_{i,t-1}} + \beta_2 \left(\frac{PPE_{i,t}}{A_{i,t-1}} \right) \quad (2)$$

$$DA_{i,t} = \frac{TA_{i,t}}{A_{i,t-1}} - NDA_{i,t} \quad (3)$$

Where TA represents total accrued profit; NDA signifying non-discretionary accruals, and DA, indicating discretionary accruals manipulation, exhibit a positive relationship between their absolute values, which translates to a greater scope for earnings management;△REVt represents the change in operating income in year t; $\triangle REC_t$ signifies the variation in accounts receivable during yeart; while PPEt represents the net fixed assets in year t; $\varepsilon_{i,t}$ denotes the residual term; A_{t-1} Represents the elimination of scale effect. In the calculation process, formula (1) is first used to perform industry-specific regression by year, and the regression coefficient is brought into formula (2) to obtain NDA of non-manipulable accruals, and then into formula (3) to obtain DA of modified manipulable accruals. The "C" prefix code of the manufacturing industry is selected with 2 digits and that of other industries is selected with 1 digit for industry classification. Samples with less than 10 samples and missing relevant data are excluded from the calculation.

The explanatory variables which is selects by this paper is the natural logarithm of the daily total amount of Baidu post bar posts of each enterprise from January 1 to December 31, 2023 and the sentiment consistency index Firm profitability, asset-liability ratio and firm size are selected as instrumental variables. Table 1 provides definitions of variables [10].

Table 1. Specific definition of variables

Variable types	Variable names	Variable symbols	Variable definitions
Variable explained	Level of earnings management	DA	The absolute value of discretionary accruals calculated by the modified Jones model
Explanatory variables	Social media attention	public	The natural logarithm of the daily total amount of Baidu post bar posts of each enterprise is taken
	Sentiment congruence index	emo	1- {1-[(number of bullish posts - number of bearish posts)/ (number of bullish posts + number of bearish posts)]^2 }$^{0.5}$
Instrumental variable	Corporate profitability	ROA	Net profit/total assets
	Asset-liability ratio	DAR	Total liabilities/total assets
	Size of enterprise	size	The natural logarithm of the total assets of the firm is taken

3.3 Descriptive Statistics and Correlation Analysis were Performed

A total of 4669 A-share listed companies were selected as the sample pool for this study, and Table 1 provides an overview of the descriptive statistics for each of the key variables that were taken into consideration in the analysis.

Table 2 Descriptive statistical analysis of the main variables

Variable	Sample size	Mean value	Variance	Maximum value	Minimum value
DA	4669	0.051	0.0028	0.6438	0
Public	4669	6.129	1.4304	11.0272	0.6931
Emo	4669	95.2785	1048.8367	191.4972	2
ROA	4669	0.0203	0.0057	0.6019	-1.6444
DAR	4669	22.4422	1.9009	30.0806	18.5788
Size	4669	0.417	0.045	1.797	0.018

Based on the data in Table 2, this paper conducts a more in-depth analysis and specizes some possible market behaviors or psychological trends:

The average level of earnings management, as indicated by the mean value of 0.051, suggests that a majority of enterprises engage in a relatively low level of such practices. The low variance of 0.0028 implies a narrow range in the degree of earnings management among these enterprises. The maximum and minimum values, 0.6438 and 0 respectively, reveal that while some enterprises abstain from earnings management, others exhibit a comparatively higher level.

The mean value of 6.129 for social media attention underscores the high level of interest enterprises garner on social media platforms. However, the variance of 1.4304 signifies considerable variation in the extent of attention received by different enterprises.

Regarding financial health, the mean asset-liability ratio of 22.4422 indicates a moderate debt burden for most enterprises, with a relatively low variance of 1.9009, suggesting little variation in this metric across enterprises.

The mean firm size of 0.417 points to a preponderance of smaller firms, but the variance of 0.045 highlights substantial disparities in size, with the dataset spanning from a minimum of 0.018 to a maximum of 1.797. Figure 1 shows the correlation analysis results of each variable.

