ISSN 2959-6130

The Relationship Between Social Attention and the Risk of Stock Price Collapse of Enterprises: Perspective from Baidu Tieba

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Abstract:

With the rapid progress of the world economy, the problem of stock price collapse has become a major threat to the stable development of stock markets in various industries. Based on Baidu Tieba, this paper collects the stock price data of each listed company in the CSMAR database as the dependent variable NCSKEW_Mdeq, the total posts, total users and average repost number as the independent variables. Use Stata to conduct regression analysis on the two. As a result, it was found a significant negative link between Total Posts and Total Users and the dependent variable NCSKEW_Mdeq and there was no statistically significant link between Avg Repost Num and the dependent variable. This study provides a brand-new perspective for reducing the risk of stock price collapse in enterprises, aiming to explore and analyze the key factors that affect the stability of corporate stock prices, and thus provide clear direction and strong theoretical support for future research on protecting the interests of shareholders.

Keywords: Social Media Attention; Stock Price Crash Risk; Baidu Tieba.

1. Introduction

1.1 Background of the Study

For the past few years, China's economic development has been positive in general. With the joint help of macroeconomic regulation and other policies, the Chinese economy has steadily developed against the wind, and the stock market has also been generally stable [1]. Meanwhile, a study shows that compared to traditional media, social media enables people to receive information faster and more comprehensively [2]. There are now various ways to understand the economic development and stock information of countries that were once out of reach, which reduces the risk of being taken away and allows people to have more independent thinking and understanding. Baidu Tieba, which has a huge number of users of different types, has become an important platform for people to share information and a database source for many researchers to collect user data. For example, a study focuses on web crawling of domain names on Baidu Tieba, combined with theory driven data source theory to identify various people's views on procrastination [3]. Another statistical study on victims of online fraud in China is also based on reports of victims in Baidu Tieba to investigate a series of services, types, and methods that lead to victims [4]. Therefore, Baidu, as Ma said, the technology-based Internet engine company is giving play to an ever-increasing important impact in China [5].

1.2 Problem Statement

However, with the swift advancement of the economic front in China, the stock price crash has become a major problem that endangers market stability and harms the interests of investors. According to Sornette, the possibility of a stock value meltdown is an extreme event in complex financial markets, accompanied by market failure, which is frightening [6]. Therefore, whether the development of social media can help lower the risk of stock price collapse has become our research direction. Our research will also be based on Baidu Tieba, collecting data such as total posts, total users and average repost number to reflect social media activity. At the same time, we will collect data NCSKEW_Mdep on stock price collapse risk to explore the relationship between the two.

1.3 Aims of Research

Take note of the consequences of social media interest and public opinion supervision regarding the probability of corporate stock price crash in the food industry, clarify

its impact mechanism, and make detailed adjustments for improving supervision and reducing the risk of corporate future stock market collapse. This research aims to improve the understanding of social media attention and the risk of corporate stock price crashes, and to understand the chain of social media attention and social sentiment fluctuations, which then affect the peril of corporate stock value collapses.

1.4 Significance of the Study

By studying the connection between social media and the risk of stock price collapse, a new perspective has been provided for stabilizing Chinese stock prices. If the development and dissemination of social media can effectively reduce the risk of stock price collapse, then there will be more specific research directions in the future, which can explore in depth how social media can minimize the risk of stock price collapse, and take more concrete measures to amplify the role of social media, better reduce the risk of stock price collapse, and protect the interests of shareholders. The significance of this study is of great significance and can provide direction for future research, as well as direction for national policies and regulations.

2. Literature Review and Hypothesis Proposal

2.1 Literature Review

The literature related to this analysis mainly focuses on two main areas: firstly, exploring the factors influencing stock market crash risk, with most of these studies originating from the perspectives of agency problems and external policy shocks. These studies examine how agency characteristics lead to the concealment of negative information about stocks, which in turn is linked to future stock market crash risks. Wang et al. suggest that stock market crashes often arise from companies hiding negative information, while Zhao et al., Wang et al., Lu and Qiu, and Xu investigate strategies for reducing risks from the angles of information disclosure quality, agency conflicts, external regulation, and internet information dissemination [7-11]. Secondly, the topic is about the impact of social media attention on stock prices, in particular with the role of platforms like Baidu Tieba in information dissemination. These platforms are increasingly important in information sharing and have significantly influenced the supply and dissemination of information in the capital market, improving the efficiency of information transmission. Therefore, whether it's trivial news about a company or major events, they can be quickly noticed by market participants and promptly reflected in stock price movements. Despite studies from different perspectives exploring the factors influencing stock market crash risks, study of the correlation between social media attention and the risk of stock market crash is still relatively limited. This study endeavors to bridge this knowledge gap through an examination of the influence of social media focus, based on Baidu Tieba, on the risk of stock market crashes. Additionally, this paper will also analyze the potential supervision mechanisms that may coexist with social media attention.

