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Corporate Social Responsibility and the Risk of Stock Price Crash

Based on A-Share Listed Company

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Abstract

With the innovation of business environment and management concept, more and more enterprises in Asia and emerging markets regard corporate social responsibility (CSR) as a responsibility they should bear. Many enterprises have also established CSR committees to compile CSR reports. This paper tests the relationship between corporate social responsibility (CSR) and the stock price crash risk of A-share listed companies. We select the relevant data of Listed Companies in the Shanghai and Shenzhen Stock Exchange from 2015 to 2020 as the sample, then the CSR performance of each company is quantified by the scores given by Hexun Website from 2015 to 2020. The empirical results show that corporate social responsibility significantly alleviates the risk of collapse of the China stock market.

Keywords: Corporate social responsibility, Risk of the stock price crash, A-share listed company

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Introduction

Corporate social responsibility (CSR) enterprises not only create profits and fulfil the responsibilities required by employees and owners, but also pay attention to customers, the environment, and society, which requires enterprises to contribute to improving the environment and society. With the vigorous rise of green finance and the rapid popularization of investment concepts, more and more institutions begin to adopt corporate social responsibility and ESG investment strategy, which replaced the past only taking a single financial index as the measurement standard of enterprise investment value, and gradually developed into the latest investment concept. International investors are increasingly inclined to integrate corporate social responsibility factors into investment considerations to reduce long-term investment risks.

Argenti and Druckenmiller (2004) put forward the concept of reputation effect. They pointed out that fulfilling corporate social responsibility is conducive to improving the company's reputation and helping the company establish and maintain a good external image. This concept is supported by Fombrun (2005) and Hillenbrand et al. (2007). Their research was broadened by Dhaliwal (2011) indicated corporate social responsibility can reduce corporate risks, improve financial performance, reduce the degree of information asymmetry between listed companies and investors, attract more investors' attention, and reduce equity capital. And EL Ghoual et al. (2011) stressed socially conscious investors prefer to invest in enterprises that improve responsible employee relations, environmental policies, and product strategies, resulting in reducing the cost of enterprises. While there

is no consensus, someone argued that the practice of corporate social responsibility runs counter to the business goal of maximizing revenue. The performance of corporate social responsibility will only increase the agency cost of enterprises. Due to the generation of new information asymmetry, the supervision cost will increase, resulting in the loss of corporate governance and the increase of the cost of equity capital (Chang et al., 2014). Although there are great differences in theoretical analysis, most empirical research results support that the practice of corporate social responsibility can reduce the cost of equity financing.

Romer (1992) first proposed that the sharp decline of the stock price was caused by the gradual disclosure of negative information by enterprises. Chen et al. (2001) first established the upper and lower volatility of stock return (DUVOL) and the negative skewness coefficient of stock return (NCSKEW) to quantify the risk of stock price collapse. We will use DUVOL and NCSKEW as an index to measure price crash risk. Kim et al. (2014) took American listed companies from 1995 to 2009 as samples and analyzed the relationship between corporate social responsibility and stock price collapse risk by using the MSCI ESG database. Their research results show that actively disclosing corporate social responsibility information can inhibit the stock price collapse risk to a certain extent, and for enterprises with less shareholding ratio of institutional investors, the more obvious this relationship is. It means when enterprises have more efficient corporate governance or many long-term institutional investors, corporate social responsibility has no significant impact on the risk of future stock price collapse. However, Jie and Nakajima (2014) took Japanese listed companies from 2006 to 2013 as

samples, and the research results were as follows contrary to Kim et al. (2014), they found that corporate social responsibility and governance mechanism could not alleviate the risk of collapse in the Japanese stock market. Still, now, no consensus on this topic. Compared with foreign countries, in China the study about this topic began slowly, the existing research focused more on the social information responsibility disclosure, part of CSR indicated the more fully the social responsibility information is disclosed, the lower probability of stock crash occurrence, and the company's reputation insurance effect is dominant. This paper focuses on the relationship between CSR and the stock price crash risk of A-share listed companies. Previous studies research CSRs impact on stock price collapse risk in developed countries the United States and Japan. These studies provide contradictory evidence. Based on the following research, I try to go further studying and assume there is a negative relationship between CSR and stock price crash risk. Build the H1: there is a positive relationship between CSR and stock price crash risk. H0: There is a negative or no relationship between CSR and stock price crash risk. Then we select the relevant data of A-share listed companies in Shanghai and Shenzhen Stock Exchange from 2015 to 2020 as the sample, then the corporate social responsibility performance of each company is quantified by the scores given by Hexun Website from 2015 to 2020. The results show that corporate social responsibility and corporate governance help to reduce the risk of stock price crashes and protect the interests of shareholders.

