

Original Paper

Financial Environment and Risk of Stock Price Crash

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Abstract

The risk of stock price crash has become an important topic in the field of macroeconomics and micro-finance in recent years, but there are relatively few researches on the risk of stock price crash from an external perspective. Therefore, this paper takes China's GEM listed companies as samples to empirically test the impact of financial environment on stock price crash risk. The research finds that there is a significant negative correlation between the financial environment and the risk of stock price crash, that is, the better the financial environment of the GEM listed company is, the lower the risk of stock price crash is. This conclusion still exists after controlling for the conservatism and endogeneity.

Keywords

Crash Risk of Stock Price, Financial Environment, GEM Listed Companies

1. Introduction

In recent years, the risk of stock price crash has become an important topic in the field of macroeconomics and micro-finance (Jung et al., 2019; Huang et al., 2020; Bai et al., 2020). On the one hand, the risk of stock price collapse is highly contagious, which will lead to the successive collapse of capital markets in different countries and regions, as well as the stock price collapse of different listed companies in the same capital market (Jayech, 2016; Xu et al., 2019). For example, in early 2020, the US stock market was blown off by four times in the 10 days due to the global crude oil crisis and COVID-19, and also triggered the successive melting of many stock markets including Germany, France, Brazil and Canada. However, in the second half of 2015, China's stock market also experienced a "thousand shares limit" collapse. On the other hand, because of its own characteristics of no signs and rapid development, the stock price crash will cause the panic of market investors in a short time, which will not only affect the decision-making of market investors, but also affect the direct

interests of listed companies, and even affect the real economy (Chen et al., 2001). Therefore, in view of the “financial anomaly” of the risk of stock price crash, especially the research on the risk of stock price crash in China’s stock market as an emerging capital market, it is of great significance to explore the factors influencing and restraining the risk of stock price crash, so as to reduce the adverse consequences of the risk of stock price crash, promote the long-term, healthy and stable development of the capital market, and protect the rights and interests of investors in the market Theoretical and practical significance (Sun et al., 2019; Lee et al., 2020).

What factors affect the stock price crash risk of listed companies? Early literature shows that the behavior of management concealing information or selectively disclosing information is the most important factor causing the risk of stock price crash (Jin & Myers, 2006; Hutton et al., 2009; Kim & Zhang, 2016). The management will selectively disclose the information of listed companies, especially the active disclosure of positive information, but will conceal some negative information. When the negative information accumulates too much, once the negative information is disclosed, the price of Listed Companies in the stock market will fall rapidly, which will also cause the collapse of the stock price. Therefore, many follow-up researches follow the idea of how to control and restrain the behavior of management concealing information, and find that a good corporate governance system can effectively control the behavior of management, such as independent director system (Liang & Zeng, 2016), employee equity incentive (Yu et al., 2020), executive liability insurance (Hu & WAN, 2016). In order to release more information to the stock market and reduce the information asymmetry between management and market investors, the risk of stock price crash can be reduced. In addition to the internal governance system of listed companies, good external governance system is also an important factor that can restrict the rise of stock price collapse risk, such as audit governance (WAN, 2015), social responsibility governance (Kim et al., 2014), regulatory governance (Lin & Deng, 2016), media Governance (Luo & Du, 2014), etc. In addition, a good external institutional environment can also restrain the risk of stock price collapse. Wang et al. (2014) pointed out that a good institutional environment can be an effective way to protect investors, and institutional environment can effectively reduce the risk of stock price collapse of Listed Companies in the region; Shi et al. (2014) pointed out that a good institutional environment can effectively improve the quality of accounting information of Listed Companies in the region, which can reduce the risk of stock price crash; Li (2018) pointed out that a good institutional environment can reduce the degree of government intervention in the region, which is conducive to restraining the risk of stock price crash.

However, the existing literature only studies the impact of institutional environment on stock price crash risk, but ignores the research based on the perspective of financial environment. On the one hand, as a “financial anomaly”, the quality of the financial environment will directly affect the resources and development of the listed companies in the region, so that it will affect the degree of information disclosure of the listed companies, which will also affect the performance of the listed companies in the

stock market; on the other hand, a good financial environment will also become the core of the region. As a part of the external governance system of listed companies, it will also restrict the behavior of local listed companies and their management, and can also become the constraint behavior of stock price crash risk.

