Original Paper

Social Responsibility, Institutional Environment and Stock Price Crash Risk: Evidence from Chinese GEM

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Abstract

The stock price crash risk has become the focus of corporate finance and macroeconomics research in recent years because it affects the stock market, listed companies, market investors and the real economy. This paper takes 1822 gem listed companies from 2011 to 2017 as samples, and empirically tests the impact of social responsibility on the risk of stock price collapse and takes into account the regulatory effect of institutional environment. The study finds that social responsibility can inhibit the stock price collapse risk of listed companies on the growth enterprise market, and the institutional environment can also inhibit the risk of stock price collapse of listed companies on the growth enterprise market. Considering the influence of the institutional environment, the influence of social responsibility on the risk of stock price collapse of listed companies on the growth enterprise market is more obvious, which shows that the institutional environment has a moderating effect between social responsibility and the risk of stock price collapse. This conclusion still exists after considering the endogenous influence. Further research shows that the inhibiting effect of social responsibility and the regulating effect of institutional environment are more obvious among gem listed companies in the first year of listing.

Keywords

Stock Price Crash Risk, Social Responsibility, Institutional Environment, GEM

1. Introduction

In recent years, there has been a growing interest in the stability of stock market in macroeconomics and microeconomics. Stock price crash risk refers to the phenomenon that the stock market or an individual stock suddenly deviates from the previous price trend without warning. A slump will have a serious impact on the stock market and market investors. One the one hand, the stock price crash is contagious. A price crash of a single stock would lead to the crash of the whole stock market, which would do harm to the real economy. On the other hand, stock price crash also damages the interests of investors, blow their confidence and cause social panic. In the China's stock market, the stock price has crashed several times in recent years. For example, A shares collapsed 40% from its peak in 60 days in the second half of 2015. The abortion of the circuit breaker mechanism in the early 2016 also hit the market hard. What's more, in 2018, A-share price plummeted on the first trade day in September and plunged 9.6% within one week in December. All of these crashes have a huge impact on the stock market. In order to prevent any more crashes, President Xi pointed out that a stock market with

complete financing functions, solid institutional system, effective market supervision and full protection for investors' right and interests should be built. Therefore, it is significant theoretically and practically to study the stock price crash in order to protect Chinese market investors and to build healthy stock market.

Since Jin and Myers (2006), information concealing has been widely recognized as an important factor in causing stock price crash. And follow-up studies are mostly conducted from the perspective of inhibiting earnings management, and improving information transparency and quality (Hutton et al., 2009; Kim et al., 2011; Kim & Zhang, 2016). Previous studies also show that fulfilling corporate social responsibility benefits companies a lot, such as reducing earnings management and improving conservatism of accounting information, thus reduces stock price crash risk. Kim et al. (2014) finds that CSR could improve information transparency and mitigate stock price crash risk. Tao (2015) also supports their finding and adds that the negative relationship between the CSR and the stock price crash risk is stronger in firms with lower corporate governance intensity and lower institutional ownership. Song et al. (2017) report in a recent study based on information effect and reputation effect that corporate social responsibility disclosure could decrease stock price crash risk. Their finding indicates that information disclosure would produce reputation effect.

However, some studies point the opposite way. Hemingway and Maclagan (2004) argue that the social responsibility disclosure would increase the stock price crash risk because it would distract stockholders and help management conceal information. Quan (2015) thinks the implementation of CSR has become a management self-serving tool. Their study reports a positive relationship between CSR and stock price crash risk, which indicates that there is a significant crash effect of CSR in China's capital market. Quan & Xiao (2016) further demonstrate that the crash effect of corporate social responsibility could be reduced because accounting conservatism has a negative effect on stock price crash risk. Tian & Wang (2017) also show that mandatory disclosure policy significantly increases the crash risk. Song et al. (2017) contend that the reason why there are totally different results is because different studies use different samples.

In the meantime, like CSR which comes from companies' internal governance, external institutional environment also inhibit crash risk. On the one hand, good institutional environment would create external governance effect and improve the quality of corporate information disclosure, thereby decreasing crash risk. On the other hand, institutional environments of different provinces and cities in China vary a lot so that the institutional environment faced by different enterprises is very different. And this disparity affects the performance of Chinese enterprises in the stock market. Previous studies also suggest that institutional environment can restrain the risk of stock price crash to a certain extent, and the difference of institutional environment will have different effects. Wang et al. (2014) notes that there is correlation between institutional environment and the stock price crash risk. Good institutional environment would protect investors and inhibit crash risk. Luo & Du (2014) also suggest that excellent institutional environment would mitigate rash risk.

What's more, compared with main board listed companies, gem listed companies are more likely to have stock price crash. On the one hand, gem listed companies' own risk characteristic, equity structure characteristic and entrepreneurship characteristic make them more vulnerable to crash risk (Lin, 2017). On the other hand, performance variable, financial fraud and other phenomena frequently appear in the "high-growth" GEM listed companies in recent years (Xue et al., 2017). These phenomena increase the risk of stock price crash of the GEM listed companies.

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On account of the reasons illustrated above, this paper takes GEM listed companies from 2010 to 2017 as samples to study the impact of social responsibility on stock price crash risk, and the mediating effect of exogenous institutional environment. This study departs from other studies. Firstly, it takes GEM as samples to study the impact of CSR on stock price crash risk. It provides empirical evidence based on GEM listed companies to confirm the significance of corporate social responsibility. Secondly, this paper regards exogenous institutional environment as the mediating variable between social responsibility and stock price crash risk, and emphasizes the importance of exogenous institutional environment in business operation and capital market. Therefore, our study adds to the growing literature on stock price crash risk.