Literature Review

Nowadays corporate social responsibility (CSR) becomes the dominant business activity, firms highly focus on CSR. Since the attention has grown worldwide, the literature on CSR and its impact on corporate outcomes increase. Many researchers study the relationship between CSR and stock price crash risk, presenting different opinions, still do not obtain a consensus view. Chen et al. (2001) put forward conditional skewness of return distribution to define crash risk, instead of the likelihood of extreme negative returns. Transferred to focus on conditional skewness. It means collapse risk captures risk asymmetry, especially downside risk. His finding and method are frequently used in the latter study. For example, Kim, (2014), testing whether CSR reduces the risk of stock price collapse by using Chen et al. (2001)'s definition and method. Finding that CSR could mitigate the risk of stock collapse, could interpret that there is a negative correlation between corporate social responsibility score and future collision risk. During the research de CSR_SCORE (the net score of CSR rating based on the MSCI ESG data), and CSR_DSI400 to measure CSR this measurement method was applied broadly. I will still adopt this way in my research. Moreover, Kim (2014) revealed the standard of financial reporting transparency and CSR. Companies with high CSR performance tend to apply for high standards of financial reporting transparency to reduce bad news hoarding. Overall, with strong CSR, managers show a lower possibility to hide bad news, leading to reducing the risk of stock price decline. Another important point is this finding is more applicable when corporate governance efficiency is low, then the mitigation effect of corporate social responsibility on the future collapse risk is significant.

Lee, M. T. (2016) agrees with Kim's opinion that when corporate governance is weak, corporate social responsibility has a more significant effect in reducing the risk of collapse. Meantime when corporate governance is good, corporate social responsibility seems to have little impact on the risk of future collapse. He paid attention to the Asian market especially Taiwan, which was related to our objective area, could have a certain degree of reference. As the original research is focused on American and Europe.

Similarly, He, J. (2021)'s research could be a reference because he studied the stock price crash risk in the Hongkong stock market. From the perspective of information asymmetry theory and stakeholder theory, this paper makes a qualitative analysis on the factors causing the collapse of Hong Kong stocks, draws the same conclusion to Kim (2014) and Lee, M. T. (2016). However, in his research there exists the limitation, the sample is mainly from 186 listed companies with relatively perfect social responsibility information disclosure among all listed companies on the stock exchange of Hong Kong. Due to the limited corporate social responsibility disclosure information and the unsatisfactory number of samples, it may not fully reflect the interaction between corporate social responsibility and the risk of future stock price collapse. Besides that, he did not consider the impact of investor classification, the background of independent directors, market situation, and other mechanisms to consider the impact of corporate social responsibility on the risk of stock price collapse.

Following this finding, Hao, D. Y., Qi, G. Y., & Wang, J. (2018) extend this view, internal control plays an important intermediary role between corporate social

responsibility and stock price collapse risk. The difference is that he thinks corporate social responsibility significantly reduces the risk of the stock price collapse incorporates with a high level of internal control, corporate social responsibility significantly reduces the risk of stock price collapse. His ideas were consistent with the previous study pointed that corporate could decrease the stock price crash risk under the better quality of internal control mechanisms (Chang et al,2017). While Hunjra, A. I., Mehmood, R (2020) combine and differentiate Kim (2014) and Hao, D. Y., Qi, G. Y., & Wang, J. (2018)'s finding. Putting forward that there is a positive relationship between managerial ownership and the stock price crash risk (Hunjra, A. I., Mehmood, R,2020). While stock price crash risk was negatively impacted by the size and duality of board size and CEO. He gathered data from 2010 to 2018 were collected in the data stream of 353 manufacturing enterprises in India and Pakistan. Both are developing country but the financial market situation is quite different from China.

While Belghitar et (2014) test the benefit of being ethical furthermore have higher CSR. Unlike Kim he used another index to express CSR, Socially Responsible Investments (SRI) compares the performance of Socially Responsible Investments (SRI) and conventional investments. SRI is an investment strategy designed to bring social change and financial returns to investors. It could see that SRI and CSR have the same purpose-safeguard social value. His finding contradicts Ahmed (2020), Dong yang, Guo you (2018), who interpret socially responsible investment to afford the additional financial cost. The index composed of socially responsible companies is dominated by the index composed of traditional companies in the trademark index and the index carefully

matched with the companies in the Sri index. According to his finding, deducing investors can avoid risks by reducing their holdings of SR companies and buying traditional stocks. Furthermore, it testified socially responsible investment requires financial costs, this means that companies with strong corporate governance and advanced corporate social responsibility may have a higher risk of collapse.