In addition, compared with China's main board listed companies, China's GEM listed companies have more obvious high valuation phenomenon than the main board listed companies, so the GEM listed companies also have higher stock price crash risk (Lin, 2016). This means that the research on the risk of stock price collapse of listed companies on GEM is more meaningful, and it is more conducive to explore the differences between emerging capital markets and traditional capital markets.

Therefore, this paper empirically tests the impact of financial environment on the stock price crash risk of Listed Companies in China's gem from 2010 to 2019. Different from the existing literature, this paper tests from the perspective of financial environment, which is a useful supplement to the existing literature.

2. Theoretical Analyses and Research Hypothesis

As an effective external governance system, financial environment will affect the financial status and governance status of Listed Companies in the region. On the one hand, the more perfect the financial environment is, the more developed the financial market is, and the greater the financial support can be provided for the listed companies in the region. As a result, the lower the degree of financing constraints the listed companies are subject to, and the better the capital structure is, which is conducive to providing better interests for shareholders. On the other hand, a good financial environment can also reduce the uncertainty in the operation and management of local listed companies, which is more conducive to the stable development of enterprises. Especially in China's capital market as an emerging capital market, the financial environment can be used as an effective "soft constraint" to provide the role that the internal corporate governance system can not play. In addition, there are great differences in the degree of economic development, the degree of government openness and resource endowment between different provinces and cities in China, so the financial environment will become an effective external governance system.

Similarly, a good financial environment can also effectively restrain the stock price collapse risk of Listed Companies in the region. First of all, a good financial environment will improve the quality of information disclosure of Listed Companies in the region, so as to reduce the risk of stock price crash due to information asymmetry. On the one hand, a good financial environment will reduce the degree of information superiority of the management of the listed companies in the region, increase the cost and difficulty of the management to manipulate the earnings information, so that the management has to reduce the degree of manipulation of earnings, and improve the robustness of the accounting information of the listed companies (Ghosh & Olsen, 2009). As a result, market investors can get more

information through more robust financial reports, which will reduce the risk of stock price crash caused by information bias. On the other hand, a good institutional environment will also promote the local listed companies to disclose more other information, such as social responsibility information and environmental responsibility information (Zhou et al.) and the disclosure of these information will also provide more information for market investors, and also ensure that market investors can have a more comprehensive understanding of listed companies, which is also an effective way to reduce the degree of information asymmetry between listed companies and market investors.

Secondly, a good financial environment can also become an effective way of governance to restrict the behavior of the management of Listed Companies in the region, so as to reduce the risk of stock price collapse of listed companies. In a good financial environment, the management of listed companies not only has the requirements of self-discipline, but also has the pressure of external constraints. On the one hand, the management needs to obtain the recognition of the financial market through good self-discipline, which is not only conducive to the management to obtain higher salary level, but also to obtain more opportunities in the future professional manager market, so that the management will not blindly make behaviors that are not conducive to their own interests and the interests of the listed companies, such as too many concealment letters. Moreover, the management will pay more attention to the stock price of the listed company, and is not willing to influence its reputation due to excessive fluctuation of the stock price. On the other hand, the governance effect of the financial environment makes the investors in the real market and the investors in the stock market compare, which is based on the more pressure of the local listed companies, so that they need to have better capital market performance, match the financial development situation of their own region, especially when other local listed companies have better performance in the stock market, the management should be strengthened. As a result, they will pay more attention to the stock price of their own listed companies and avoid accumulating more risk of stock price collapse.

Moreover, a good financial environment can not only provide more financial resources for the listed companies in the region, but also ensure the sufficient interests of market investors, so as to reduce the probability of market investors “voting with their feet”. The areas with better financial environment have more financial institutions and higher quality, which can not only provide richer financing methods and more sufficient financing funds for the local listed companies, but also provide more opportunities, which is conducive to the better growth of the listed companies and more income (MA & Wang, 2017). Therefore, the good earnings of listed companies can ensure the earnings of investors, market investors will not blindly reduce their holdings, especially not blindly follow suit, which is also conducive to the stability of the stock price of listed companies.

To sum up, this paper puts forward the research hypothesis :

H1: there is a significant negative correlation between the financial environment and the risk of stock price crash, that is, the better the financial environment of the region where the listed company is

located, the lower the risk of stock price crash.

