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How Do Question-and-Answer Messages Affect the Risk of a Stock Crash?

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Abstract. Based on the question-and-answer data of online interactive platforms from 2011 to 2016, this paper studied the impact of question-and-answer information on the stock price crash risk of listed companies from the perspective of investors and listed companies. The following research conclusions were found through the manual collection of question and answer data and data analysis. From the perspective of investors, the higher the degree of information questions, that is, the more questions and the more detailed the questions. As a result, the transparency of information between investors and listed companies is improved, thus reducing the risk of stock price crash of listed companies. From the perspective of the listed company, the more detailed the information of the listed company is replied, and the faster the information is replied, so as to dispel investors' doubts, the lower the risk of stock price crash of the listed company is.

1. Introduction

In June 2015, a-shares climbed to 5178 before falling. The stock price crash has seriously affected the investment enthusiasm of investors and the stability of China's capital market. According to the 41st China Internet network development statistics report, the number of Chinese netizens reached 772 million as of December 2017. Chinese Internet users spend 27 hours per person per week online, with Internet penetration reaching 55.8 percent. China's search engine users reach 507 million. Social media and the general social mass media is the most significant difference is that let users have more choice and editing skills. Social media enhances market efficiency through information dissemination [1], information concentration [2] and resource disclosure [3].Attention can reduce information asymmetry, improve information transparency and reduce market fluctuations [4].Through information exchange, investors are connected with listed companies, so that investors can acquire information and interpret information more effectively [5].Online interactive platforms make individuals a source of online information and information consumers a producer of information. This article's contribution mainly manifests in the following aspects. First of all, this paper will study the question degree and reply degree of network interactive platform information, and introduce it into the research of stock price crash risk. Secondly, previous studies on media and stock price crash risk are mostly based on the passive acquisition of information released by listed companies, or information reported by media. This paper is more direct than other measurement methods from the perspective of investors' active access to information and interaction between investors and listed companies.

2. Theoretical Analysis and Research Hypothesis

From the perspective of investors, the q&a information of online interactive platform comes from investors' active questions. The disclosure of question information has the "disclosure effect" of general media, which reduces the degree of information asymmetry [6].Investor questions involve information disclosure in various aspects such as corporate performance, statement disclosure, and various corporate behaviors. The disclosure of such information can reduce the behavior of external

investors, improve the transparency of the company, reduce the earnings management behavior, reduce the agency cost of management and the agency cost of major shareholders. The more detailed the information asked by investors, the more extensive and in-depth the information reflected, and the stronger the information disclosure effect. Investors' questions about all aspects of listed companies effectively improve the "quality" of information disclosure on online interactive platforms. Therefore, the following hypothesis is proposed:

Hypothesis 1: the more detailed the investors' questions, the less the risk of a stock price crash.

From the perspective of the listed company, the listed company can choose to answer or not answer the questions raised by investors on various aspects of the company, and the degree of answer is also controlled by the listed company itself. From the data collected, it can be seen that after investors ask questions on the platform, listed companies reply to investors on average within 3.39 days. The information efficiency of this information transmission process is much higher than that of investors, and the audience obtains information of listed companies from traditional news media. Listed companies respond to investors' questions in a timely manner, thus reducing investors' doubts.With the development of information technology, the information acquisition ability of investors is gradually improved and the cost of information acquisition is reduced [7].According to the cognitive theory, investors repeatedly obtain and interpret information before making investment decisions, test and revise expectations to achieve consistency with external evidence. The more detailed the response of the listed company, the shorter the time of this process, thus affecting the decision of investors. Therefore, the following hypothesis is proposed:

Hypothesis 2: the higher the response level of listed companies, the lower the risk of stock price crash.

3. Research Design

3.1 Variable Design

Interpreted Variable. Stock price crash risk is measured by NCSKEW and DUVOL .The specific calculation process is as follows:

$$r_{i,t}=\alpha+\beta_{1,i}\,\gamma_{m,t-2}+\beta_{2,i}\,\gamma_{m,t-1}+\beta_{3,i}\,\gamma_{m,t}+\beta_{4,i}\,\gamma_{m,t+1}+\beta_{5,i}\,\gamma_{m,t+2}+\varepsilon_{i,t}\,. \tag{1}$$

$$W_{i,t}=Ln(1+\varepsilon_{i,t}). \tag{2}$$

$$NCSKEW_{i,t}=-[n(n-1)^{3/2}\sum W_{i,t}^{3}]/[(n-1)(n-2)(\sum W_{i,t}^{2})^{3/2}]. \tag{3}$$