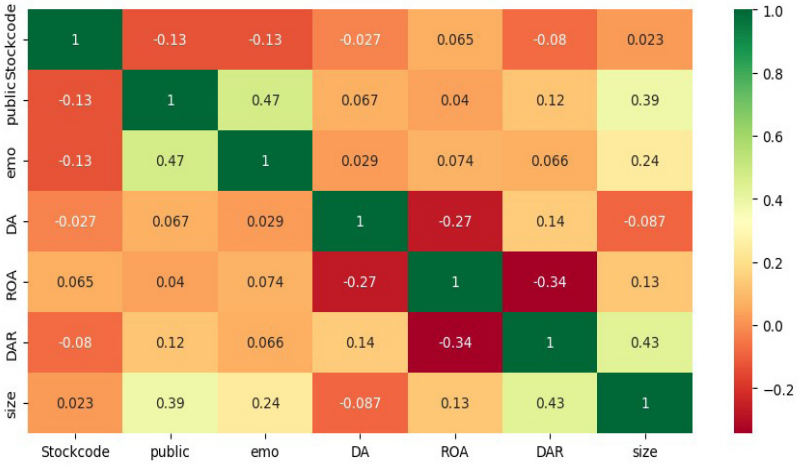

Fig.1 Correlation analysis of the main variables

Where Stockcode represents the stock code, public represents the attention of social media, emo represents the sentiment consistency index, DA signifies the absolute measure of discretionary accruals that have been calculated, ROA represents the profitability level of enterprises, DAR reflects the asset-liability ratio indicating their financial leverage, and size denotes the magnitude or scale of enterprises. In Figure 1, the correlation is lower than 0.5, Furthermore, the absence of a discernible correlation among the variables, including DA, ROA, DAR, and size, does not necessarily imply the irrelevance or lack of significance of any individual variable.

Based on this result, this paper will explore how social media attention affects corporate earnings management.

3.4 Regression Analysis

This paper constructs an OLS model for empirical test to study the relationship.

$$DA_{i,t} = \alpha\, public_{i,t} + \beta emo_{i,t} - \gamma ROA_{i,t} + \delta DAR_{i,t} - \epsilon size_{i,t} + \theta \quad (4)$$

Here, $public_{i,t}$ denotes the level of attention garnered by a company on social media platforms, $emo_{i,t}$ represents the sentiment consistency index reflecting the coherence of opinions expressed, $DA_{i,t}$ stands for the absolute value of discretionary accruals calculated, $ROA_{i,t}$ measures the profitability of the enterprise, $DAR_{i,t}$ indicates the asset-liability ratio reflecting its financial leverage, $size_{i,t}$ represents the size of the enterprise, and the symbol stands for the constant term in the equation.Table 3 describes the regression results of Model (1).

Table 3. Regression results of Model (1)

Variables	Coef.	Std.err.	t	P>|t|	[0.025	0.975]
Intercept	0.0342	0.008	4.126	0.000	0.018	0.050
public	0.0031	0.001	4.159	0.000	0.002	0.004
emo	0.0005	0.002	0.252	0.801	-0.005	0.004

Omnibus	3241.592	Durbin-Watson	1.956
Prob(Omnibus)	0.000	Jarque-Bera(JB)	66817.209
Skew	3.061	Prob(JB)	0.00
Kurtosis	20.492	Cond.No.	84.9

Model (1) only retains the explained variable discretionary accruals and the explanatory variables social media attention and investor sentiment consistency index. In the regression results, No. Observations is 4669, Df Residuals is 4666, and the coefficient of explanatory variable social media attention is 0.0031, indicating that the level of corporate earnings management is positively correlated with online public opinion, and the coefficient of investor sentiment consistency is 0.0005. It shows that investors' sentiment consistency is also positively correlated with the level of corporate earnings management.

According to the regression results in Table 3, Model (1)

is obtained as follows:

$$DA_{i,t} = 0.0031 public_{i,t} + 0.0005 emo_{i,t} + 0.0342 \quad (5)$$

Among them, the R^2 of the model is 0.005, the adjusted R^2 is 0.004, the F-statistic of the significance test is 10.55, and the P value is 2.67e-05, indicating that the coefficient of the model is significant at the level of 99.9%. The Akaike Information criterion (AIC) is -1.421e+04, and the Bayesian information quality (BIC) is -1.419e+04, which are small, indicating that the model is good. The D.W statistic is 1.956, which is close to 2, indicating that the degree of model autocorrelation is very small. The condition number (Cond.No.) is 84.9, which is less than 100, indicating that the model has a small degree of collinearity. Therefore, the model can better reflect the relationship between explanatory variables and explained variables. Table 4 describes the regression results of Model (2).

Table 4. The regression results of Model (2)

Variables	Coef.	Std.err.	t	P>|t|	[0.025	0.975]
Intercept	0.1389	0.015	9.508	0.000	0.110	0.168
public	0.0050	0.001	6.765	0.000	0.004	0.006
emo	0.0028	0.002	1.394	0.163	-0.001	0.007
ROA	-0.1458	0.011	-13.236	0.000	-0.167	-0.124
DAR	0.0319	0.004	7.429	0.000	0.023	0.040
size	-0.0063	0.001	-9.373	0.000	-0.008	-0.005

Omnibus	3282.418	Durbin-Watson	1.978
Prob(Omnibus)	0.000	Jarque-Bera(JB)	81210.015
Skew	3.045	Prob(JB)	0.00
Kurtosis	22.503	Cond.No.	495.

Building upon Model (1), Model (2) incorporates instrumental variables such as profitability, asset-liability ratio, and enterprise size. The findings reveal that the coefficient of social media attention as the explanatory variable is 0.0050, suggesting that an increase in social media attention leads to an escalation in the degree of earnings management practices by enterprises. Additionally, the sentiment consistency coefficient of 0.0028 indicates a positive correlation between the degree of earnings management and the coherence of investor sentiment, meaning that a higher degree of investor sentiment consensus also corresponds to a greater level of earnings management. Furthermore, the analysis shows that both a higher asset-liability ratio and a smaller firm size are associated with more pronounced earnings management behaviors.

