

Article

Corporate Social Responsibility, Internal Controls, and Stock Price Crash Risk: The Chinese Stock Market

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Received: 15 April 2018; Accepted: 18 May 2018; Published: 22 May 2018



Abstract: As the core of sustainable development strategy, corporate social responsibility (CSR) is a concept that influences business missions, management, operations, finance, and marketing. Studies of the economic consequences of CSR have focused on the theoretical and practical arenas. However, few studies have examined the impact of CSR on the market price fluctuations of company shares. The purpose of this study was to investigate the effect of CSR on stock price crash risk and its relationship with the role of internal controls in China. After empirical analysis, we found a significantly negative association between CSR and stock price crash risk. Furthermore, we determined that internal controls play a significant and partially mediating role between CSR and stock price crash risk. Internal controls have become an important system for Chinese companies to improve their social responsibility and reduce their operating risk, especially the risk of a stock price crash. We also found that internal controls had a significant and partial moderating effect on the relationship between CSR and stock price crash risk. In certain environments with higher levels of internal controls, CSR prominently reduced the risk of stock price crash. In theory, our study adds to the growing literature about CSR, expands the scope of CSR research, elaborates upon relevant CSR economic consequences, and complements the literature about the determinants of stock price crash risk. In practice, our conclusions provide a reference for Chinese managers, investors, and the related government departments to evaluate the effects of CSR and internal controls, and provides regulators with a method to help control abnormal fluctuations in the stock market. More importantly, the results of this study have reference value for scholars and practitioners in developing countries like China.

Keywords: CSR; internal control; stock price crash risk; mediating effect; moderating effect

1. Introduction

Corporate social responsibility (CSR) is the responsibility of enterprises toward consumers, communities, and the environment while creating profit and maintaining legal responsibility to shareholders and employees. Corporate social responsibility requires enterprises to go beyond the traditional idea of profit being the sole goal, to emphasize the value of people in the production process and to contribute to the environment, consumers, and society. As the core of the sustainable development strategy, it plays an irreplaceable role in enhancing the reputation of the company and

realizing the sustainable development of the company. The integration of CSR into the company's operations and decision-making can not only effectively improve the competitiveness of the company, but also protect the company's brand, discover new market opportunities, and achieve continuous profitability, thus ensuring the sustainability of the company. Excellent enterprises are not only able to exploit the needs of society to create economic value, but are also able to actively fulfill their responsibilities, give back to society, and create value for society in coordination with other parties. Thus, the positive interaction between the economic value and social value of enterprises is realized, and the sustainable development of enterprises and society is promoted. In the 1980s, the CSR movement began to emerge in Western developed countries. More recently, companies in China have also made progress in implementing and ensuring CSR. Many listed companies have created social responsibility committees, and an increasing number of public companies have taken the initiative to issue their own social responsibility reports. However, the real economic consequences of CSR for listed companies in China are unknown. Does CSR enhance or reduce shareholder wealth? Does it improve information transparency, thereby reducing the volatility of share prices and protecting investor interests? This remains an issue that should be addressed. The implementation of CSR will influence the accounting and financial behavior and market performance of a company. A large number of studies have investigated the link between CSR and company accounting, financial, or market performance [1–6]. However, whether CSR creates positive or negative value is controversial, since CSR has two drivers: value and opportunity [7]. A need for further research still exists about the environments in which CSR exerts either a positive value effect or a negative value effect. This is especially true for China, which is a country where CSR introduction has lagged and whose society is in a transition phase. After all, at the request of the China Securities Regulatory Commission (CSRC), it was only in 2009 that some Chinese-listed companies began to disclose their social responsibility reports together with annual reports, and some social institutions began to evaluate the social responsibility of listed companies. Although Chinese companies have made great progress in undertaking and fulfilling CSR in just a few years, they are still far from Western developed countries (for example, the MSCI ESG Stats, previously known as KLD, began to evaluate U.S. firms' CSR activities as early as 1990). At present, with the understanding that the Chinese government guides enterprises to rationally use social resources and achieve scientific development through institutional innovation, thereby improving the quality of the national economy, the economic consequences of the establishment of the CSR system (as an important micro-institutional design) have become the focus of attention for all sectors of society.

Unlike previous studies on CSR, which paid little attention to the impact of CSR on stock price volatility of listed companies in the securities market, in this study, we examined the relationship between CSR and firm-specific stock price crash risk in the Chinese stock market. More importantly, we examined the effects of internal controls on CSR and stock price. As stock price crash risk captures downside risk and is crucial for investment decisions and risk management, our research provides a reference for shareholders, company managers, and government regulators for understanding whether CSR reduces a company's share price risk. Simultaneously, our results provide evidence for all stakeholders to objectively evaluate the role of the internal enterprise control system.