3. Variables, Models and Data

3.1 Variable Definition

(1) Stock Price Crash Risk (SPCR)

In this paper, the negative return skewness coefficient (*Ncskew*) and return volatility ratio (*Duval*) are used to measure the risk of stock price crash. The first step is to calculate the weekly special rate of return of sample companies after market adjustment, which is as follows:

$$R_{i,t} = \alpha_0 + \alpha_1 R_{m,t-2} + \alpha_2 R_{m,t-1} + \alpha_3 R_{m,t} + \alpha_4 R_{m,t+1} + \alpha_5 R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

In equation (1), $R_{i,t}$ are the t-week returns of sample companies, and $R_{m,t}$ are the t-week average returns of China's main board market. Referring to the method of Xu et al. (2014), we consider the market return of the two weeks before and after the t-week. Because the distribution of residual term in equation (1) is biased, it needs to be corrected, which is as follows:

$$W_{i,t} = \ln(1 + \varepsilon_{i,t}) \quad (2)$$

Secondly, based on equation (2), the calculation formulas of negative return skewness coefficient (*Ncskew*) and return volatility ratio (*Duval*) are constructed, which is as follows:

$$Ncskew_{i,t} = - \left[n(n-1)^{3/2} \sum W_{i,t}^3 \right] / \left[(n-1)(n-2) (\sum W_{i,t}^2)^{3/2} \right] \quad (3)$$

$$Duval_{i,t} = \log \left\{ \left[\left(n_u - 1 \right) \sum_{\text{down}} W_{i,t}^2 \right] / \left[\left(n_d - 1 \right) \sum_{\text{up}} W_{i,t}^2 \right] \right\} \quad (4)$$

The larger the variables *Ncskew* and *Duval* obtained from equation (3) and equation (4), the higher the risk of stock price crash of sample listed companies.

(2) Financial Environment (FE)

Refer to Wang et al. (2019) and measure by the financial environment index of China's provinces and cities provided in the report of marketization index of China's provinces (2018).

(3) Control Variable

Referring to the existing literature, this paper adds the following variables as control variables: *Awcy*: measured by the mean value of formula (2) W value; *Swcy*: measured by the standard deviation of formula (2) W value; *Size*: measured by the natural logarithm of the total assets of the sample company; *Debt*: measured by the capital liability ratio of the sample company; *Roa*: measured by the return on assets of the sample company; *H10*: measured by the equity concentration of the top ten shareholders of the sample company *IDP*: measured by the proportion of independent directors of sample companies; *Age*: measured by the listing time of sample companies.

3.2 Definition of Empirical Model

According to the previous theoretical analysis and variable definition, this paper constructs the corresponding empirical test model:

$$SPCR_{i,t+1} = \alpha_1 FE_{i,t} + \alpha_2 Control_Variable_{i,t} + Year + Industry + C + \varepsilon_{i,t} \quad (5)$$

In equation (5), the risk variables of stock price crash are measured by *Ncskew* and *Duval* respectively. Considering the lag of the impact of stock price crash risk, they will be added in the form of a lag variable. At the same time, in the empirical model, we also add the control of sample year and sample industry. In addition, in order to eliminate the influence of extreme values, this paper uses 1% Winsorize tail reduction for variables.

3.3 Data Description

This paper selects 2010-2019 GEM listed companies as the original sample, and removes the samples according to the following principles: first, remove the samples of financial industry GEM listed companies; second, remove the samples of GEM listed companies with special treatment; third, remove the samples of IPO GEM listed companies; fourth, remove the samples of gem with annual trading volume less than 30 weeks Fifth, remove the sample of GEM listed companies with missing data. Finally, this paper obtains 3885 annual samples of 738 GEM listed companies from 2010 to 2019.

4. Empirical Results and Analysis

4.1 Descriptive Statistical Results

Table 1. Descriptive Statistics

	Mean	Std.dev	Median	25%	75%
<i>Ncskew</i>	-0.151	0.706	-0.119	-0.541	0.252
<i>Duval</i>	-0.083	0.477	-0.092	-0.403	0.227
<i>FE</i>	9.121	1.524	9.440	8.190	10.290
<i>Awcy</i>	0.003	0.012	0.001	-0.005	0.010
<i>Swcy</i>	0.072	0.026	0.066	0.054	0.082
<i>Size</i>	21.347	0.824	21.256	20.741	21.845
<i>Debt</i>	0.310	0.181	0.283	0.165	0.429
<i>Roa</i>	0.058	0.100	0.058	0.033	0.087
<i>H10</i>	0.130	0.082	0.109	0.071	0.173
<i>IDP</i>	0.381	0.071	0.375	0.333	0.429
<i>Age</i>	4.004	2.459	4.000	2.000	6.000