Tasnia and Rosaan (2020) also were interested in this topic but they transferred into another field-bank, they research the impact of CSR on stock price volatility based on US banks. Their finding is different than before indicate there is a relationship between CSR and stock price volatility but it is positively related, which means paying more attention to CSR resulted in excess expense for a bank then become financial deficiency and loss of market competitiveness. Banks should stress wealth management rather than CSR. But this conclusion seemed not adoptable in other fields and countries. Because the bank's function and purpose are quite different from others. And the US is a capitalist and developed country, tax policy disclosure process and the relative reaction of the masses are different. So, I will focus on emerging markets and developing countries, collecting data from non-bank corporate.

In contrast, Jie, L. and Nakajima, K. (2014) disagree with this idea and think Japanese enterprises' CSR practice has no impact on reducing the crash risk. Secondly, they also indicated no evidence can prove firms' governance reduces crash risk. Same to most researches' studies in CSR and stock price crash risk, they use the corporate social responsibility ranking data which is divided into 4 categories human resources utilization,

environment, corporate governance, and social performance. The different part is Jie, L, and Nakajima, K. removed the corporate governance in their research. The significant point is the corporate social responsibility of Japanese enterprises has unconcerned about their commitment to financial reporting transparency and their participation in less hoarding of bad news Which is opposed to Kim and He Jie's opinion. He discovered due to the time interval between the negative events affecting the company and its public disclosure, t stock price decline may have a false correlation. Most research ignores this factor and I think this could remind me that noticing the importance of the event not only the time of disclosure. However, in his research, he deleted the data that comes from the period stock market is dramatically unstable, this may make his results, not street enough. I would test this period independently during my research to check they are irrelevant factors.

Methodology

Sample

We select the relevant data of A-share Listed Companies in the Shanghai and Shenzhen Stock Exchange spanning from 2015 to 2020. In the process of sample selection, the data are screened as follows by referring to the existing literature: (1) eliminate the samples of Listed Companies in the financial industry because the financial statement structure and financial data are different from other industries; (2) To ensure the accuracy of the calculation of the specific weekly rate of return, the listed companies with less than 30 weeks of annual transactions shall be eliminated (3) the samples lacking relevant data shall be eliminated; (4) Winsorized the tail of continuous variables at 1% and 99% quantiles respectively to ensure that the results are not affected by outliers(Hao, D. Y., Qi, G. Y., & Wang, J,2018). There are overall sample contains 5489 company annual observations.

Relevant financial data are from the Bloomberg database and CSMAR, corporate social responsibility data are from Hexun Website Website. Compared with other third-party rating agencies such as RKS, Hexun Website has more extensive sources of initial information on corporate social responsibility evaluation data. It not only extracts information from the social responsibility report issued by the enterprise itself but also refers to the relevant official reports issued in the stock exchange. Therefore, even if the listed company does not issue the social responsibility report, Hexun Website can still rate it according to the relevant information, which means its rating range is wider.

CSR Measurement

We chose the overall evaluation score of corporate social responsibility to measure the performance and disclosure of corporate social responsibility in the social responsibility report. Hexun Website committed to providing objective and scientific corporate responsibility rating information for responsible investors (SRI), responsible consumers, and the public. The data of the professional evaluation system of social responsibility report of listed companies collect from the social responsibility report and annual report released by enterprises of Shanghai stock exchange and Shenzhen stock exchange through the official website. The responsibility rating of risks is divided into 5 categories including shareholder responsibility; employee responsibility; rights and responsibility of suppliers, customers, and consumers; environmental responsibility; and social responsibility, which value each indicator in proportion. Since different industries have different emphases on shareholder responsibility, employee responsibility, supplier, customer and consumer rights and interests' responsibility, environmental responsibility and social responsibility, there will be corresponding adjustments in the assignment weight to be more reasonable. By default, shareholders' responsibility weight accounts for 30%, employees' responsibility weight accounts for 15%, suppliers, customers and consumers' rights and interests' responsibility weight accounts for 15%, environmental responsibility weight accounts for 20%, and social responsibility weight accounts for 20%. Hexun Website provides numerical indicators and logical indicators. For numerical indicators, accurate scores are obtained according to the calculation model of Hexun data

center; logical indicators are scored according to whether the social responsibility report discloses the indicator and whether the disclosure is detailed or not. In this paper, we adopt the numerical indicators, which is more accurate. The total marks score of the CSR report is between 0 and 100. The higher the score, the better the CSR performance.

Crash Risk Measurement

Based on the research of Chen et al. (2001) and Kim et al. (2011), this paper measures the stock price collapse risk of A-share Listed Companies in two variables: negative coefficient of skewness (*NCSKEW*) and down to up volatility of earnings (*DUVOL*) (Kim et al.,2011).