In view of the fact that Chinese-listed companies have disclosed CSR reports since 2009, and that relevant agencies have also rated Chinese-listed companies' CSR performances since then, this paper used data from A-share listed companies in China from 2009 to 2015 to carry out research. Through empirical research, we found a significantly negative association between listed companies' CSR and stock price crash risk, and the results remained robust after considering potential endogeneity. Furthermore, we found internal control played a significant partial mediating role between CSR and stock price crash. Internal control is an important system for Chinese companies to ensure social responsibility and reduce operating risk, especially the risk of stock price crash. We also determined that internal control had a significant moderating effect on the relationship between CSR and stock price crash. In certain environments with higher levels of internal control, the effect of CSR was more obvious, and CSR more prominently reduced the company's stock price crash risk.

The contributions of this study are as follows: (1) Adding to the growing volume of CSR literature, expanding the scope of CSR research, and enriching the understanding of CSR-related economic consequences. Previous literature on the economic consequences of CSR rarely studied the impact of CSR on the volatility of company stock prices. Our study enriches and expands upon the existing research findings. (2) Our study complements the literature on the determinants of stock price crash risk. Based on the theory of management information hoarding, scholars have studied the factors that influence stock price crash risk from the aspects of financial information transparency, tax avoidance, CEO compensation, earnings management, and accounting conservatism. However, most of the studies did not analyze the stock price crash risk process from the perspective of socialized, non-financial behavior. This study combines CSR as a corporate social behavior with the internal control level as the internal environment, and analyzes their joint impact on the risk of stock price crash. Our study creates a better understanding about the causes of stock price crash risk. (3) Based on a developing capital market like China, the results of this study provide a reference for managers, investors, and relevant government departments in developing countries to evaluate the effect of CSR and internal controls, and helps regulators to control abnormal stock market fluctuations. The research conclusions have practical value.

The rest of the paper is structured as follows. Section 2 provides literature review on CSR, internal controls, and stock price crash risk, and then puts forward hypotheses. Section 3 discusses the sample, variable measurements, and research design. Section 4 presents empirical results and discusses the findings. The study is concluded in Section 5.

2. Literature Review and Hypotheses Development

2.1. Literature Review

There are two different views on the economic consequences of CSR. The first view is a social impact theory that CSR maximizes the interests of all stakeholders, including shareholders. According to this view, CSR enhances the competitiveness of the enterprise and builds a good reputation for the enterprise, thus improving the corporate brand, creating a good impression for all stakeholders, and increasing investor confidence. Through CSR investment, enterprises can attract responsible consumers, obtain financial resources from investors with strong social responsibility, facilitate financing, or help struggling companies to recover from financial distress [8–11]. Scholars have found that CSR is positively related to financial performance and that CSR can improve stakeholder interests, ultimately leading to better financial performance [12–14]. On the contrary, failure to meet the expectations of stakeholders creates fear in the market and ultimately a loss in profitability [15]. In terms of influencing financial information disclosure and risk accumulation, previous studies reported that CSR construction effectively suppressed the opportunistic behavior of management, constrained management earnings, improved the transparency of accounting information, restricted management over-investment behavior, protected and improved the reputation of a company, and ultimately reduced corporate risk [2,4,16]. The second view is the management balance theory, which states that CSR only serves the interests of management rather than shareholders. According to this view, enterprises cannot fully satisfy the interests of each stakeholder, so the interests must be weighed for each group. If enterprises assume too much social responsibility, then shareholders' interests are affected, thus affecting the business activities of enterprises, resulting in a higher cost rate and lower performance [17]. Because of the agency problem, the benefits of CSR are enjoyed by management, but risks and costs are paid by shareholders. Therefore, an enterprise's CSR is centered on management and CSR is actually a type of agency cost. Also, because CSR can unnecessarily raise the cost and risk, it may weaken a company's competitiveness [18–20]. Some scholars have found a negative correlation between CSR and financial performance. When the management compensation plan is closely related to short-term profit and stock price, a negative correlation between CSR and financial performance often develops due to managers pursuing their own interests [21]. Some researchers even stated that CSR reports are issued to disguise the impact of some misconduct. Therefore, they oppose CSR and

argue that business has only one social responsibility, which is to use its resources without violating the rules of the game and work to increase corporate profits.