2. Theoretical Analysis and Research Hypothesis

2.1 Social Responsibility and Stock Price Crash

What can social responsibility bring to a company? Based on prior studies, social responsibility is a double-edged sword. On the one hand, the fulfillment of social responsibility can bring advertising effect to enterprises and improve the quality of information disclosure. On the other hand, social responsibility is also a kind of cost, which could increase the financial pressure of enterprises and influence the business performance. In recent years, as Chinese enterprises pay more attention to social responsibility and standardize the fulfillment of social responsibility, especially the change of social responsibility information disclosure pattern from "one-dimensional" to "multi-dimensional", social responsibility has regulated the business behavior of enterprises to a greater extent, and has a good governance effect on enterprises.

Social responsibility influences companies' stock price in many ways. Firstly, the fulfillment of social responsibility enriches the content of corporate information disclosure and improves the timeliness and quality of information disclosure. On the one hand, companies with superior CSR performance generally have good information disclosure quality and good accounting conservatism (Dhaliwal et al., 2011). Compared with companies with bad CSR performance, they will contain richer and more real information in their financial report. So investors can get the information at a lower cost, thus reduces information asymmetry between market investors and enterprises. On the other hand, Companies with good CSR performance would disclose their CSR sooner and better, which helps market investors get access to more non-financial information, such as insider trading, real earnings management and charity. In this way, it could reduce the agency problems caused by insider advantages, reduce market investors' "blind area" and "unknown information" about enterprises, and avoid sudden appearance of "bad" information in the stock market.

Secondly, the performance of CSR would also create reputation effect which could boost market investors' confidence. For one thing, fulfilling CSR reduces agency costs because it helps management satisfy the interests of shareholders. In the process of fulfilling social responsibilities, enterprises can improve their reputation, reflect their ethical standards, enhance the degree of due diligence of corporate management, and protect the legitimate rights and interests of shareholders (Quan et al., 2015). For another, the performance of CSR satisfies market investors' interests as well. As a result, common market investors will also give returns to enterprises in the stock market. They will not blindly sell shares, which will give enterprises a relatively stable performance in the stock market. Even when there is uncertainty, ordinary market investors will give some time to the enterprise rather than sell their stocks immediately.

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In the GEM market, due to the relatively complete information disclosure system, companies' social responsibility performance is also better, and the corporate governance effect of social responsibility is also stronger (Qin et al., 2018). Even though investing GEM listed companies is riskier, gem listed companies with good CSR performance are also favored by investors because investors think they could get enough corporate information, have less information asymmetry and enjoy reputation effect.

Hypothesis 1: In the GEM market, social responsibility is negatively correlated with stock price crash. The better the social responsibility performance, the lower the stock price crash risk.

2.2 Social Responsibility, Institutional Environment and Stock Price Crash Risk

Good institutional environment could produce corporate governance effect on companies, such as reducing agency costs, transaction cost and uncertainty (La Porta et al., 2002), especially in China. As is pointed out, enterprises in China are actually in different institutional environments due to distinct economic development status and opening policies of different areas, even though the economic system and laws are the same across China. In other words, different institutional environments have various governance effects on enterprises in different provinces and cities. So there will be different influences on the performance of enterprises in the stock market. Firstly, the governance effect of institutional environment could help standardize information disclosure system. It would regulate companies. Companies have to follow the regulations and disclose sufficient information on time. As a result, enterprises and investors gets closer, information asymmetry is reduced, and market investors can get enough information. Secondly, good institutional environment is conducive to reducing agency costs and protecting investors' interests. A favorable institutional environment improves the level of information disclosure, reduces the self-interested behavior of the management, reduces information asymmetry between the management and shareholders, and cuts the agency cost between the management and shareholders. In other words, it reduces the accumulation of bad information of the enterprise.

Good institutional environment has a regulating effect between social responsibility and stock price crash risk. Firstly, from the perspective of the information effect of social responsibility on stock price crash risk, good institutional environment enhances governance effect of social responsibility, thus contributing to a more rigorous regulation of disclosure. Hence the possibility of crash risk caused by information concealing is reduced. On the on hand, social responsibility and institutional environment form "dual supervision", which further improves the information disclosure system of enterprises and encourages them to disclose more information in a more timely manner. On the other hand, a favorable institutional environment will not only restrain enterprises from carrying out non-social responsibility behaviors, but also require enterprises to disclose social responsibility information in time. On account of the constraint and governance effect of institutional environment, information disclosure will be improved, the possibility of concealing information will decrease, and the risk of stock price crash caused by information asymmetry will decline. Secondly, from the perspective of reputation effect, good institutional environment could improve the performance of CSR, thereby better satisfying stockholders and investors' interests. On the one hand, good institutional environment could regulate management and require better CSR performance to satisfy stockholders' interests. In this way, the agency costs would be further reduced. On the other hand, good institutional environment, like social responsibility, also demands protection for market investors. It not only helps keep the support of investors, but also makes contributions to the stability of companies in the stock market.

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Especially in the growth enterprise market, because of the non-state-owned nature as well as the small or medium size, gem listed companies are more dependent on the governance effect of the external system environment than state-owned enterprises. They need external institutional environment to build a good business environment. As a result, the governance effect of institutional environment would be stronger (Liu et al., 2014). Bound by institutional environment, gem listed companies would pay more attention to the performance of CSR and its impact. Meanwhile, market investors would also perceive corporate social responsibility behaviors. This would help regulate the potential crash risk.