Note. *, **, and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 1 gives the descriptive statistical results of the sample. The mean values of variables *Nc skew* and *Du vol* are -0.151 and -0.083 respectively. Compared with the existing studies on the stock price crash risk of listed companies on the main board of China, the mean values of the sample variables in this paper are relatively high, which indicates that the stock price crash risk of listed companies on the gem of China is relatively high. The mean value of variable *Fe* is 9.121, and the standard deviation is 1.524, which indicates that the financial environment faced by different GEM listed companies is quite different.

4.2 Correlation Test Results

Table 2. Correlation Test Results

	<i>Nc skew</i>	<i>Du vol</i>	<i>FE</i>	<i>Awcy</i>	<i>Swcy</i>	<i>Size</i>	<i>Debt</i>	<i>Roa</i>	<i>H10</i>	<i>IDP</i>	<i>Age</i>
<i>Nc skew</i>	1										
<i>Du vol</i>	0.866***	1									
<i>FE</i>	-0.038**	-0.054***	1								
<i>Awcy</i>	-0.141***	-0.145***	-0.082***	1							
<i>Swcy</i>	-0.150***	-0.147***	-0.044***	0.584***	1						
<i>Size</i>	0.008	-0.047***	0.182***	-0.075***	-0.138***	1					
<i>Debt</i>	-0.030**	-0.039**	0.139***	-0.056***	0.036**	0.447***	1				
<i>Roa</i>	-0.024*	-0.034**	0.009	0.168***	-0.083***	0.005	-0.156***	1			
<i>H10</i>	0.002	0.005	-0.079***	0.038**	0.005	-0.178***	-0.098***	0.069***	1		
<i>IDP</i>	0.005	0.003	0.050***	0.044***	0.087***	-0.057***	0.003	-0.039**	0.053***	1	
<i>Age</i>	-0.068***	-0.089***	0.206***	-0.064***	-0.082***	0.467***	0.253***	-0.082***	-0.320***	0.013***	1

Note. *, **, and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 2 shows the correlation test results of the samples in this paper. There is a significant negative correlation between the variable *Fe* and the variables *Nc skew* and *Du vol*, which indicates that there is a negative correlation between the financial environment variables and the stock price crash risk variables, which preliminarily verifies the previous research hypothesis. At the same time, the correlation coefficient between variables is not high, which indicates that there is no collinearity between variables.

4.3 Multiple Regression Test Results

Table 3. Multiple Regression Test Results

	<i>Ncskew</i>	<i>Duval</i>	<i>Ncskew</i>	<i>Duval</i>
<i>FE</i>	-0.018** (0.007)	-0.017*** (0.005)	-0.017** (0.008)	-0.014*** (0.005)
<i>Awcy</i>			-4.636***	-3.324***
<i>Swcy</i>			-2.948***	-2.060***
<i>Size</i>			0.045***	-0.008***
<i>Debt</i>			0.116*	0.031*
<i>Roa</i>			-0.214*	-0.171**
<i>H10</i>			-0.195*	-0.163*
<i>IDP</i>			-0.243*	-0.131*
<i>Age</i>			-0.029***	-0.019***
<i>Year</i>	Control	Control	Control	Control
<i>Industry</i>	Control	Control	Control	Control
<i>C</i>	0.012***	0.072***	-0.624***	0.430***
<i>R²</i>	0.001	0.003	0.036	0.040

Note. The Standard Error reported in parentheses. *, **, and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 3 shows the results of multiple regression test. Before the addition of control variables, the *Fe* coefficients of explanatory variables in regression results (1) and (2) are negative, and can pass the significance test of conventional confidence level. After the addition of control variables, the *Fe* coefficients of explanatory variables in regression results (3) and (4) are still significantly negative, indicating that there is a significant negative correlation between financial environment and stock price crash risk, that is, regional financial environment The better, the lower the risk of stock price collapse of the local GEM listed companies, which verifies the previous research hypothesis.