Where i stands for different stocks, t for year and n for the number of trading weeks per year of stock i. $W_{i,t}$. is the return on the stock at week t in a given year. The specific calculation of the risk indicator DUVOL of the stock price of the listed company is shown in formula (4):

$$DUVOL=\log\{[(n_u-1)\sum_{Down}W_{i,t}^{2}]/[(n_d-1)\sum_{Up}W_{i,t}^{2}]\}. \tag{4}$$

Where n_u is the number of weeks in which the weekly return of stock i is higher than the average weekly return of that year. The corresponding n_d represents the number of weeks in which the weekly return on stock i is lower than the average weekly return for that year.

Explanatory Variables. The data of two network interactive platforms collected by hand are summarized and sorted out.The natural log of the total number of questions asked by investors plus one times the natural log of the average number of words asked by investors plus one indicates the degree of questions asked by investors.

$$QW_{i,t}=LN(QuesNumber_{i,t}+1)*LN(QuestionWordNumber_{i,t}+1). \tag{5}$$

Information response degree of listed companies AA expressed the detailed degree of information response and the timeliness of information response by multiplying the average response word of

listed companies by the natural logarithm of the average response time and the natural logarithm of the average response time.The larger the AA, the higher the response degree of the listed company.

$$AA_{i,t}= LN(AuestionWordNumber_{i,t}+1)* LN(AverageAnswerTime_{i,t}+1). \quad (6)$$

Control Variables. In this paper, control variables are selected according to previous studies:(1) ROA. (2) LEV. (3) BM. Use the book value of the company and the market value ratio to express. (4) SIZE. (5) TANGIBLE. Proportion of fixed assets. (6) HI5. Expressed by the shareholding ratio of the top five shareholders. (7) LNSALARY. (8) GOVERNMENT. (9) INDUSTRY. (10) YEAR.

3.2 Samples and Data Sources

This paper selects a-share listed companies from 2011 to 2016 as the initial research sample. The initial sample is processed according to the following principles:(1) the data of listed companies in the financial and insurance industries were excluded in this study;(2) listed companies excluding ST and ST*;(3) eliminate sample companies with annual trading week less than 30;(4) eliminate data missing samples.The annual observations of 12,934 effective companies were finally obtained.The financial data used in this research are mainly from the manual collection and collation of data from China stock market database (CSMAR) developed by guotai 'an information technology co., LTD., as well as the “q&a” section of Shanghai e-interactive and shenzhen-based interactive platform.

3.3 Research Model

According to the above theoretical analysis, this model (7) is used to test the hypothesis of this paper for empirical study.Among them, INFORMATION indicates the detailed INFORMATION asked by investors and the INFORMATION replied by listed companies.Multiple regression model is set as follows:

$$Crashrisk_{i,t}=\alpha+\beta_1 INFORMATION_{i,t}+\beta_m Controlvaribles_{m,i,t}+\varepsilon_{i,t}. \quad (7)$$

In the formula, Crashrisk is represented by NCSKEW and DUVOL, respectively. $Crashrisk_{i,t}$ is the measurement indicator of stock price crash risk constructed by this project. Based on the measurement methods of Chen et al.(2001), Jin et al., and Myers(2006), the negative return skewness coefficient, the fluctuation ratio, or the probability of stock price crash in a specific period were used to measure the stock price crash risk.

4. Empirical Results and Analysis

4.1 Descriptive Statistical Analysis

Table 1. Descriptive Statistical Analysis Table

stats	Mean	Sd	Min	P25	P50	P75	Max	N
NCSKEW	-0.218	1.061	-3.186	-0.878	-0.227	0.462	2.560	12934
DUVOL	-0.073	0.765	-2.314	-0.553	-0.082	0.410	2.002	12934
QW	39.606	20.348	1.441	22.498	42.468	53.507	123.431	12934
AA	15.508	5.186	0.039	12.469	15.557	18.550	43.150	12934
HIT5	48.859	15.598	16.247	37.265	48.645	60.054	85.809	12934
SIZE	22.068	1.270	19.438	21.157	21.893	22.792	25.879	12934
LEV	0.431	0.217	0.046	0.255	0.422	0.599	0.929	12934
BM	0.512	0.251	0.074	0.309	0.484	0.693	1.096	12934
TANGIBLE	0.224	0.166	0.002	0.095	0.190	0.321	0.710	12934
LNSALATY	14.202	0.675	12.543	13.767	14.183	14.608	16.068	12934
ROA	0.039	0.050	-0.156	0.013	0.035	0.064	0.195	12934
GOVERN~T	0.098	0.098	0.000	0.000	0.071	0.143	0.778	12934

The results of the descriptive statistical analysis are shown in Table 1. As can be seen from the table, the mean values of NCSKEW and DUVOL, which represent the stock price crash risk of listed companies, are -0.218 and -0.073 respectively, and the standard deviations are 1.061 and 0.765 respectively, which are basically consistent with the existing research results. The average asset-liability ratio is 43.1%. The average proportion of fixed assets is 22.4%. The average shareholding ratio of the top five shareholders of listed companies is 48.86%, and the equity is relatively concentrated.