Hypothesis 2: In growth enterprise market, institutional environment would have regulating effect between social responsibility and stock price crash risk. In other words, the social responsibility of GEM listed companies has a stronger inhibitory effect on stock price crash risk in areas with superior institutional environment than in areas with inferior institutional environment.

3. Research Design

3.1 Samples

Since there are higher stock price crash risk and frequently occurring crashes in the growth enterprise market, this paper takes gem listed companies as samples for research. Due to the fact that GEM did not start to trade until the second half of 2009, and the number of annual trading weeks was too small, as well as the consideration of the lag risk of stock price crash in the empirical model design in the following paper, the sample interval of this paper is from 2011 to 2017.

At the same time, the original samples were selected. The specific principles are as follows: (1) excluding the samples of companies that were listed in the initial public offering in that year, (2) excluding companies with special treatment, (3) excluding companies with less than 30 weeks of stock trading in a year, (4) excluding the companies with less than 30 weeks of stock trading in the previous year, (5) excluding the companies which misses data and cannot be supplemented by the annual report. Finally, 1,822 samples of GEM listed companies from 2011 to 2017 were obtained. The data is from RESSET.

3.2 Variables

3.2.1 Stock Price Crash Risk

Based on prior studies, this paper takes the negative conditional skewness of firm-specific weekly returns over the fiscal year (Ncskew) and down-to-up volatility measure (Duvol) as the measurement variables of stock price crash risk. Specifically, for each firm i in year t, NCSKEW and DUVOL are calculated as:

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

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

where n refers to the actual trading weeks of enterprise i in the stock market each year, W is the adjusted weekly specific return rate, n_u is the number of weeks in which the W value of enterprise i is greater than the average, and n_d is the number of weeks in which the W value of enterprise i is less than the average. In order to obtain the adjusted specific weekly return rate, the regression model first constructed:

$$R_{i,t} = \alpha_0 + \alpha_1 R_{m,t-2} + \alpha_2 R_{m,t-1} + \alpha_3 R_{m,t} + \alpha_4 R_{m,t+1} + \alpha_5 R_{m,t+2} + \varepsilon_{i,t} \tag{3}$$

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where $R_{i,t}$ is the weekly return on stock i in week t, and $R_{m,t}$ is the value-weighted average return in week t. At the same time, following Dimson (1979) and Xu et al. (2012), we consider the influence of non-synchronous trading between a single stock and the market index and add the influence of the market conditions before and after the two periods. The residual term obtained by Equation (3) is skewed in distribution, so it is modified to obtain the value W as follows:

$$W_{i,t} = \ln\left(1 + \varepsilon_{i,t}\right) \tag{4}$$

The bigger the *Ncskew* and *Duvol*, the higher the stock price crash risk of enterprise i in year t, and vice versa.

3.2.2 Social Responsibility

As Yang and Qiao (2013), Zhou and Lin (2015) demonstrates that enterprises satisfy the interests of different stakeholders differently in the process of fulfilling social responsibility, this paper constructs the corresponding social responsibility variable (CSR), namely:

$$CSR_{i,t} = \left(GE_{i,t} + IR_{i,t} + ER_{i,t} + SR_{i,t} + CR_{i,t}\right) - NR_{i,t} \tag{5}$$

In Equation (5), *GE* is the satisfied government responsibility interest. It is the difference ratio between taxes and tax rebates after the total assets are treated. *IR* is the proportion of cash distributed to the enterprise after the total assets are treated to satisfy the shareholders' liability interests. *ER* is the proportion of cash paid to employees by the enterprise after the total operating revenue is processed. *SR* is the proportion of cash received for labor expenditures for goods purchased after treatment of closing operating cash flow to satisfy supplier liability benefits. *CR* is the satisfied charitable donation responsibility benefit, is the proportion of charitable donation expenditure after the total assets processing. NR is the proportion of the fines paid by the enterprise after the total assets are treated.

3.2.3 Institutional Environment

Following previous studies, this paper measures institutional environment by assigning value to the ranking of indexes provided by Wang et al. (2017) in Business Environment Index for China's Provinces 2017 Report (*INEN*).

3.2.4 Control Variables

Based on prior studies, this paper takes average weekly specific return rate (*AW*), the standard deviation of weekly specific return rate (*SW*), last year's negative return skewness coefficient (*LYN*), firm size (*Size*), debt-to-asset ratio (*Debt*), return on assets (*Roa*), age of listed (*Age*), industry (*Indu*) and Year (*Year*) as control variables. The variables are better illustrated in Table 1.