From the empirical evidence of this paper, the financial environment can have a good governance effect on the local GEM listed companies. It can improve the information disclosure governance of the listed companies, restrain the behavior of the management, and create better returns for the market investors, so as to reduce the stock price collapse risk of the local GEM listed companies. This shows that in China's capital market, external governance is the most important factor. It is a beneficial system to restrain the risk of stock price collapse of listed companies.

From the test results of control variables, variables *Awcy*, *Swcy*, *Roa*, *H10*, *IDP*, *Age* have significant negative correlation with the explained variables, while variable *Debt* has significant positive correlation with the explained variables. There was no significant difference between the results of control variable test and those of other researches.

In order to verify the robustness of the previous empirical evidence, this paper carries out the corresponding robustness test. Firstly, this paper tests the actual value of the financial environment index, and further uses the ranking method to assign the value according to the regional financial environment index, and then carries out the regression test; secondly, the explained variable in the regression model is the stock price crash risk variable lagging for one period, and this paper further uses the current stock price crash risk variable to test; thirdly, this paper analyzes some of the variables. For example, *H10* was replaced by *H5*, *Roa* was replaced by *Roe*, and regression test was performed. There is no substantial difference between the results of robustness test and the previous paper, which shows that the empirical results of this paper are robust.

4.4 Endogeneity Test

Although the previous test results show that there is a significant negative correlation between financial environment and stock price crash risk, there may also be endogenous problems among variables. One possibility is that the different administrative levels of GEM listed companies in different regions will lead to different financial environment, which may lead to false relationship between financial environment and stock price crash risk. Therefore, this paper uses Heckman's two-stage regression method for endogenous test. In the first stage, the variable of whether the sample company is located in a municipality or not is selected as the instrumental variable (*MDC*), followed by the second stage regression test.

Table 4. Endogenous Test Results

	Stage I	Stage II	
	<i>FE</i>	<i>Ncskew</i>	<i>Duval</i>
<i>MDC</i>	0.776*** (0.055)		
<i>FE</i>		-0.017 (0.008)	-0.014*** (0.005)
<i>Control Variable</i>	Control	Control	Control
<i>Year</i>	Control	Control	Control
<i>Industry</i>	Control	Control	Control
<i>C</i>	5.881***	-0.624***	0.427***
<i>R</i> ²	0.109	0.036	0.040
<i>J-statistic</i>	—	1.635	2.458

Note. The Standard Error reported in parentheses. *, **, and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

The results of endogeneity test are given in Table 4. In the first stage test results, there is a significant positive correlation between the variable *MDC* and the explained variable *Fe*, which indicates that compared with the GEM listed companies whose location is not in the municipality directly under the central government, the GEM listed companies whose location is in the municipality directly under the central government have a better financial environment, which indicates that there is a certain correlation between the instrumental variables and the explained variables. However, in the second stage test results, there is still a significant negative correlation between the variable *Fe* and the explained variables *Ncskew* and *Duval*, which indicates that after considering the endogenous factors, the financial environment can still be used as an external governance factor to restrict the stock price collapse risk of GEM listed companies. At the same time, the probability values of Sargan test of J statistic in the second stage test results of Table 4 are greater than 10%, which indicates that there is no correlation between instrumental variables and disturbance terms, and also meets the exogenous requirements of instrumental variables.

5. Research Conclusions

The risk of stock price crash is a hot issue in recent years, which has attracted the attention of academic and practical circles. In addition to the research based on the internal perspective of the company, external environmental factors are also important factors affecting the risk of stock price crash. This paper empirically tests the impact of the financial environment of the listed companies on the risk of stock price crash. It is found that the financial environment is an important factor to restrain the risk of stock price crash, that is, the better the financial environment of GEM listed companies, the lower the risk of stock price crash. This conclusion is still true after controlling the robustness and endogeneity.

From the conclusion of this paper, a good financial environment has become an effective external governance mechanism, which can restrain the behavior of local listed companies and their management, and effectively protect the interests of market investors. Therefore, from the perspective of regulatory authorities, we should actively create a good financial environment for regional listed companies, such as the establishment of more financial institutions, giving financial institutions more development space. From the perspective of market investors, we can also regard the regional financial environment as an important factor in the market investment decision-making, and make corresponding investment decisions by observing the local financial environment, so as to judge the possible fluctuation of the investment object in the stock market. From the perspective of listed companies, they should also regard the financial environment as their own “soft constraints”, and restrict their own behavior through the governance factors of the financial environment, so as to improve their corporate governance level.

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