4.2 Correlation Test

Pearson and Spearman correlation analysis was used, as shown in Table 2. As can be seen from this table, the Pearson correlation coefficient of NCSKEW and DUVOL is 0.906 and is significant at the 1% level. Spearman correlation coefficient was 0.913 and was significant at the 1% level. The results show that there is a strong consistency between the two measurement methods. From the correlation coefficient between QW and AA and the risk of stock price crash, both show negative correlation. It indicates that the degree of investors' questions and the degree of information reply of listed companies reduces the risk of stock price crash. The relationship between other variables and the risk of stock price crash is consistent with the theoretical analysis.

Table 2. Correlation Analysis

Variable	NCSKEW	DUVOL	QW	AA
NCSKEW	1	0.913***	-0.0951***	-0.0266***
DUVOL	0.906***	1	-0.0574***	-0.0235***
QW	-0.0861***	-0.0575***	1	0.123***
AA	-0.0205***	-0.0190***	0.135***	1

4.3 Regression Analysis Results

The Impact of Investors' Questions on the Stock Price Crash Risk of Listed Companies. Test results are shown in Table 3, and QW is used to indicate the degree of investor questions.The regression coefficients of NCSKEW and DUVOL, which represent the risk of the company's stock price crash, are -0.00534 and -0.00302 respectively, and both are significant at the 1% level. The above test results show that there is a significant negative correlation between the degree of investor information questioning and the risk of stock price crash in the case of controlling other factors affecting stock price crash risk. The more active investors ask questions on the interactive platform, the more detailed the questions will be. Increased disclosure reduces the “bad news” hoards of listed companies, reducing the risk of a stock price crash. Hypothesis 1 is verified.

Impact of Information Reply Degree of Listed Companies on Stock Price Crash Risk of Listed Companies. The test results are shown in the Table3, and AA is used to indicate the degree of information reply of listed companies. The regression coefficients of AA on NCSKEW and DUVOL were -0.00403 and -0.00281, respectively significant at 5% and 10% levels. The above test results show that under the control of other influencing factors, the response degree of listed companies on the interactive platform is significantly negatively correlated with the stock price crash risk of listed companies. The more responses listed companies have on interactive platforms, the shorter the response time. Reduce investors' doubts and hesitation time, reduce the risk of stock price crash of listed companies. Hypothesis 2 is verified.

Table 3. Regression Results

Variable	NCSKEW		DUVOL	
QW	-0.00534***		-0.00302***	
	(-10.93)		(-8.42)	
AA		-0.00403**		-0.00281*
		(-2.02)		(-1.96)

4.4 Robustness Test

Variable Substitution Method. LNQN and LNQWN were used to indicate the degree of investor questions, and LNAN and LNAAT were used to indicate the degree of response of listed companies.After controlling endogenous problems, LNQN, LNQWN, LNAN and LNAAT still show a significant negative correlation with the stock price crash risk of listed companies.There is no material difference from Table 3, and hypothesis 1 and hypothesis 2 are further verified.

Expansion of Variable Shrinkage. The scale of the continuous variable was increased to 5% for Winsorize treatment and multiple regression analysis was conducted.The network interactive platform has a significant negative correlation with the stock price crash risk, which is not substantially different from previous studies.

5. Research Conclusions

Question and answer data of online interactive platform from the perspective of investors, investors' questions on the interactive platform make more information disclosure of online interactive platform as a media.Reducing the incentive for management to hide “bad news”, thereby reducing the risk of a stock price crash.From the perspective of the degree to which the listed company replies to information, that is, the shorter the average response time interval of the listed company after the investor raises a question on the online interactive platform, the more detailed the reply content, which increases the transparency of the information between the investor and the listed company.Tempered investor sentiment, the stock prices of listed companies crash risk reduced.Interactive platform q&a information becomes the “buffer” of stock price crash risk.

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