Table 1. Definition and Illustration of Variables

Type	Definition	Illustration
Explained variables	Negative conditional skewness of firm-specific weekly returns over the fiscal year (*Ncskew*)	Seen in Equation (1)
	Down-to-up volatility measure (*Duvol*)	Seen in Equation (2)
	Corporate social responsibility (*CSR*)	Seen in Equation (5)
Explaining variables	Institutional environment (*INEN*)	The business environment index of areas where the sampling companies located (*INEN*1)
		Assignment of different annual institutional environment index in the region where the sample company is located (*INEN*2)
	Average weekly specific return rate (*AW*)	The mean value of W obtained by Equation (4)
	The standard deviation of weekly specific return rate (*SW*)	The standard deviation of W value obtained by Equation (4)
	Last year's negative return skewness coefficient (*LYN*)	See Equation (1), the value of the previous year
Control variables	Total assets (*Size*)	The natural logarithm of the total assets of the sample firm
	Debt-to-asset ratio (*Debt*)	Ratio of total liabilities to total assets of sample companies
	Return on assets (*Roa*)	Ratio of net profit to total assets of sample companies
	Age (*Age*)	Difference between sample year and listing year

3.3 Empirical Model

According to the above research hypotheses and variables, we construct corresponding empirical models. Firstly, the empirical model to test the relationship between social responsibility and stock price crash risk is as follows:

$$Ncskew/Duvol_{t+1} = \begin{pmatrix} \alpha_1 CSR_t + \alpha_2 AW_t + \alpha_3 SW_t + \alpha_4 LYN_t + \alpha_5 Size_t + \alpha_6 Debt_t \\ + \alpha_7 Roa_t + \alpha_8 Age_t + Idu + Year + C + \varepsilon_t \end{pmatrix} \quad (6)$$

Meanwhile, in order to test the regulating effect of institutional environment, the empirical model is constructed as follows:

$$Ncskew/Duvol_{t+1} = \begin{pmatrix} \alpha_1 CSR_t + \alpha_2 INEN_t + \alpha_3 \left(CSR_t \times INEN_t \right) + \alpha_4 AW_t + \alpha_5 SW_t \\ + \alpha_6 LYN_t + \alpha_7 Size_t + \alpha_8 Debt_t + \alpha_9 Roa_t + \alpha_{10} Age_t \\ + Idu + Year + C + \varepsilon_t \end{pmatrix} \quad (7)$$

In the above two formulas, we lag the measures of *NCSKEW* and *DUVOL* by one term to account for the hysteresis of the impact on the risk of a crash.

4. Results and Discussion

4.1 Descriptive Statistics

Table 2. Descriptive Statistics

Variables	Mean	Median	SD	5%	25%	75%	95%
Ncskew	-0.298	-0.268	0.724	-1.521	-0.673	0.095	0.788
Duvol	-0.228	-0.236	0.500	-0.993	-0.546	0.086	0.608
CSR	0.796	0.816	0.121	0.559	0.729	0.883	0.955
*INEN*1	8.697	9.350	1.405	6.100	7.790	9.780	10.010
*INEN*2	4.406	5.000	1.011	2.000	4.000	5.000	5.000
AW	-0.002	-0.001	0.002	-0.004	-0.002	-0.001	0.000
SW	0.052	0.047	0.021	0.026	0.036	0.062	0.093
LYN	-0.304	-0.265	0.694	-1.514	-0.669	0.093	0.703
Size	21.346	21.269	0.776	20.240	20.770	21.813	22.803
Debt	0.292	0.267	0.166	0.068	0.160	0.160	0.598
Roa	0.046	0.046	0.050	-0.017	0.022	0.022	0.119
Age	3.999	4.000	1.657	2.000	3.000	3.000	7.000

Descriptive statistical results of the main variables are presented in Table 2. The mean value of *NCSKEW* was -0.298 (median value, -0.268), and the mean value of *DUVOL* was -0.288 (median value, -0.236). Compared with other studies which take main board listed companies as samples, gem listed companies has high stock price crash risk.

Table 3. Group Test

	High-*CSR* group			Low *CSR* group			T test	Wilcoxon Z
	Sample size	Mean	Median	Sample size	Mean	Median		
Ncskew	1040	-0.315	-0.307	782	-0.276	-0.228	4.658***	1.832*
Duvol	1040	-0.230	-0.239	782	-0.225	-0.227	5.484***	1.678*

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

Table 3 displays the grouping test results after grouping companies according to the value of *CSR*. In the high-*CSR* group, the mean values of *NCSKEW* and *DUVOL* are significantly lower than those of the low-*CSR* group. The preliminary results show that gem listed companies with a better social responsibility fulfillment will have a lower risk of stock price crash.

4.2 Correlation Analysis

Table 4. Correlation

	Ncskew	Duvol	CSR	INEN1	INEN2	AW	SW	LYN	Size	Debt	Roa	Age
Ncskew	1											
Duvol	0.830***	1										
CSR	-0.052**	-0.042*	1									
*INEN*1	0.024*	0.016*	0.049**	1								
*INEN*2	0.042*	0.031*	0.064***	0.914***	1							
AW	0.076***	0.071***	0.013	-0.061***	-0.022	1						
SW	-0.108***	-0.113***	-0.011	0.067***	0.038*	-0.825***	1					
LYN	0.060**	0.041*	-0.033	0.015	0.039*	-0.005	0.022	1				
Size	0.061***	0.043*	0.017	0.179***	0.106***	0.087***	-0.128***	0.036*	1			
Debt	-0.014*	0.009*	0.216***	0.041*	-0.001	-0.051**	0.035	-0.054**	0.461***	1		
Roa	-0.003*	-0.026*	-0.153***	0.061***	0.089***	0.039*	-0.051**	0.048**	0.061***	-0.254***	1	
Age	0.008*	0.010*	-0.067***	0.143***	-0.025	0.060***	-0.116***	-0.069***	0.424***	0.192***	-0.080***	1

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

Table 4 presents the correlation results for the measures used in the study. There is a significant negative relationship between *CSR* and *Ncskew*, as well as *CSR* and *Duvol*. The values of correlations among other variables are not high enough. So there are no correlations among other variables.