Due to the instances of crashes in the global stock market, stock price crashes have become a hot issue in the field of finance. The management possession of a high level of private information about firm operations and reluctance to report bad news are considered to be important causes of stock price crashes, which leads to an accumulation of negative news until a breaking point is reached [22–24]. Under certain internal and external conditions, conflicts of interest between managers and outside investors lead to the management hoarding bad news. Additionally, managers may retain bad projects or conceal bad performance for their own benefit at the expense of shareholders. Given this information asymmetry, outside investors may be overly optimistic about corporate performance growth. So, the value of the company is overestimated, which results in bubbles. Then, once the bad news is rapidly released, a stock price crash occurs. Many studies have examined the cause of stock price crashes based on the management hoarding bad news theory. Many papers provided firm-specific determinants of stock price crashes. Earlier literature used the management opportunistic behavior of hoarding negative information to explain the risk of stock price crash, and more current literature focused on the impact of information asymmetry caused by the agency problem as explaining the risk. For example, scholars have reported that the lower the quality of financial reporting, the higher the stock price crash risk [25], and the higher the accounting conservatism and real earnings management, the lower the stock price crash risk [26,27]. In addition, other scholars found that tax avoidance, excessive perquisites, over-investment, equity incentives, and political incentives increased the stock price crash risk [28–30]. However, a female CEO and mandatory International Financial Reporting Standards (IFRS) adoption reduced the stock price crash risk [31,32]. Overall, existing empirical studies have provided strong support for the new hoarding theory of crash risk, and subsequent research should continue under the guidance of this doctrine.

As a special corporate management activity to control business risk, internal controls can restrict employee moral hazard behavior and irrational decision-making. These controls play an important role in improving operational efficiency, asset safety, developing corporate strategy, and reporting reliability, through containment, restraint, protection, guidance, supervision, and influence. With the implementation of the Sarbanes-Oxley Act in 2002, internal control has become an important aspect in strengthening corporate governance and a hot issue in academic circles. Research on the economic consequences of internal controls has included several aspects, including the improvement accounting information quality, the optimization of internal financial decisions, such as investments and cash holdings, and the evaluation of external stakeholders. In terms of the quality of accounting information, researchers generally found that high-quality internal controls reduced the level of listed companies' earnings management, and increased the earnings persistence and earnings response coefficients [33,34]. As a result, companies with high-quality internal control systems often are charged lower audit fees by accounting firms. Conversely, companies with defective internal control systems are charged higher audit fees for the risk of accounting information [35–37]. To improve internal financial decisions, researchers found that high-quality internal controls improved the efficiency of investments and the ability to manage uncertainty [38]. Those companies with higher levels of internal control have lower equity capital and bank debt costs, and more commercial credit financing compared to others in the industry [39–41]. In summary, internal controls are not the only management activity available to improve efficiency and prevent risk, but are important for value creation.

Based on the relevant research literature about CSR, stock price crashes, and internal controls, we make theoretical deductions and introduce research hypotheses in the following article. First, we discuss the impact of CSR on the risk of stock price crash. Next, we discuss the role of internal controls on the relationship between CSR and stock price crash, including moderating and mediating effects.

2.2. CSR and Stock Price Crash

Considering that implementing CSR may affect the accounting information disclosure of a company, and inadequate information disclosure is an important reason for stock price crashes, an important relationship between CSR and stock price crashes may exist, which needs to be

investigated through empirical research. Simultaneously, such research can also determine whether CSR functions to help protect the interests of investors or to attract the attention of investors.

Based on two opposing theories—social impact theory and management balance theory—we wanted to determine the relationship between CSR and stock price crash risk. We introduce two opposing hypotheses as follows: a risk reduction hypothesis and a risk increasing hypothesis.

For the first hypothesis, if a company performing CSR complies with social impact theory, CSR means benefits to shareholders. As a result, the better the CSR, the more acceptable the company to investors, and the more likely investors will retain the company's shares long term, so there is less risk that the stock price will crash. Specifically, the role of CSR in increasing company information transparency reduces the risk of a stock price crash. Because CSR is being performed for the long-term development of the enterprise, managers will emphasize the relationship with investors, consumers, suppliers, etc., and provide transparent and reliable financial reports to meet their requirements. These actions will considerably reduce the degree of information asymmetry, supervising and restricting managers, thus reducing the probability of the negative manager information hoarding behavior. As previously discussed, negative management information hoarding is the main reason for the risk of stock price crashes [22]. Since companies performing CSR emphasize the interests of stakeholders, the managers of such companies tend to have higher ethical standards, be more diligent and conscientious, and less motivated to hoard information. Therefore, as CSR enhances information transparency, and the information transparency reduces the likelihood of managers hoarding bad news, we hypothesized the following:

H1a: if, in the Chinese capital market, the managers of a listed company perform CSR for the interest of shareholders, then CSR and the stock price crash risk should be negatively correlated.

For the second hypothesis, if a company performing CSR complies with management balance theory, CSR aims the benefit of management rather than the shareholder. As a result, the more CSR implemented, the more likely managers are to use CSR as a tool to engage in self-interested behavior to the detriment of shareholders, so stock prices will have a higher crash risk. Specifically, from the agency theory viewpoint, management often uses CSR to enhance personal reputation, thereby neglecting shareholder interests. In fact, managers have been shown to always be motivated to engage in CSR to hide unethical behavior [39]. In this case, CSR is essentially a self-interest tool for managers. After using CSR to build personal reputation, managers prefer to hide their benefit expropriation behavior, decreasing the company's information transparency, and increasing earnings management. As information transparency decreases and earnings management increases, companies inevitably lag in the transmission of negative information, so the risk of a stock price crash increases. Therefore, as CSR provides managers with an opportunity to usurp the company's interests, CSR helps management hide gains while enhancing their personal reputation, so bad news hoarding and accumulation occurs. As such, we hypothesized the following:

H1b: if, in the Chinese capital market, the managers of a listed company perform CSR for self-interested reasons, then CSR and the stock price crash risk should be positively correlated.