2.2 Hypothesis Proposal

Social media attention plays a crucial role in measuring market information efficiency. In the context of today's widespread use of social media, platforms such as Baidu Tieba have become key forums for investors to exchange intelligence and express opinions, significantly enhancing the market's sensitivity to negative information about listed companies. As investors' attention on social media increases, potential negative information about companies can be quickly exposed and widely disseminated, effectively alleviating the problem of information asymmetry. The rapid flow of this information not only prompts stock prices to more accurately reflect the true value of companies but also decreases the possibility of market misjudgment. As Martellini and Menzio point out the rise in social media attention helps bridge the information void between insiders and external financiers, thereby correcting the deviation between stock prices and the company's fundamental aspects [12]. Therefore, the increase in investor attention has a dual positive effect. On the one hand, it brings higher positive returns to market investors, contributes to the stabilization of the stock market, and diminish the likelihood of volatility-induced market crashes. On the other hand, it serves as an alternative mechanism, reducing the impact of investors' heterogeneous beliefs on market volatility, as discussed by Xiao et al. [13]. Through these two mechanisms, the increase in investor attention accelerates the integration of information into stock prices, reduces the phenomenon of earnings drift, and thus effectively suppresses the rise in stock market crash risk. Therefore, social media attention is not only an indicator of market information efficiency but also a crucial factor in maintaining the stability and fairness of the capital market. Drawing on the above findings, this paper proposes Hypothesis:

H1: The increase in social media attention can minimize the likelihood of stock market collapses.

3. Methodology

3.1 Data and Research Design

The essential variables, along with their definitions, are

outlined in Table 1.

Table 1. Main Variables Definition Table

Variable Types	Variable Name	Variable Definition
Dependent Variable	NCSKEW_Mdeq	NCSKEW (Market Equal Weighted Average)
Independent Variable	TotalPosts	The total number of posts in the corporate bar during the statistical period.
	TotalUsers	The total number of users in the corporate bar during the statistical period.
	AvgRepostNum	The average number of reposts for all posts within a specific time period in the forum of this listed company.
Control Variable	CompanySize	Company size, logarithmic transformation of total company assets
	Big4	Audited by Big Four accounting firms: 1 for yes, 0 for no
	CompanyOpacity	Public company transparency: 1 = Excellent, 2 = Good, 3 = Passed, 4 =Failed
	ROE	Net Income to Equity Ratio
	ROI	Investment Profitability
	Stkcd	According to the securities code announced by the exchange.
	Trdynt	Trading year

3.2 Sample Selection and Research Design

3.2.1 Stock price crash risk

This paper draws on the research of Professor Xu Nianxing and his colleagues to calculate the stock price crash risk index in the Chinese stock market [14].

$$r_{i,t} = \alpha + \beta_{1,i} r_{n,t-2} + \beta_{2,i} r_{n,t-1} + \beta_{3,i} r_{n,t} + \beta_{4,i} r_{n,t+1} + \beta_{5,i} r_{n,t+2} + -\epsilon_{i,t} \quad (1)$$

Where ri,t signifies the weekly return of stock i over the course of a year, while rn,t denotes the average return of all A-shares during week t, which is calculated by weighting the returns according to market capitalization.

$$W_i t = ln\left(1+\epsilon_{i,t}\right) \quad (2)$$

In which $W_i t$ means the return of stock i relative to the market in week t, after adjusting for market performance.

$$NCSKEW = -\frac{\left[m(m-1)^{3/2}\sum W_{i,t}^3\right]}{|(m-1)(m-2)\left(\sum W_{i,t}^2\right)^{3/2}} \quad (3)$$

The metric employed in this research to gauge the peril of stock market collapses is the negative skewness of stock i's weekly returns, as measured by the NCSKEW, after market adjustments.