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4.3 Multiple Regression Analysis

Table 5. Multiple Regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Ncskew	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*
CSR	-0.310**	-0.174*	-0.312**	-0.212**					-1.014***	-0.818***	-0.433***	-0.681***
	(0.141)	(0.097)	(0.145)	(0.100)					(0.097)	(0.627)	(0.064)	(0.044)
*INEN*1					-0.129**	-0.077**			-0.352***	-0.282***		
					(0.012)	(0.009)			(0.008)	(0.006)		
*INEN*2							-0.274***	-0.164**			-0.131***	-0.284***
							(0.017)	(0.012)			(0.011)	(0.007)
*CSR*INEN*1									0.026**	0.024**		
									(0.010)	(0.007)		
*CSR*INEN*2											0.223**	0.127***
											(0.140)	(0.001)
AW			-20.002*	-22.471*	-20.372*	-22.720*	-20.799*	-22.977**	-20.078*	-22.541*	-20.436*	-22.780*
SW			-4.850***	-4.143***	-4.887***	-4.162***	-4.896***	-4.167***	-4.964***	-4.215***	-4.961***	-4.215***
LYN			0.058**	0.030*	0.059**	0.031*	0.058**	0.030*	0.058**	0.030*	0.057**	0.030**
Size			0.075***	0.027*	0.073***	0.026*	0.071**	0.025*	0.070**	0.024**	0.069**	0.023*
Debt			0.162*	0.005*	0.209*	0.037*	0.207*	0.036*	0.154*	0.001***	0.150*	0.003*
Roa			-0.515*	-0.465*	-0.458*	-0.425*	-0.475*	-0.434*	-0.544*	-0.483**	-0.557*	-0.493**
Age			-0.016*	-0.008*	-0.014*	-0.007*	-0.012*	-0.006*	-0.017*	-0.009*	-0.014*	-0.008*
Indu	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
C	-0.052	-0.090	-1.281**	-0.391*	-1.593***	-0.601*	-1.573***	-0.589*	-1.464*	-0.561*	-1.186*	-0.422*
Adj R^2	0.002	0.001	0.019	0.017	0.017	0.015	0.018	0.016	0.019	0.016	0.019	0.017
F-statistic	4.853**	3.221*	5.363***	4.908***	4.909***	4.443***	5.104***	4.590***	4.443***	4.052***	4.621***	4.181***

Note. p***<0.01, p**<0.05, p*<0.1. In parentheses are the standard error values of the regression results.

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Table 5 presents the results of multiple regression analysis for the main variables. If only industry and age are considered, the coefficients of the in regression results (1) and (2) are significantly negative. After adding other variables, the coefficients in (3) & (4) are still significantly negative and they are bigger than those in (1) & (2). This demonstrates that social responsibility has a more obvious inhibiting effect on stock price crash risk, if the early risk factors of stock price crash and the company's financial status are controlled. This finding supports hypothesis 1. In gem listed companies, although the firm size is not large, they will lay more emphasis on the fulfillment of social responsibility because shareholders and executives want the company to be strong and bigger and hope to achieve sustainable development. The strong sense of social responsibility constraints the behavior of the gem listed companies and brings more efficiency to the company (Wang et al., 2017). What's more, it will be perceived by market investors, thereby reducing the risk of the enterprise in the stock market. In regression result (5) & (6), the coefficients of $INEN1$ are also significantly negative. So are the coefficients of $INEN2$ in (7) & (8). These results indicate that there is a significant relationship between external institutional environment and stock price crash risk. In gem listed companies, external institutional environment has a remarkable governance effect of inhibiting the crash. This finding is different from Lin (2017)'s finding because of different samples. This difference indicates that as time goes by, institutional environment starts to have governance effect on gem listed companies in the stock market. When the interaction term is introduced to consider the moderating effect of institutional environment, there is still a significant negative correlation between CSR and the explained variables in the regression results (9) to (12). The absolute values of the coefficients in the regression results (9) and (11) are bigger than those in (3). The absolute values of the coefficients in the regression results (10) and (12) are also larger than those in (4). These results show that with the influence of institutional environment, social responsibility has a stronger inhibiting effect on stock price crash risk. Institutional environment dose have a moderating effect on the influence of social responsibility on stock price crash risk. So we find support for hypothesis 2. At the same time, from the result of the interaction term, the coefficient value of the interaction term is significantly positive. This result implies that the marginal effect of social responsibilities' inhibiting effect on stock price crash risk is enhanced after considering the influence of institutional environment.

In the test results of control variables, AW and SW are negatively correlated with the explained variables, while LYN, $Size$, $Debt$ and explained variables have significant positive correlation. The results show that gem listed companies with a higher crash risk, larger size and higher debt ratios in the previous year would have a higher risk of a stock price crash in the future. The variables Roa and Age have significant negative correlation with the explained variables, indicating that the better the performance and the longer the listing time of GEM listed companies, the lower the risk of future stock price crash. There was no significant difference between the test results of control variables and those of other literatures.

In order to ensure the robustness of the research conclusions, the robustness test is carried out in this paper. First of all, since the following year's stock price crash risk variables are the explained variables in the paper, we take the current year's stock price crash risk variables as the explained variable to conduct an empirical test. Secondly, on the account of the institutional environment difference between municipals and other provinces, we exclude gem listed companies in Beijing, Shanghai, Tianjin and Chongqing to conduct the empirical test. The result of the robustness test is consistent with the findings above.