2.3. CSR, Internal Controls, and Stock Price Crashes

As an important institutional arrangement for enterprises, we wanted to determine the role of internal controls in the relationship between CSR and stock price crashes. The existing literature suggests that internal controls can reduce the risk of stock price crashes, but the studies did not address the interrelationship between CSR, internal controls, and stock price crash risk. In fact, internal controls may have both a mediating effect and a moderating effect on the relationship between CSR and stock price crash risk.

2.3.1. Mediating Effect of Internal Controls on the Relationship between CSR and Stock Price Crash Risk

From the existing research, the establishment of an internal control system helps limit management risk-taking behavior, improve financial decision-making efficiency, and avoid the risk of improper

investment, thereby reducing the accumulation of enterprise risk. At the same time, the internal control system will mitigate negative management information hoarding behavior, and then play a role in reducing the risk of stock price crash. As to the relationship between CSR and the risk of a stock price crash, CSR will likely influence the risk of stock price crash via internal control systems.

If H1a, the CSR value hypothesis, is supported by empirical evidence, and since the performance of CSR means that companies assume multiple social responsibilities to shareholders, creditors, governments, consumers, and the public, companies will create a public image of observing law and discipline, transparency, and sustainable development while maximizing profits. Therefore, companies will establish internal systems to achieve this goal. In China, government departments issued the Basic Standards of Internal Control, which requires enterprises to establish internal control systems. From this point, the establishment of an efficient internal control system will not only improve management and risk prevention capabilities and promote sustainable development, but also be an important aspect of observing law and discipline. In addition, ensuring information transparency, minimizing the risk of improper management decisions, and achieving sustainable development, thus achieving the objectives of the CSR, also requires efficient internal control systems. Overall, if H1a is supported, then the greater the CSR, the easier the establishment of an efficient internal control system. More managers will comply with internal control standards, which will facilitate the functioning of the internal control system, thus enabling the timely disclosure of negative information and reducing the risk of a stock price crash.

If H1b, the CSR tool hypothesis, is supported by empirical evidence, then managers will tend to implement CSR based on personal gain, in which case the corporate commitment is not based on management intent. Their inherent drive to create a public image of transparency, compliance, and sustainable development is insufficient. Therefore, they do not constrain their opportunistic behavior by establishing an efficient internal control system. Thus, under the tool hypothesis, the greater the CSR, the more self-interested the manager is, the harder the establishment of efficient internal controls, and the less willing the manager to abide by internal control rules. As a result, the level and function of internal controls are lower, and then the negative information hoarding of managers cannot be suppressed, so the risk of a stock price crash increases.

Thus, we hypothesized the following about the role of internal controls in mediating the relationship between CSR and the company's stock price crash risk:

H2: In the Chinese capital market, CSR influences the risk of a stock price crash by influencing internal controls;

H2a: If, in the Chinese capital market, the performance of listed companies' CSR is in the interest of the shareholders, then CSR will increase the internal control efficiency of the companies, thereby reducing the risk of a stock price crash;

H2b: If, in the Chinese capital market, the performance of listed companies' CSR is in the interest of management, then CSR will reduce internal control efficiency, and thus, increase the risk of a stock price crash.

2.3.2. Moderating Effect of Internal Controls on the Relationship between CSR and Stock Price Crash Risk

According to the existing literature, as an important institutional design, internal controls restrict employee behavior at all levels of the enterprise by controlling activities based on risk assessment. After the internal control environment is formed, the opportunistic behaviors of enterprise managers are restrained and the risk is prevented. As a result, differences occur in the consequences of manager behavior in different internal control environments, and companies with high levels of internal controls tend to have higher investment efficiency, lower capital costs, and higher information transparency. As to the relationship between CSR and stock price crash risk, the internal control environment is likely to be a moderating mechanism.

Specifically, if H1a, the CSR value hypothesis, is supported by empirical evidence, the possible moderating effect of internal controls will be reflected as follows. In a more efficient internal control environment, maintaining good relations with shareholders would be easy for management because the higher internal control environment allows shareholders to be confident that managers are being diligent, reducing the possibility of self-serving information hoarding behavior. Moreover, some synergies may be found between CSR and internal controls as their goals coincide in focusing on the relationship with stakeholders, and providing transparent and reliable financial reports. Thus, CSR will easily improve financial information transparency and reduce the level of earnings management, which will objectively enhance the effective supervision of managers and improve the probability of discovering management information hoarding behavior. As such, if CSR is performed for the benefit of shareholders, the effect of CSR on reducing the risk of a stock price crash will be enhanced in a more efficient internal control environment.