3.2.2 Social media attention index

The paper starts by compiling a list of stock codes for the food industry listed on the A-share market through online platforms. It then imports the data into CSMAR for retrieval, searching, and obtaining social media data from Baidu Tieba from 2020 to 2023. The data includes three main explanatory variables: "The overall count of posts and users, the mean quantity of reposts per post."

3.2.3 Empirical design

To eliminate the influence of other factors concerning the likelihood of stock price collapses, this paper draws on related research and sets up control variables [15]. The baseline condition selected include company size, whether the company receive audit services from one of the leading global accounting firms, commonly referred to as the Big Four, company transparency, return on net assets, and return on investment. Additionally, the study also incorporates controls for the impact of year-specific factors (Trdynt) and industry-specific influences (Stkcd).

To validate Hypothesis H1, this paper establishes an empirical model, employing panel fixed effects method, to examine the impact of investor focus on the susceptibility of a company's stock to sharp price declines.

The regression equation is as follows:

$$\begin{aligned} &NCSKEW\_Mdos \\ &= \beta_0 + \beta_1 \times TotalPosts + \beta_2 \times AvgRepostNum + \beta_3 \\ &\times AvgThumbUps + \beta_4 \times CompanySize + \beta_5 \times Big4 + \beta_6 \\ &\times CompanyOpacity + \beta_7 \times ROE + \beta_8 \times ROI + \sum Trdynt \\ &+ \sum Stkcd + \in \end{aligned} \quad (4)$$

4. Empirical Analysis

4.1 Descriptive Statistics

In this part, the researcher sorted out the social media attention data and stock crash risk data of all Chinese listed companies collected by CSMAR, used STATA to conduct descriptive statistics and regression analysis, and finally made a brief summary. The study's variables' descriptive statistics are displayed in Table 2.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Stkcd	6,435	379624.2000	257702.1000	2	688788
Trdynt	6,435	2022	0.8166	2021	2023
NCSKEW_Mdeq	6,435	-0.3825	0.7849	-4.4676	4.7559
Total Posts	6,435	1.4313	5.5301	0	168.5644
Total Users	6,435	1.2209	4.4368	0	131.8849
Avg Repost Num	5,971	0.1430	0.1900	0	5.1860
Company Size	6,429	6.55E+10	1.03E+12	9.01E+07	3.96E+13
Big4	6,429	0.0649	0.2463	0	1
Company Opacity	4,977	2.0328	0.6502	1	4
ROE	6,408	0.0045	0.4131	-16.3420	4.6764
ROI	5,561	46423.7500	3461402	-1628.0350	258000000

In Table 2, researchers analyzed data from 2021-2023 using the year of the transaction (Trdynt) as a control variable. Average number of stock price crash risk (NCSKEW_Mdeq) is -0.3825, the standard deviation is 0.7849, and the range is from -4.4676 to 4.7559. This indicates that the stock price crash risk is widely distributed, covering large negative and positive values.

In terms of social media attention, the average number of Total Posts is 1.4313, the standard deviation is 5.5301, the minimum is 0, and the maximum is 168.56. This shows that although the number of posts varies widely between different companies, the distribution of posts is very scattered. The average of total users is 1.2209, the standard deviation is 4.4368, and the range from 0 to 131.88 shows that the range of users is also large. The standard deviation of the average number of forwards (Avg Repost Num) is 0.1900, indicating that the distribution of the number of forwards is relatively concentrated and does not change much. Overall, there may be a complex relationship between the risk of stock price crashes and these social media indicators.

For the control variables, we find that Company Size has an average of 6.55 billion, showing that company size varies widely in the sample, ranging from small to very large firms. Most companies are not audited by a Big Four accounting firm (Big4) with an average of 0.065. In addition, the average Company Opacity is 2.03, and most companies are rated "good." The mean value of return on equity (ROE) is only 0.0045, but its standard deviation is large, indicating significant differences in corporate profitability. The mean value of return on investment (ROI) is 46,423.75, but its standard deviation is high, which reflects the significant fluctuation of ROI in the sample.

4.2 Regression Analysis

In this section, the researchers used the fixed-effect regression model to conduct regression analysis of the study variable, and the research results are shown in Table 3.

Table 3 shows that Total Posts show a negative relationship with NCSKEW_Mdeq.