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4.4 Endogeneity

Our analysis so far suggests *CSR* has regulating effect on stock price crash risk after we controlled some variables. However, the potential endogenous relation between *CSR* and crash risk is a concern in our analysis. Enterprises may have pseudo social responsibility, thus makes the governance effect and regulatory effect generated by *CSR* become ineffective, and makes the false correlation between social responsibility and the risk of stock price crash. If the endogenous problem is solved, this article would adopt the Heckman two-stage regression testing method. The first stage is a test model which control social responsibility. We employ strategy committee, last year's CSR performance and other control variables as instrumental variables. The second stage is regression analysis.

Table 6. Results of Endogenous Test

	(1)	(2)	(3)	(4)	(5)	(6)
	Ncskew	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*
CSR	-0.312**	-0.211**	-1.044***	-0.880***	-0.432***	-0.568***
	(0.145)	(0.100)	(0.001)	(0.002)	(0.062)	(0.042)
*INEN*1			-0.351***	-0.282***		
			(0.081)	(0.005)		
*INEN*2					-0.131*	-0.284**
					(0.001)	(0.005)
*CSR*INEN*1			0.025**	0.024**		
			(0.011)	(0.008)		
*CSR*INEN*2					0.222*	0.127**
					(0.140)	(0.070)
AW	-20.002*	-22.471*	-20.078*	-22.541*	-20.436*	-22.780*
SW	-4.850***	-4.143***	-4.964***	-4.215**	-4.961***	-4.215***
LYN	0.058**	0.030*	0.058**	0.030***	0.057**	0.030*
Size	0.075***	0.027*	0.070**	0.024*	0.069*	0.023*
Debt	0.162*	0.005*	0.154*	0.001	0.150*	0.003*
Roa	-0.515*	-0.465*	-0.544*	-0.483**	-0.557*	-0.493**
Age	-0.016*	-0.008*	-0.017*	-0.009*	-0.014*	-0.008*
Indu	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
C	-1.281**	-0.391*	-1.464*	-0.561*	-1.186*	-0.422*
Adj R^2	0.019	0.017	0.019	0.016	0.019	0.016
F-statistic	5.363***	4.908***	4.443***	4.052***	4.621***	4.181***
J--statistic	1.643	1.279	1.797	1.337	1.466	1.269

Note. p***<0.01, p**<0.05, p*<0.1. In parentheses are the standard error values of the regression results.

From the endogenous test results in Table 6, we note that after controlling the potential endogenous influence, *CSR* is till negatively and significantly associated with the explained variables and institutional environment still has regulating effect between *CSR* and stock price crash risk. The findings are consistent with the previous research conclusion.

4.5 Additional Analysis

On October 30, 2009, GEM officially started trading. Twenty-eight companies are the first to trade in GEM, followed by eight more on December, 25. Companies listed in the first year of GEM are all excellent. Though their size is not large, they have great potential and advanced technology. For example, 24 out of the first 28 companies are either Torch Program Innovation Companies or national high-tech enterprises. They are the leaders in the growth enterprise market. Therefore, we further examine whether our results are still robust to companies listed in the first year. The empirical conclusion above shows that there is a significant negative correlation between the listing time and the stock price crash risk.

Table 7. Results of the Additional Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Ncskew	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*	*Ncskew*	*Duvol*
CSR	-5.832***	-2.577***	-3.104***	-1.184**	-0.847**	-0.357*	-0.249*	-0.202*
	(2.010)	(0.166)	(1.190)	(0.098)	(0.010)	(0.070)	(0.075)	(0.050)
*INEN*1	-0.531***	-0.251***			-0.123*	-0.648**		
	(0.196)	(0.016)			(0.090)	(0.062)		
*INEN*2			-0.502**	-0.192**			-0.138**	-0.846**
			(0.217)	(0.018)			(0.013)	(0.086)
*CSR*INEN*1	0.676***	0.295**			0.136**	0.685**		
	(0.239)	(0.020)			(0.012)	(0.078)		
*CSR*INEN*2			0.677**	0.246**			-0.137**	0.079*
			(0.269)	(0.022)			(0.016)	(0.011)
AW	-8.427*	4.127*	6.359*	2.643*	-21.906*	-24.362**	-22.451*	-24.784*
SW	-6.987	3.879*	5.476*	2.655*	-5.595***	-4.838***	-5.622***	-4.862***
LYN	0.001*	0.019*	0.013*	0.014*	0.060**	0.034*	0.059**	0.033*
Size	0.061***	0.044***	0.039***	0.060***	0.077**	0.033*	0.075*	0.031*
Debt	0.016*	0.222*	0.038*	0.234*	0.161*	0.035*	0.162*	0.035*
Roa	-0.005*	-0.380*	-0.066*	-0.424*	-0.816*	-0.680**	-0.815*	-0.685**
Age	-0.024*	-0.030*	-0.021*	-0.028*	-0.018*	-0.013*	-0.016*	-0.012*
Indu	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
C	2.900*	2.488*	1.125*	1.615*	-2.310**	-0.974*	-1.812**	-0.754*
Adj R^2	0.030	0.027	0.040	0.023	0.024	0.025	0.024	0.026
F-statistic	4.067***	6.401***	9.331***	5.144***	4.819***	5.136***	4.901***	5.306***

Note. p***<0.01, p**<0.05, p*<0.1. In parentheses are the standard error values of the regression results.