Conversely, in a less efficient internal control environment, even if the manager is willing to implement CSR and shape the enterprise image for shareholders' benefit, shareholders may question if poor internal controls lead to management self-beneficial information hoarding behavior, because imperfect enterprise risk control mechanisms cannot prevent potential risky management behavior. At the same time, poor internal control environments also negatively impact the CSR objectives of maintaining the relationship with the related parties through financial information transparency. Poor control and restraint mechanisms, at all levels of the enterprise, prevent the improvement of financial information transparency. Then, the effect of reducing the stock price risk decreases as information transparency restricts management information hoarding behavior. As such, if CSR is performed for the benefit of shareholders, the effect of CSR on reducing the risk of a stock price crash will be weakened in a less efficient internal control environment.

If H1b, the CSR tool hypothesis, is supported by empirical evidence, the possible moderating effect of internal controls will be reflected as follows. In a more efficient internal control environment, the management expropriation of shareholder benefit will be more difficult, even if managers have strong motive to perform CSR for themselves rather than for shareholders. Because management behavior is supervised and restrained, violating the interests of the enterprise by using CSR as a cover-up tool becomes difficult. If risk is strictly controlled and information is transparent, managers have little opportunity to hoard bad news under the cover of CSR. As such, if CSR is performed for the benefit of managers, the effect of CSR on raising stock price crash risk will be reduced in a more efficient internal control environment.

In a less efficient internal control environment, the violation of shareholders' interests will be easy to achieve if managers use CSR as a cover tool to maximize their own interests. Due to the weak internal control system, managers have limited restraint or supervision. So, the goal of creating a good enterprise image and attracting the interests of shareholders in the process of CSR implementation would be easily to accomplish. With poor internal controls and extremely low levels of transparency, managers can easily hoard bad news under the cover of CSR, and the stock price crash risk increases accordingly. As such, if CSR is performed for the benefit of managers, the effect of CSR on raising stock price crash risk will increase in a less efficient internal control environment.

Thus, we hypothesized the following about the role of internal controls in moderating the relationship between CSR and the company stock price risk:

H3: In capital markets in China, internal controls will constrain the ability of CSR to influence the risk of a stock price crash.

H3a: If, in Chinese capital markets, the performance of CSR by the managers of listed companies is in the interest of shareholders, then CSR is more effective at reducing the risk of a stock price crash with higher levels of internal controls and less effective at lower levels of internal controls.

H3b: If, in Chinese capital markets, the performance of CSR by the managers of listed companies is performed in their own interests, the role of CSR in increasing the risk of a stock price crash is weaker at higher levels of internal control and stronger at lower levels of internal control.

3. Research Methodology

3.1. Sample and Variables

3.1.1. Sample

This analysis used sample data from Chinese A-share companies listed on the Shanghai and Shenzhen exchanges from 2009 to 2015. We excluded the following companies: (1) financial, (2) ST (listed company under special treatment), (3) those with negative net assets, (4) those with incomplete data, and (5) those with less than 30 specific weekly stock return rate data per year, because stock crash risk calculations are based on the company's specific weekly stock return rate data, which is obtained and processed from the regression residual of the index model. To ensure the reliability of the results of the index model, at least 30 weekly stock return rate data are required for regression, so we excluded companies with less than 30 specific weekly stock return rate data per year. These data requirements yielded a final sample of 2747 firm-years from 2009 to 2015. Table 1 provides the sample distribution by year and industry.

Table 1. Sample distribution by year and industry.