Table 3. Regression analysis

	(1)	(2)	(3)
	NCSKEW_Mdeq	NCSKEW_Mdeq	NCSKEW_Mdeq
Total Posts	-0.0095**		
	(-2.1312)		

Total Users		-0.0119**	
		(-2.1802)	
Avg Repost Num			-0.0612
			(-0.4978)
Company Size	-0.0000	-0.0000	0.0000
	(-0.5016)	(-0.4682)	(0.0580)
Big4	0.0572	0.0570	0.0322
	(0.2580)	(0.2573)	(0.1190)
Company Opacity	0.0389	0.0390	0.0651
	(0.9018)	(0.9033)	(1.2939)
ROE	-0.0789	-0.0784	-0.0082
	(-0.9015)	(-0.8956)	(-0.0844)
ROI	0.0000	0.0000	0.0000
	(0.2414)	(0.2415)	(0.2558)
_cons	-0.0805	-0.0886	-0.3245
	(-0.1244)	(-0.1370)	(-0.3392)
Trdynt fe	Yes	Yes	Yes
Stkcd fe	Yes	Yes	Yes
N	4298	4298	3874
r2_a	0.0105	0.0106	-0.0333

Note: * p < 0.1, ** p < 0.05, *** p < 0.01

A rise in Total Posts will substantially lower the dependent variable NCSKEW_Mdeq, according to the regression coefficient of -0.0095, T-value of -2.1312, and P-value of less than 0.05. Similarly, the independent variable Total Users' regression coefficient is -0.0119, its T-value is -2.1802, and its P-value is less than 0.05, all of which show that an increase in Total Users similarly considerably lowers the value of NCSKEW_Mdeq. This suggests that when both the overall number of postings and the total number of users increases, the probability of a stock market crash decreases significantly.

Nevertheless, given a regression coefficient of -0.0612, a T-value of -0.4978, and a P-value exceeding 0.1, there was no statistically significant relationship between the independent variable, Avg Repost Num, and the dependent variable. This indicates that variations in Avg Repost Num do not significantly impact NCSKEW_Mdeq. This might be due to the fact that the independent variable is a mean value, which, as a measure of central tendency, may not sufficiently capture the actual distribution of the data, could be influenced by extreme values, and may not provide an accurate representation of the overall scenario.

Based on the regression analysis results, we discover that the dependent variable Ncskew_mdeq has a significant negative relationship with two independent variables (total posts and total users), while there is no statistically important relationship between the dependent variable and average repost number.

5. Conclusions

The data analysis for the years 2021–2023 in our study showed a negative link between the total number of users and postings and the chance of a company's stock price dropping. As the overall number of posts and users rises, the likelihood of a stock market crash falls (correlation coefficients: -0.0095 and -0.0119, respectively). This suggests that greater social media attention is associated with a lower likelihood of stock market collapses. However, the average number of retweets and the likelihood of a stock market crash do not significantly correlate; the average number of retweets has a T-value of -0.4978 and a coefficient of -0.0612. However, this insignificant relationship may be due to the influence of the average, that is, the average number of retweets, as an average measure, may not accurately capture the variability or extremes of the retweets, thus limiting its effectiveness in predicting stock price fluctuations.

The empirical findings reveal a significant inverse correlation between the likelihood of a stock market crash and social media interest. Both the total number of users

and postings can serve as valuable indicators of potential stock market downturns. The limited predictive value for stock price crashes may be due to the less dynamic nature of average retweets compared to other indicators. Overall, heightened social media engagement was linked to a decreased risk of stock price declines, underscoring the potential utility of social media as a tool for assessing financial risk. However, this study has some limitations. First, it examines stock price crash risk based on social attention data from Baidu Tieba, which might not fully capture user behavior across all social media platforms and could have platform-specific biases. Second, average metrics like Avg Repost Num may not fully reflect actual user interactions, as averages can obscure the impact of extreme values. Finally, the study does not account for other market factors, such as macroeconomic conditions, which could also significantly influence stock price crash risk.

Prospective research could include merging data from many social media sites to present a more comprehensive picture of social attention. More comprehensive and dynamic social media analytics are also advised to gain a better understanding of how user activity affects the likelihood of a stock market catastrophe. The study should also include the inclusion of extra market and business characteristics in order to develop a more accurate stock price crash risk prediction model. This would facilitate better risk management on the part of investors and provide them with a better knowledge of the intricate connection between societal issues and the probability of a stock market disaster.

Authors Contribution

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

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