The results of additional analysis in Table 7 show that the coefficient values of *CSR* in regression results (1) to (4) are bigger than those in (5) to (8). This indicates that *CSR* performance of companies listed in the first year has a stronger inhibiting effect on stock price crash risk than companies that are not listed in the first year. And the regulatory effect produced by the institutional environment is also stronger.

5. Conclusions

Because stock price crash risk has strong infectivity, it will affect the development of the stock market, damage the interests of market investors and blow their confidence. Moreover, it will destroy capital accumulation in the real economy and cause crisis in the real economy. Compared with main-board listed companies, gem listed companies are more likely to suffer stock price crash. This study takes 1822 gem listed companies from 2011 to 2017 as samples, and empirically tests the impact of social responsibility on the risk of stock price collapse. Moreover, we take into account the regulatory effect of institutional environment. We find that CSR has an inhibiting effect on future crash risk of gem listed companies. In other words, firms' CSR performance is negatively associated with future crash risk. In addition, institutional environment can also inhibit the stock price crash risk of GEM listed companies. More importantly, after considering the influence of institutional environment, social responsibility has a more obvious influence on the stock price crash risk of GEM listed companies. It shows that institutional environment has a moderating effect between social responsibility and stock price crash risk. This result holds after considering endogeneity. Further research implies that the inhibiting effect of CSR and moderating effect of institutional environment are larger for GEM companies listed in the first year.

Stock price crash has emerged as a dominant theme in corporate finance and macroeconomics because it will do harm to stock market, listed companies, market investors and real economy. Many studies are aimed to restrain the risk of stock price crash. It has been well documented that information concealing is the trigger to crash so that many studies are conducted from the perspective of information. However, besides preventing information concealing, improving accounting conservatism and constraining earning management, other aspects which could reduce crash risk are also worth investigating. For example, this study shows that CSR performance would reduce crash risk. Prior studies also report that social trust and media reports could lower crash risk. Therefore, apart from the traditional information perspective, internal and external governance is also worthy of studying.

Meanwhile, this study shows that the CSR performance of GEM listed companies has a corresponding restrictive effect on reducing the risk of stock price crash, which indicates that fulfilling social responsibility is beneficial to the GEM listed companies. Therefore, although fulfilling social responsibility will increase the financial cost of the enterprise, it can win the confidence and support of market investors, thus improving the stability in the stock market. So it is necessary for gem listed companies to fulfill social responsibility.

Moreover, contrary to some studies which contend that institutional environment couldn't restrain stock price crash risk, we find that institutional environment has governance effect on stock price crash risk. Our finding is consistent with studies which take main-board listed companies as samples. China's market environment is constantly optimized, and the market mechanism is improving. Young firms are growing and the corporate governance system is getting better. Thanks to their development, the institutional environment can protect and constrain gem listed companies not only through its own governance effect, but also through joint efforts with companies' internal governance, such as CSR.

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Besides, gem listed companies could take advantage of institutional environment's governance effect and supervision to reduce its own supervision cost.

Acknowledgements

References

Bekaert, G., & Wu, G. (2000). Asymmetric Volatility and Risk in Equity Markets. *Review of Financial Studies*, *2000*(1), 1-42. https://doi.org/10.1093/rfs/13.1.1

Dhaliwal, D. S., Li, O. Z., & Tsang, A. (2011). Voluntary Nonfinancial Disclosure and the Cost of Equity Capital: The Initiation of Corporate Social Responsibility Reporting. *Accounting Review*, *2011*(1), 59-100. https://doi.org/10.2308/accr.00000005

Dimson, E. (1979). Risk Measurement when Shares Are Subject to Infrequent Trading. *Journal of Financial Economics*, *1979*(2), 197-226. https://doi.org/10.1016/0304-405X(79)90013-8

Gao, F., Ling, L. L., & Zhang, I. X. (2014). Commitment to Social Good and Insider Trading. *Journal of Accounting & Economics*, *2014*(2), 149-175. https://doi.org/10.1016/j.jacceco.2014.03.001

Godfrey, P. C., Merrill, C. B., & Hansen, J. M. (2009). The Relationship between Corporate Social Responsibility and Shareholder Value: An Empirical Test of the Risk Management Hypothesis. *Strategic Management Journal*, *2009*(4), 425-445. https://doi.org/10.1002/smj.750

Hemingway, C., & Maclagan, P. (2004). Managers' Personal Values as Drivers of Corporate Social Responsibility. *Journal of Business Ethics*, *2004*(1), 33-44. https://doi.org/10.1023/B:BUSI.0000020964.80208.c9

Hutton, A. P., Marcus, A. J., & Tehranian, H. (2009). Opaque Financial Reports, R2, and Crash Risk. *Journal of Financial Economics*, *2009*(5), 67-86. https://doi.org/10.1016/j.jfineco.2008.10.003

Jin, L., & Myers, S. C. (2006). R^2 Around the World: New Theory and New Tests. *Journal of Financial Economics*, *2006*(2), 257-292. https://doi.org/10.1016/j.jfineco.2004.11.003

Kim, J. B., & Zhang, L. (2016). Accounting Conservatism and Stock Price Crash Risk: Firm-Level Evidence. *Contemporary Accounting Research*, *2016*(1), 412-441. https://doi.org/10.1111/1911-3846.12112

Kim, J. B., Li, Y., & Zhang, L. (2011). Corporate Tax Avoidance and Stock Price Crash Risk: Firm-level Analysis. *Journal of Financial Economics*, *2011*(3), 639-662. https://doi.org/10.1016/j.jfineco.2010.07.007