| Industry | Year | | | | | | | Total | % |
|---|------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | | |
| Agriculture, forestry, husbandry, and fishery | 6 | 9 | 11 | 13 | 14 | 14 | 15 | 82 | 2.99 |
| Mining | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 18 | 0.66 |
| Food and beverage | 12 | 16 | 19 | 20 | 21 | 23 | 25 | 136 | 4.95 |
| Textile, garment manufacturing, and products of leather and fur | 20 | 24 | 25 | 27 | 29 | 31 | 32 | 188 | 6.84 |
| Wood and furniture | 2 | 4 | 5 | 5 | 6 | 6 | 7 | 35 | 1.27 |
| Papermaking and printing | 10 | 13 | 13 | 14 | 15 | 17 | 17 | 99 | 3.60 |
| Petroleum, chemical, plastic, and rubber products | 27 | 38 | 41 | 43 | 46 | 49 | 52 | 296 | 10.78 |
| Electronics | 16 | 23 | 25 | 29 | 31 | 33 | 35 | 192 | 6.99 |
| Metal and non-metal | 21 | 25 | 27 | 31 | 35 | 38 | 41 | 218 | 7.94 |
| Machinery, equipment, and instrument manufacturing | 31 | 45 | 49 | 54 | 55 | 58 | 62 | 354 | 12.89 |
| Medicine and biological products manufacturing | 16 | 27 | 28 | 31 | 31 | 31 | 33 | 197 | 7.17 |
| Other manufacturing | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 62 | 2.26 |
| Production and supply of electricity, steam, and tap water | 3 | 3 | 5 | 6 | 6 | 6 | 6 | 35 | 1.27 |
| Construction | 6 | 8 | 8 | 9 | 9 | 9 | 9 | 58 | 2.11 |
| Transportation and warehousing | 3 | 5 | 5 | 6 | 6 | 6 | 7 | 38 | 1.38 |
| Information technology | 17 | 25 | 27 | 29 | 30 | 31 | 34 | 193 | 7.03 |
| Wholesale and retail | 12 | 21 | 21 | 23 | 25 | 25 | 27 | 154 | 5.61 |
| Real estate | 14 | 22 | 23 | 25 | 26 | 27 | 29 | 166 | 6.04 |
| Social services | 5 | 8 | 9 | 10 | 10 | 11 | 13 | 66 | 2.40 |
| Communication and culture | 0 | 0 | 2 | 2 | 3 | 3 | 3 | 13 | 0.47 |
| Conglomerates | 13 | 21 | 20 | 21 | 23 | 24 | 25 | 147 | 5.35 |
| Total by year | 243 | 348 | 375 | 410 | 433 | 454 | 484 | 2747 | |
| % | 8.85 | 12.67 | 13.65 | 14.93 | 15.76 | 16.53 | 17.62 | | 100 |

The data were mainly obtained from China's stock market and accounting research database (CSMAR), and the internal control index data were obtained from the DIB internal control database (<http://www.ic-erm.com/>). Corporate social responsibility report score data were obtained from Rankings CSR Ratings (RSK). To avoid the impact of extreme values on empirical results, all continuous variables were winsorized at the top and bottom 1%.

3.1.2. CSR Measurement

Following prior studies [40], in this paper, we chose Rankings CSR Ratings (RKS) overall evaluation score to measure the performance and disclosure of CSR in social responsibility reports. Rankings CSR Ratings is a third-party, authoritative rating agency for CSR in China, established in 2007. It is committed to providing objective scientific CSR ratings information for socially responsible investments, responsible consumers, and the public at large. In 2009, RST successively issued 371 evaluation reports on annual social responsibility reports of A-share listed companies, and disclosed evaluation scores to the public. Rankings CSR Ratings responsibility rating index evaluates CSR reports in four dimensions using its original Macrocosm-Content-Technique (MTC) system, based on structured scoring methods. The RKS overall score of the CSR report ranges from 0 to 100. The higher the score, the better the CSR performance. Many studies on the CSR of Chinese-listed companies have used the RKS index [40], so we used the same method.

3.1.3. Crash Risk Measurement

Based on the findings reported by Hutton et al. and Kim et al. [16,28,30], we used two measures of firm-specific crash risk. Specifically, we performed the calculations as follows:

First, we calculated the firm-specific weekly return of stock i in week t $W_{i,t} = \ln(1 + \varepsilon_{i,t})$, where $\varepsilon_{i,t}$ is the residual return from Equation (1):

$$R_{i,t} = \beta_0 + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{m,t+1} + \beta_5 R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

where $R_{i,t}$ is the return rate of stock i in week t considering cash dividend reinvestment, and $R_{m,t}$ is the average return rate of all stocks in the A-share market weighted by week t current stock market value in circulation.

Next, based on $W_{i,t}$, we constructed two variables to measure the risk of stock crash.

The first measure is the negative conditional skewness of firm-specific weekly returns over the fiscal year (*NCSKEW*):

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

where n is the number of weekly returns during year t .

The other measure is the down-to-up volatility (*DUVOL*):

$$DUVOL_{i,t} = \log \frac{[(n_u - 1)\sum_{Down} W_{i,t}^2]}{[(n_d - 1)\sum_{Up} W_{i,t}^2]} \quad (3)$$

where n_u and n_d are the number of up and down weeks in year t , respectively. The larger the negative conditional skewness coefficient (*NCSKEW*), the greater the risk of stock crash. The greater the down-to-up volatility (*DUVOL*), the greater the risk of stock crash.

3.1.4. Internal Controls

In our paper, we used the DIB internal control information disclosure index to reflect the quality of internal control information disclosure. The data were obtained from the DIB internal control and risk management database (<http://www.ic-erm.com/>). The DIB internal index is based on the

research results of related internal control indexes in other countries, combined with the relevant Chinese institutional environment and the current situation of listed companies in China. The index is designed based on the realization of the five internal control goals, and the basic internal control index is constructed to reflect the level of internal controls and the risk control capability of listed companies. Because of relative objectivity and authority, many studies on internal control in China use it. Considering that the index value range is 0 to 1000, we used its natural logarithm to measure the internal control quality of the companies. Then, we got the internal control efficiency variable (*IC*).