Firstly, the weekly return data of stock I is regressed as follows every year:

$$R_{i,t} = \alpha_i + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{m,t+1} + \beta_5 R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the stock return of firm i in week t, and $R_{m,t}$ refers to average return weighted by the circulating market value of all a shares in week t. The residual error $\varepsilon_{i,t}$ is obtained by model (1), then define stock i special rate of return in week t as:

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

Then construct the following methods:

$$NCSKEW_{i,t+1} = -[n(n-1)^{\frac{3}{2}} \sum w_{i,t}^3] / [(n-1)(n-2)(w_{i,t}^2)^{3/2}] \quad (3)$$

$$DUVOL_{i,t+1} = \log\{ [(n_{up} - 1) \sum_{down} w_{i,t}^2] / [(n_{down} - 1) \sum_{up} w_{i,t}^2] \} \quad (4)$$

where n is the number of weekly returns during year t, $NCSKEW_{i,t+1}$ is the negative coefficient of skewness, $DUVOL_{i,t+1}$ is the down to up volatility of earnings, n is the number of trading weeks of individual stocks i each year, n_{up} (n_{down}), refers to the

number of weeks in which the annual return of an individual stock is higher (lower) than the average weekly special return of the stock (Chen et al,2001). $NCSKEW_{i,t+1}$ and $DUVOL_{i,t+1}$ is higher, the degree of negative deviation is higher and the fluctuation ratio of earnings is greater, indicating the risk of collapse is higher.

Control Variable

First, we consider the one phase behind $NCSKEW_t$ and $DUVOL_t$, used to control the time persistence of the third-order moment characteristic of stock return (Kim et al. 2014) Then we control the monthly average excess turnover rate ($Dturn_t$) to measure investors' heterogeneous beliefs, as the NCSKEW and Duvol is positively related with investors' heterogeneous beliefs (Chen Guojin, & Zhang Yijun,2009). Chen et al. (2001) empirical research shows that the risk of stock risk can be predicted by average weekly rate of return, and the higher the market bubble, the higher the stock returns, leading to a sharp rise in stock price risk, so we control the average weekly rate of return (Ret_t) to measure stock market bubbles. We also selected the standard deviation of the company-specific weekly returns ($Sigma_t$) as the control variable to handle the volatility of stock holding income, it is the standard deviation of weekly return weighted by current market value during the sample period. Chen et al. (2001) shows that there is a positive correlation between the size of enterprises and the risk of stock price collapse. Previous research proved higher the ratio of book value to market value of total assets, the greater the risk of stock collapse (Kim et al, (2014). Based on the following findings we also handle the market value to book value (Mb_t), financial leverage (Lev_t), and rate of

return on assets (Roa_t). Besides that, we also add the auditing quality ($Audit_t$) as a control variable in our research to check the accuracy and transparency of corporate report, while this index is not accurate. We assume that the corporate report is an audit by four big auditing companies is more reliable and accurate.

In the specific regression process, the effect of the industry and year is controlled respectively. The manufacturing industry is classified according to the secondary classification, and other industries are classified as the primary classification. The relevant variables are defined and explained in table 1.

Table 1. Variable Definitions.

Category	Variable	Symbol	Definition
Dependent Variable	Stock Price Crash	$NSCKEW_{t+1}$	Negative skewness of firm-specific weekly returns over t + 1 years
		$DUVOL_{t+1}$	Log of the ratio of the standard deviations of down-week to up-week firm-specific weekly returns over t + 1 year
Independent Variable	<i>Corporate Social Responsibility</i>	CSR_t	Corporate social responsibility score from Hexun website
Control Variable	Negative Skewness of	$NSCKEW_t$	NSCKET in year t
Control Variable	Volatility Ratio of Weekly Return	$DUVOL_t$	DUVOL in year t

Control Variable	Monthly average excess turnover rate	$Dturn_t$	Current year average monthly turnover rate -last year average monthly turnover rate
Control Variable	The volatility of Firm-Specific Weekly Returns	$Sigma_t$	The standard deviation of firm-specific weekly returns over t years
Control Variable	RET	Ret_t	Average weekly return of stock i in year t
Control Variable	Firm Size	$Size_t$	Ln (total assets)
Control Variable	Market Value to Book Value	Mb_t	$Market\ vaue / Book\ value$
Control Variable	Financial Leverage	Lev_t	Total liabilities/total assets
Control Variable	Rate of Return on Assets	$Roat_t$	$earning / average\ asset$
Control Variable	Auditing Quality	$Audit_t$	Equal to 1 if the auditor is big 4, and 0 otherwise
Control Variable	Year Fixed Effect	Year	Control annual fixed effect
Control Variable	Industry Fixed Effect	Industry	Control industry fixed effects