Kim, Y., Li, H., & Li, S. (2014). Corporate Social Responsibility and Stock Price Crash Risk. *Journal of Banking & Finance*, *2014*(1), 1-13. https://doi.org/10.1016/j.jbankfin.2014.02.013

Kim, Y., Park, M. S., & Wier, B. (2012). Is Earnings Quality Associated with Corporate Social Responsibility. *Accounting Review*, *2012*(3), 761-796. https://doi.org/10.2308/accr-10209

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (2002). Investor Protection and Corporate Valuation. *Journal of Finance*, *2002*(3), 1147-1170. https://doi.org/10.1111/1540-6261.00457

Lin, C., Yang, B., & Peng, C. (2017). Controlling Shareholder Power, Institutional Environment and Stock Price Crash: Evidence from Chinese GEM. *Modern Finance and Economics-Journal of Tianjin University of Finance and Economics*, *2017*(12), 36-51.

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Liu, W., Yang, B. B., & Liu, Y. Y. (2014). The Impact of Institutional Environments on New Ventures' Entrepreneurial Orientation: the Study based on GEM Listed Companies. *Studies in Science of Science*, *2014*(3), 421-430.

Luo, J. H., & Du, X. Q. (2014). Media Coverage, Institutional Environment and Stock Price Crash Risk. *Accounting Research*, *2014*(9), 53-59.

Pan, Y., Dai, Y. Y., & Liu, S. C. (2011). Do Underwriters Provide Price Support by Analyst Coverage in China. *Economic Research Journal*, *2011*(3), 131-144.

Qin, X. Z., Wang, Z. S., & Zhao, H. (2018). Corporate Governance and CSR Disclosures: Evidence from the SMEs of ChiNext Board. *Management Review*, *2018*(3), 188-200.

Quan, X. F., & Xiao, H. J. (2016). Study on the Effect of Corporate Social Responsibility Disclosure on Stock Price Crash Risk: Based on Mediation Mechanism of Accounting Conservatism. *China Soft Science*, *2016*(6), 80-97.

Quan, X. F., Wu, S. N., & Yin, H. Y. (2015). Corporate Social Responsibility and Stock Price Crash Risk: Self-interest Tool or Value Strategy. *Economic Research Journal*, *2015*(11), 49-64.

Shen, Y., Xu, G. H., & Wang, Z. Y. (2014). The CSR Disclosure Reflects CSR Practice: An Approach based on the Big Data Era. *Accounting Research*, *2014*(9), 29-36.

Song, X. Z., Hu, J., & Li, S. H. (2017). Corporate Social Responsibility Disclosure and Stock Price Crash Risk: Based on Information Effect and Reputation Insurance Effect. *Journal of Financial Research*, *2017*(4), 161-175.

Song, Y., Teng, P. P., & Qin, C. C. (2017). Corporate Social Responsibility and Earnings Management: Based on the Empirical Study of Shanghai and Shenzhen Stock A-share Manufacturing Listed Companies in China. *Chinese Journal of Management Science*, *2017*(5), 187-196.

Tao, C. H., Yang, S. J., & Lin, W. F. (2015). Corporate Governance, Corporate Social Responsibility and Stock Price Crash Risk. *Journal of Xiangtan University (Philosophy and Social Sciences)*, *2015*(6), 50-56.

Tian, L. H., & Wang, K. D. (2017). The "Masking Effect" of Social Responsibility Information Disclosure and the Crash Risk of Listed Companies: A DID-PSM Analysis from China's Stock Market. *Management World*, *2017*(11), 146-157.

Wang, H. C., Cao, F., & Gao, S. H. (2014). Investor Protection and Stock Price Crash Risk. *Finance & Trade Economics*, *2014*(10), 73-82.

Wang, L., Liu, X. M., & Cui N. (2017). Will Social Responsibility of Start-up Enterprises Drag Down its Economic Consequences: An Empirical Study from the Perspective of Ultimate Control. *Commercial Research*, *2017*(12), 137-145.

Wang, X. L., Fan, G., & Ma, G. R. (2017). *2017 Report on the Business Environment Index of China's Provincial Enterprises*. Beijing: Social Sciences Academic Press.

Xu, N. H., Jiang, X. Y., Yin, Z. H., & Xu, X. Z. (2012). Conflicts of Interest, Analyst Optimism and Stock Price Crash Risk. *Economic Research Journal*, *2012*(7), 127-140.

Xue, H. G., Wang, D., & He, Q. (2017). The Effect of Corporate Political Connection on Stock Price Crash Risk: An Analysis based on the intermediary Mechanism of Earnings Management. *Commercial Research*, *2017*(11), 109-116.

Yang, Z. Z., & Qiao, Y. H. (2013). The Relationship among the Industrial Competition Attribute, Company Characteristics, and Social Responsibility: Based on the Empirical Analysis of the Listed Company. *Science Research Management*, *2013*(3), 58-67.

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Ye, K. T., Liu, F., & Li, F. (2018). CSI300 Index Additions and Stock Price Crash Risk: Evidence from a Quasi-Natural Experiment. *Journal of Financial Research*, *2018*(3), 172-189.

Zhou, Y. Y., & Lin, C. (2015). Earnings Management, Social Responsibility and Cash Dividends Tendencies. *Journal of Technical Economics & Management*, *2015*(12), 67-71.