3.1.5. Control Variables

Following prior studies [30–32,41], we used several control variables for the factors that have been shown to affect the dependent variables of stock price crash risk and internal control efficiency.

A summary of the variable definitions is shown in Table 2.

Table 2. Summary of variable definitions.

| Category | Variable | Symbol | Formula |
|----------------------|---|----------------|---|
| 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 $t + 1$ years |
| Independent Variable | Corporate Social Responsibility | CSR_t | RKS CSR reporting index value |
| Independent Variable | Internal Control | IC_t | Ln (DIB internal control index value) |
| Control Variable | Negative Skewness of Weekly Return | $NSCKEW_t$ | $NSCKET$ in year t |
| Control Variable | Volatility Ratio of Weekly Return | $DUVOL_t$ | $DUVOL$ in year t |
| Control Variable | Turnover Rate | $DTurnover_t$ | Average monthly share turnover rate over year t minus that of previous year t |
| Control Variable | Mean of Firm-Specific Weekly Returns | $Return_t$ | Mean of firm-specific weekly returns over t years |
| Control Variable | Volatility of Firm-Specific Weekly Returns | $Sigma_t$ | Standard deviation of firm-specific weekly returns over i years |
| Control Variable | Firm Size | $Lsize_t$ | Ln (total assets) |
| Control Variable | Market Value to Book Value | Mb_t | Market value of equity/book value of equity |
| Control Variable | Financial Leverage | Lev_t | Total liabilities/total assets |
| Control Variable | Rate of Return on Assets | Roa_t | Earnings/average assets |
| Control Variable | Value of Discretionary Accruals | Acc_t | Discretionary accruals are estimated from the modified Jones model |
| Control Variable | Ratio of Fixed Asset | $Fixratio_t$ | Value of fixed asset/value of total assets |
| Control Variable | Growth Opportunity of Listed Company | $Growth_t$ | Change in operating income in year t /operating income in year $t - 1$ |
| Control Variable | Age of Listed Company | Age_t | Listing year number of listed company |
| Control Variable | Property Rights of Controlling Shareholders | Soe_t | Equal to 1 if controlling shareholders are state-owned property rights, and 0 otherwise |
| Control Variable | CEO and Chairman of the Board in One Person | $Ceochair_t$ | Equal to 1 if the CEO is also the Chairman of the Board, and 0 Otherwise |
| Control Variable | Auditing Quality | $Audit_t$ | Equal to 1 if the auditor is big 4, and 0 otherwise |
| Control Variable | Year Fixed Effect (FE) | $Year$ | Equal to 1 if of certain year, and 0 otherwise |
| Control Variable | Industry Fixed Effect | $Industry$ | Equal to 1 if of certain two-digit industry, and 0 otherwise |

3.2. Empirical Models

Firstly, based on hypotheses H1a and H1b, to investigate how CSR is associated with firm-specific stock price crash risk, we estimated the model as follows:

$$\begin{aligned} Crash_{i,t+1} = & \beta_0 + \beta_1 CSR_{i,t} + \beta_2 Crash_{i,t} + \beta_3 DTurnover_{i,t} + \beta_4 Return_{i,t} + \beta_5 Sigma_{i,t} + \beta_6 Lsize_{i,t} \\ & + \beta_7 Mb_{i,t} + \beta_8 Lev_{i,t} + \beta_9 Roa_{i,t} + \beta_{10} Acc_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (4)$$

Our unbalanced panel analysis regressed the stock price crash risk in $t + 1$ year on the CSR variable in t year and other control variables. Following prior studies on stock price crash [28–30], these control variables included the stock crash risk in t year ($Crash_t$), stock turnover rate in t year ($DTurnover_t$), mean of firm weekly returns in t year ($return_t$), volatility of firm weekly returns ($Sigma_t$), firm size in t year ($Lsize_t$), market value to book value in t year (Mb_t), financial leverage in t year (Lev_t), rate of return on assets in t year (Roa_t), and earnings management of discretionary accruals in t year (Acc_t). In addition, our regression considered year and industry fixed effects. Added to the panel data regression, we further considered the model's endogenous problems. We also used the two-stage instrument variable method (2SLS) and the generalized moment estimate method (GMM) for regression.