According to the regression results detailed in Table 4, the derived Model (2) can be formulated as follows:

$$DA_{i,t} = 0.0050 public_{i,t} + 0.0028 emo_{i,t} - 0.1458 ROA_{i,t} + 0.0319 DAR_{i,t} - 0.0063 size_{i,t} + 0.0342 \quad (6)$$

Among them, the R^2 of Model (2) is 0.096, and the adjusted R^2 is 0.095, which is better than that of Model (1). The F-statistic of the significance test is 99.41, and the P value is 7.05e-100, shows that the coefficient of the model is significant at the level of 99.9%. The Akaike Information criterion (AIC) is -1.466e+04, and the Bayesian information quality (BIC) is -1.462e+04, which are small, indicating that the model is good. The D.W statistic is 1.978, which is close to 2, indicating that the degree of model autocorrelation is very small. Therefore, compared with Model (1), Model (2) better reflects the relationship between explanatory variables, explained variables and instrumental variables.

3.5 Robustness Check

This paper believes that the model may be interfered by endogeneity problems and other factors, so this paper will conduct robustness tests. For the purpose of alleviate the endogeneity, in this paper, bullish sentiment (emobull) is chosen as the instrumental variable, and the two-stage least squares (2SLS) method is employed for regression analysis. This approach aims to address potential endogeneity issues and provide more robust estimates of the relationship between the variables of interest. Bullish sentiment can effectively measure investors' social media attention to enterprises, but corporate earnings management behavior is not directly related to investors' bullish sentiment, so it can be an instrumental variable. Table 5 reflects the regression analysis results of the robustness test.

Table 5. Robustness check

Variables	Coef.	Std.err.	t	P>|t|	[0.025	0.975]
public	0.0318	0.008	4.057	0.000	0.016	0.047
emo	0.0324	0.011	3.016	0.003	-0.053	-0.011

Omnibus	1856.577	Durbin-Watson	1.925
Prob(Omnibus)	0.000	Jarque-Bera(JB)	20397.787
Skew	1.584	Prob(JB)	0.00
Kurtosis	12.737	Cond.No.	12.4

In the regression results, the regression coefficients of explanatory variables social media attention and investor sentiment consistency are 0.0318 and 0.0324 respectively.

4. Conclusion

Based on the CSMAR database Baidu Post bar social media indicators and earnings management indicators through the linear regression model, this paper arrives at the subsequent conclusions.

First, social media attention plays a positive role in earnings management. As the most widely available channel for enterprises to receive external information, social media will directly affect the enterprise's next decision, and adjust its overall financial and management strategy according to the public opinion trend on social media, not only limited to earnings management. This could include more investor relations activities and information disclosure. Specifically, social media attention reflects the attention and interest of the public, investors and stakeholders in the enterprise. When a company's social media attention is high, its financial performance and operating conditions will receive more attention and scrutiny. In this case, firms may feel greater external pressure and expectations and thus adjust their financial statements through earnings management to demonstrate more desirable operating results and financial health.

The observed positive relationship implies that with heightened social media attention, firms may feel more compelled to undertake earnings management activities to ensure that their financial reports align with external expectations. In response, enterprises may manipulate revenue, costs, expenses, and other financial data to achieve their earnings management objectives, thereby preserving their reputation and maintaining a favorable image among the public and investors.

Second, the consistency of investors' sentiment has a positive correlation with corporate earnings management, which means that when investors' sentiment consistency is high, companies are more likely to conduct earnings management. Specifically, investor sentiment consistency reflects the degree of consistency of investor sentiment in the market. When the consistency of investor sentiment is high, investors in the market tend to hold similar views on the prospects and performance of enterprises, which may lead to relatively concentrated market expectations for enterprises. In this case, enterprises may feel more pressure to meet market expectations, so as to adjust financial statements and maintain or improve their market performance through earnings management.

In essence, as the level of investor sentiment cohesion increases, businesses tend to adopt earnings management strategies to satisfy the demands of the market and the anticipations of investors. This suggests that companies may manipulate their financial reporting to match prevailing sentiments and maintain harmony with the expectations of stakeholders. This suggests that the coherence of investor sentiment may influence corporate behavior towards managing earnings. Enterprises may achieve the purpose of earnings management by adjusting revenue recognition, cost allocation and other ways to ensure that their financial performance is consistent with investors' expectations.

While this paper primarily explores the impact of social media attention on a company's earnings management practices, it acknowledges shortcomings in certain aspects, particularly in the selection and limitations of conditional variables. There are limitations in the choice of variables used in the analysis, and some of these variables may have constrained the comprehensiveness and accuracy of the findings.

Author Contributions

All the authors contributed equally and their names were listed in alphabetical order.

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