Model Building

According to sample screening and variable setting, the model to be tested is set as the follows:

$$\begin{aligned}
Crash\ Risk_{i,t+1} = & \beta_0 + \beta_1 CSR_{i,t} + \beta_2 Crash_{i,t} + \beta_3 DTurnover_{i,t} + \beta_4 Sigma_{i,t} + \\
& \beta_5 Reti_{i,t} + \beta_6 Size_{i,t} + \beta_7 Mb_{i,t} + \beta_8 Lev_{i,t} + \beta_9 Roa_{i,t} + \beta_{10} Audit_{i,t} + \sum Year + \\
& \sum Industry + \varepsilon_{i,t} \quad (5)
\end{aligned}$$

Among them, *crash Risk*_{*i,t+1*} is the risk of stock price collapse, which is measured by *NSCKEW*_{*t+1*} and *DUVOL*_{*t+1*} considering cash dividend reinvestment respectively; *CSR*_{*i,t*} is the totally grades of corporate social responsibility based on five categories including: shareholder responsibility; employee responsibility; rights and responsibility of suppliers, customers, and consumers; environmental responsibility; and social responsibility, value each indicator in proportion. This is a prediction model so we use the *t* year *CSR*_{*i,t*} to predict next year stock price crash risk (*Crash Risk*_{*i,t+1*}). $\sum Year$ and $\sum Industry$ are year and industry dummy variables respectively; $\varepsilon_{i,t}$ is the residual. All variables have a lag period during the regression process.

Analysis and Findings

Descriptive Statistics

According to the description of sample selection in Table 1, the overall descriptive statistical analysis of the variables involved in the screened overall sample is carried out, and the results are shown in Table 2.

According to Table 2, the negative skewness coefficient of stock return (NCSKEW) and the upper and lower volatility of return (DUVOL) represent corporate stock price crash risk, the means value is -0.319 and -0.210 respectively, the standard deviation is 0.789 and 0.501 respectively. It shows that the risk difference of sample stock price collapse is obvious. The mean and standard deviation about corporate social responsibility scores are 21.133 and 12.391. The minimum score is -18.45 the maximum score is 90.010, which indicates during the sample period the overall corporate social responsibility level is low and the differences between samples are huge. It shows corporate awareness of social responsibility needs to be improved.

Table 2- Descriptive statistics

Variable	Mean	Median	Max	Min	Standard Deviation
CSR	21.133	21.355	90.010	-18.450	12.391
NCSKEW	-0.319	-0.290	4.802	-4.708	0.789
DUVOL	-0.210	-0.218	2.728	-2.368	0.501
Ret	0.0030	0.001	0.107	-0.045	0.012
Sigma	0.069	0.062	0.267	0.012	0.031
Size	22.308	22.136	28.636	17.641	1.332
Lev	0.423	0.413	3.919	0.008	0.207

Roa	0.037	0.037	0.880	-1.872	0.087
Mb	1.007	0.649	26.642	0.011	1.451
Dturn	-0.102	-0.017	4.447	-6.010	0.582
Audit	0.058	0.000	1.000	0.000	0.233

Correlation Test

According to Pearson's results in table 53, the correlation coefficient of the two explanatory variables for measuring the risk of the stock price collapse, the negative skewness coefficient of stock return (NCSKEW) and the upper and lower volatility of return (DUVOL) is 0.874, indicating that the two indicators for measuring the risk of stock price crash have good consistency and the appropriateness of variable selection. The correlation coefficients between the negative skewness coefficient of stock return (NCSKEW) and the upper and lower volatility of return (DUVOL) and corporate social responsibility (CSR) are significant, which are -0.027 and -0.037 respectively. Both show that there is a negative correlation between corporate social responsibility information disclosure and stock price collapse risk. Among other control variables, the correlation level between market book ratio (MB), leverage (Lev), company size, market fluctuation (Sigma), market return (Ret), return on asset (Roa), investor heterogeneity (Dturnt), and report accuracy (Audit) does not exceed 0.6, which also indicates that no serious multicollinearity between independent variable and control variable, control variable and control variable, which explains the rationality of variable selection to a certain extent. Next, we test the regression model to verify whether there is a correlation between corporate social responsibility and stock price crash risk as we expected.

Table 3- Pearson test result

		Correlations										
		CSR	Size	ROA	Lev	Ret	Sigma	Big4Aduit	MB	Dturn	NCSKEW	DUVOL
CSR	Pearson Correlation	1	.267**	.250**	-.032**	.013'	-.125**	.168**	.054**	-.047**	-.027**	-.037**
	Sig. (2-tailed)		.000	.000	.000	.031	.000	.000	.000	.000	.000	.000
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
Size	Pearson Correlation	.267**	1	.049**	.032**	-.074**	-.219**	.352**	.529**	.129**	-.032**	-.046**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
ROA	Pearson Correlation	.250**	.049**	1	-.608**	.102**	-.021**	.022**	-.072**	-.055**	-.020**	-.028**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.001	.000
	N	29104	29104	29104	29104	29104	29104	29104	29104	28132	29104	29104
Lev	Pearson Correlation	-.032**	.032**	-.608**	1	-.019**	-.004	.014'	.071**	.018**	.001	.005
	Sig. (2-tailed)	.000	.000	.000		.001	.443	.015	.000	.002	.798	.364
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
Ret	Pearson Correlation	.013'	-.074**	.102**	-.019**	1	.618**	-.016**	-.162**	.346**	-.175**	-.191**
	Sig. (2-tailed)	.031	.000	.000	.001		.000	.005	.000	.000	.000	.000
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
Sigma	Pearson Correlation	-.125**	-.219**	-.021**	-.004	.618**	1	-.087**	-.176**	.273**	-.135**	-.127**
	Sig. (2-tailed)	.000	.000	.000	.443	.000		.000	.000	.000	.000	.000
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
Big4Aduit	Pearson Correlation	.168**	.352**	.022**	.014'	-.016**	-.087**	1	.163**	.014'	-.015**	-.019**
	Sig. (2-tailed)	.000	.000	.000	.015	.005	.000		.000	.021	.008	.001
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
MB	Pearson Correlation	.054**	.529**	-.072**	.071**	-.162**	-.176**	.163**	1	.053**	-.018**	-.012'
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.002	.033
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
Dturn	Pearson Correlation	-.047**	.129**	-.055**	.018**	.346**	.273**	.014'	.053**	1	-.083**	-.087**
	Sig. (2-tailed)	.000	.000	.000	.002	.000	.000	.021	.000		.000	.000
	N	28133	28133	28132	28133	28133	28133	28133	28133	28133	28133	28133
NCSKEW	Pearson Correlation	-.027**	-.032**	-.020**	.001	-.175**	-.135**	-.015**	-.018**	-.083**	1	.874**
	Sig. (2-tailed)	.000	.000	.001	.798	.000	.000	.008	.002	.000		.000
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105
DUVOL	Pearson Correlation	-.037**	-.046**	-.028**	.005	-.191**	-.127**	-.019**	-.012'	-.087**	.874**	1
	Sig. (2-tailed)	.000	.000	.000	.364	.000	.000	.001	.033	.000	.000	
	N	29105	29105	29104	29105	29105	29105	29105	29105	28133	29105	29105

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Regression Analysis

Based on regression 5, regression analysis was performed on the research hypotheses H1 and H0, table 4 reported the regression results between corporate social responsibility scores and stock price crash risk. From table 4 there is a significant positive correlation between the future stock price crash risk (NCSKEW and DUVOL) and the annual mean value of the specific return (Ret), which indicates that the higher the accumulated

earnings in the early stage, the more likely the stock is to have the risk of stock price crash. The coefficients of monthly average turnover rate (Dtrun) and market book ratio (Mb) are significantly negatively correlated at the level of 0.01. Indicating the higher the turnover rate of the company to the trend, the lower the risk of the stock price collapse, and growth stocks have a lower risk of collapse which is consistent with Xu Niancheng's (2012) result. After controlling the relevant factors affecting the crash risk, when the stock price crash risk is measured by the negative skewness of stock return (NCSKEW), the regression coefficient of CSR, F is -0.001 and significant at the level of 10%; When using DUVOL to measure the risk of the stock price crash, the regression coefficient of CSR, F is -0.001 and significant at the level of 10%. The regression results are consistent with the results of kim2014's study of the U.S. stock market and song Xianzhong's (2016) study of A-share listed companies in Shanghai and Shenzhen. The regression results support H1, pointing out corporate undertaking corporate social responsibility could reduce the risk of stock price crash.

Table4-Regression analysis of CSR and stock price crash risk

VARIABLES	F_NCSKEW	F_DUVOL
CSR	-0.001 (0.001)	-0.001* (0.000)
NCSKEW	0.053*** (0.019)	0.016 (0.012)
DUVOL	0.042 (0.030)	0.046** (0.019)
Dturn	-0.053*** (0.014)	-0.042*** (0.009)
Sigma	-0.364	-0.333

	(0.484)	(0.302)
Ret	16.455***	9.721***
	(1.335)	(0.851)
Size	0.016*	0.007
	(0.009)	(0.006)
MB	-0.037***	-0.021***
	(0.008)	(0.005)
Lev	-0.011	-0.008
	(0.049)	(0.031)
ROA	-0.352***	-0.295***
	(0.105)	(0.073)
Big4Audit	0.025	0.025
	(0.031)	(0.020)
Industry fixed effect	Control	Control
Year fixed effect	Control	Control
Constant	-0.388*	-0.144
	(0.209)	(0.131)
Observations	11,497	11,497
R-squared	0.049	0.047

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Tables 5 and 6 show the linear regression results. During the regression process, we winsorized the tail of continuous variables at 1% and 99% quantiles respectively to ensure that the results are not affected by outliers (Hao, D. Y,2018). According to Table5 $F(34,5454) = 8.65$, $\text{prob} > F = 0.000$ et0, the model has high level of significance. In the assumed regression model, the explanatory variables of the model have a significant

impact on the explanatory variables. By observing the regression results, there is a significant negative correlation between corporate social responsibility and the risk of stock price collapse of listed companies at the level of 1%.

The correlation coefficient between corporate social responsibility and stock crash risk (NCSKEW) is -0.0043689, which means that in the multiple linear regression model if the score of corporate social responsibility increase (decrease) by one unit, the corresponding stock crash risk will decrease (increase) by 0.43689%.

Table5-Linear regression test results (NCSKEW)

```
. reg F_NCSKEW CSR NCSKEW DUVOL Dturn Sigma Ret Size MB Lev ROA Big4Aduit i.ind i.year,r
```

```
Linear regression                Number of obs    =      5,489
                                F(34, 5454)      =      8.65
                                Prob > F           =      0.0000
                                R-squared          =      0.0508
                                Root MSE       =      .77687
```

F_NCSKEW	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
CSR	-.0043689	.0011147	-3.92	0.000	-.0065541	-.0021837
NCSKEW	.0762412	.0271029	2.81	0.005	.0231087	.1293736
DUVOL	-.0211548	.0423841	-0.50	0.618	-.1042445	.061935
Dturn	-.04828	.0238204	-2.03	0.043	-.0949774	-.0015826
Sigma	-.8770519	.6637203	-1.32	0.186	-2.178209	.4241048
Ret	11.82553	1.695885	6.97	0.000	8.500915	15.15014
Size	.0202969	.0134257	1.51	0.131	-.0060228	.0466166
MB	-.0255542	.013464	-1.90	0.058	-.051949	.0008406
Lev	-.0203698	.0767141	-0.27	0.791	-.1707601	.1300204
ROA	-.1383516	.189743	-0.73	0.466	-.5103236	.2336204
Big4Aduit	.0614666	.0501683	1.23	0.221	-.0368832	.1598165

Similarly, according to Table5 $F(34,5454) = 8.94$, $\text{prob} > F = 0.0000$, the model has high level of significance. In the assumed regression model, the explanatory variables of the model have a significant impact on the explanatory variables. By observing the regression results, there is a significant negative correlation between corporate social responsibility and the risk of stock price collapse of listed companies at the level of 1%.

The correlation coefficient between corporate social responsibility and stock crash risk (DUVOL) is -0.0032324, which means that in the multiple linear regression model if the score of corporate social responsibility increase (decrease) by one unit, the corresponding stock crash risk will decrease (increase) by 0.32324%. This is consistent with H1 proposed earlier, which shows that the higher the degree of corporate social responsibility, the lower the risk of corporate stock price crash.

Table6-Linear regression test results (DUVOL)

```
. reg F_DUVOL CSR NCSKEW DUVOL Dturn Sigma Ret Size MB Lev ROA Big4Aduit i.ind i.year,r
```

```
Linear regression                               Number of obs   =       5,489
                                                F(34, 5454)     =         8.94
                                                Prob > F        =       0.0000
                                                R-squared       =       0.0533
                                                Root MSE      =       .48636
```

F_DUVOL	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
CSR	-.0032324	.0007436	-4.35	0.000	-.0046901	-.0017746
NCSKEW	.0305829	.0175538	1.74	0.082	-.0038295	.0649953
DUVOL	.0031119	.0272379	0.11	0.909	-.0502852	.056509
Dturn	-.0338143	.0149472	-2.26	0.024	-.0631168	-.0045118
Sigma	-.6793128	.4165167	-1.63	0.103	-1.495852	.137226
Ret	7.192332	1.079181	6.66	0.000	5.076706	9.307957
Size	.0058105	.0082736	0.70	0.483	-.0104091	.0220301
MB	-.0125641	.0080875	-1.55	0.120	-.0284188	.0032907
Lev	-.0219461	.0473128	-0.46	0.643	-.114698	.0708058
ROA	-.160854	.1129958	-1.42	0.155	-.3823709	.0606628
Big4Aduit	.0407371	.033008	1.23	0.217	-.0239718	.105446

Conclusion

This paper selects 5489 company annual observations from 2015 to 2020 as the research sample to study the corporate social responsibility and stock price crash risk of A-share listed companies on the stock exchange of Shanghai and Shenzhen. Through the empirical research on the linear regression data model by Stata statistical analysis software, we conclude that there is a significant negative correlation between corporate social responsibility and stock price crash risk. The relationship between corporate social responsibility and stock price collapse risk is shown only after controlling the factors such as company size, reliability of company information disclosure, company financial leverage, return on assets, market value to book value ratio, monthly average excess turnover rate, stock fluctuation and weekly special return of stocks. This shows that companies with better social responsibility have a lower risk of the stock price collapsing in the future.

The above research conclusions will have some inspiration for information disclosers, information users and regulators of corporate social responsibility. On the one hand, investors can judge the extent to which enterprises fulfil their social responsibilities by investigating the implementation of the corporate social responsibility report, to screen out enterprises with a sense of social responsibility for investment and reduce the possibility of risks in the investment process. On the other hand, corporate executives should also pay more attention to the performance of corporate social responsibility, timely disclose the relevant information of corporate social responsibility, reduce the possibility of hoarding and hiding bad news, and ensure the stability of stock price, to

curb the risk of future stock price collapse and pay attention to the long-term sustainable development of enterprises. For regulators, companies should be encouraged to actively perform social responsibility and disclose social responsibility reports, standardize the disclosure methods and contents of social responsibility information, and improve the effectiveness of social responsibility information.

Limitations and Contributions

The main model used in this paper is to use foreign research results for reference and assign Chinese data. The model lacks certain innovation. We should summarize and accumulate more models of various documents and think about whether we can use innovation to build a new model more suitable for Chinese data.

Another limitation is data selection, due to the late rise of corporate social responsibility disclosure in China, it is difficult to obtain long-term data. This study only selects the data from 2015 to 2020 as the sample, which cannot verify whether there is still a stable correlation between the performance of corporate social responsibility and the risk of the future stock price collapse in a long economic cycle.

Besides that, the article does not discuss the impact of more investor classification methods, the background of independent directors, market situation and other mechanisms considering the impact of corporate social responsibility on the risk of stock price collapse because the factor which will affect the corporate stock price is too much.

Though we testified there is a negative relationship between corporate social responsibility and stock price crash risk but lack further study. We divided corporate social responsibility performance into 5 categories including shareholder responsibility; employee responsibility; rights and responsibility of suppliers, customers, and consumers; environmental responsibility; and social responsibility, value each indicator in proportion, did not research which categories mainly affect the price crash risk.

It is still of great implications despite the mentioned above limitations. This paper enriched the study in the field of corporate social responsibility and social price crash risk in China. Because corporate social responsibility was introduced later in China compared to European countries. The study in this field is less, through studying the literature, it is found that most domestic scholars have studied the relationship between corporate social responsibility and corporate financial performance, corporate social responsibility and corporate capital cost, corporate social responsibility and corporate earnings management, and some scholars have studied corporate social responsibility and stock value. There are few studies on the relationship between corporate social responsibility and the risk of future stock price crashes. This paper creatively connects the performance of social responsibility of domestic corporate with the risk of a future stock price crash in China's capital market, makes up for the research gap between corporate social responsibility and stock price crash risk, and enriches the literature.

This study extends previous studies on predicting the risk of future stock price collapse. For investment decision-making, it is important to predict the risk of the stock price

collapse. The volatility of the stock market in recent years makes the risk of stock price collapse more important to investors. By studying the correlation between corporate social responsibility and stock price collapse risk, we can determine a new factor that can alleviate the risk of a stock price crash in the future. On the one hand, it supplements the previous research, on the other hand, it is very useful for companies, shareholders and investors who care about the risk of the stock price collapse in asset portfolio and risk management decisions.

Besides that, the measurement of corporate social responsibility performance in this paper is rigorous and reliable. In a previous study, scholars measure the corporate social responsibility performance through whether the corporate disclosure report or not. In previous research, they only judge the performance of corporate social responsibility from the information disclosed in the social responsibility report, and can't investigate the actual actions of enterprises. They don't have more energy to investigate the actual performance of corporate social responsibility. It's difficult to obtain complete and true information, they can only assume that enterprises have fulfilled some social responsibilities through corporate social responsibility. For the evaluation content of some dimensions in the process of corporate social responsibility performance, the enterprise may have achieved it in practice but did not disclose it in the social responsibility report, then the score of the enterprise in a certain dimension will be correspondingly low, some enterprises may write beautiful reports, but in fact -- some social responsibilities are not actually fulfilled, but the corporate social score is very high. This would cause the score of corporate social responsibility to have bias and

unreliability. To solve this problem, we use the score from the Hexun website is divided the corporate social responsibility performance into 5 categories, each pointing out numbers. Ana also makes a clear assign weight standard based on the different industry this would reduce the bias. Besides that, in our model, we add the audit factor which examines whether the corporate is audited by the big four company which is authorized in auditing fields. According to the table3, the Pearson correlation between Audit and NCSKEW (DUVOL) is -0.15(-0.19) show a significant negative correlation on the risk of stock price collapse of listed companies at the level of 1%. So, considering this factor in our research could reduce the impact of false reports by the company.

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