Secondly, based on hypotheses H2a and H2b, and using the method for testing the intermediate factors presented by Baron and Kenny [42], we investigated whether internal controls play a mediating role in the relationship between CSR and stock price crash risk. Based on Equation (4), we derived the following models:

$$\begin{aligned} IC_{i,t} = & \beta_0 + \beta_1 CSR_{i,t} + \beta_2 Lsize_{i,t} + \beta_3 Lev_{i,t} + \beta_4 Roa_{i,t} + \beta_5 Fixratio_{i,t} + \beta_6 Growth_{i,t} \\ & + \beta_7 Age_{i,t} + \beta_8 Soe_{i,t} + \beta_9 Ceochair_{i,t} + \beta_{10} Audit_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (5)$$

$$\begin{aligned} Crash_{i,t+1} = & \beta_0 + \beta_1 CSR_{i,t} + \beta_2 Crash_{i,t} + \beta_3 IC_{i,t} + \beta_4 DTurnover_{i,t} + \beta_5 Return_{i,t} + \beta_6 Sigma_{i,t} \\ & + \beta_7 Lsize_{i,t} + \beta_8 Mb_{i,t} + \beta_9 Lev_{i,t} + \beta_{10} Roa_{i,t} + \beta_{11} Acc_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (6)$$

Equation (5) is the determination equation of internal control (IC_t). The independent variable is CSR in t year (CSR_t). Following prior studies on internal controls [43], there are some control variables such as firm size ($Lsize_t$), financial leverage (Lev_t), rate of return on assets (Roa_t), ratio of fixed assets ($Fixratio_t$), growth opportunity ($Growth_t$), age of company (Age_t), property rights of controlling shareholders (Soe_t), CEO and chairman of board in one person ($Ceochair_t$), and auditing quality ($Audit_t$) in t year. Equation (6) is the result of adding a variable of internal control (IC_t) to Equation (4). Both equations consider year and industry fixed effects.

Thirdly, based on hypotheses H3a and H3b, to investigate whether internal controls play a moderating role in the relationship between CSR and stock price crash risk, we derived the following model:

$$\begin{aligned} Crash_{i,t+1} = & \beta_0 + \beta_1 CSR_{i,t} + \beta_2 IC_{i,t} + \beta_3 CSR_{i,t} * IC_{i,t} + \beta_4 Crash_{i,t} + \beta_5 DTurnover_{i,t} + \beta_6 Return_{i,t} \\ & + \beta_7 Sigma_{i,t} + \beta_8 Lsize_{i,t} + \beta_9 Mb_{i,t} + \beta_{10} Lev_{i,t} + \beta_{11} Roa_{i,t} + \beta_{12} AbsAcc_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \end{aligned} \quad (7)$$

Equation (7) is the result of adding the variable of internal control (IC) and interaction term of internal controls and CSR ($CSR \times IC$). And the interaction of $CSR \times IC$ is used to investigate internal controls' moderating effect on the relation of CSR and stock price crash risk.

4. Results and Discussion

4.1. Descriptive Statistics

Table 3 lists the descriptive summary of the variables. The mean values of the crash risk measures (i.e., $NCSKEW$ and $DUVOL$) are 0.158 and -0.380 , respectively. Although some differences were found between the two measures, the measures were in the same direction. The standard deviation of the

two variables was 0.935 and 0.677, respectively. The significant SD indicated that the risk of stock price crash varied widely between different companies in China. The sample firms had an average CSR score of 35.666. In our firm dataset, the average firm had an IC score of 6.560. The average turnover rate was -0.090 , the average firm-specific weekly return was 0.005, and the weekly return volatility was 0.066. The average abnormal accrual value was -0.001 . The average financial level value was 0.501 and the return rate on assets was 0.052. The average company age was 11.74 years. For the company ownership, 65% were state-owned, and 16% had the CEO also serving as the chairman of the board. In addition, 15.9% of the firms were Big 4 auditor's customer companies.

Table 4 presents the correlation matrix of the variables employed in our empirical regression. With the exception of the correlation coefficient between *NCSKEW* and *DUVOL* of 0.607, the correlation coefficient between other variables was below 0.5, so there was no serious multi-collinearity in the models. At the same time, the correlation coefficients of *CSR* and *NCSKEW*, and *CSR* and *DUVOL*, were respectively negative at the lower level of 1%, which initially verified the correctness of hypotheses 1a. However, further multivariate regression analysis is still needed to test the preliminary results.

Table 3. Summary of descriptive statistics.

| Variable | Mean | SD | Min. | P25 | Median | P75 | Max. |
|------------------|--------|--------|---------|---------|--------|--------|--------|
| <i>NCKEW</i> | 0.158 | 0.935 | -2.529 | -0.394 | 0.189 | 0.813 | 2.125 |
| <i>DUVOL</i> | -0.380 | 0.677 | -2.319 | -0.797 | -0.347 | 0.093 | 1.053 |
| <i>CSR</i> | 35.666 | 12.015 | 13.33 | 15.32 | 32.750 | 39.84 | 87.95 |
| <i>IC</i> | 6.560 | 0.129 | 6.170 | 6.498 | 6.558 | 6.623 | 6.871 |
| <i>DTurnover</i> | -0.090 | 0.431 | -1.671 | -0.224 | -0.040 | 0.175 | 0.921 |
| <i>Return</i> | 0.005 | 0.013 | -0.026 | -0.010 | 0.004 | 0.012 | 0.053 |
| <i>Sigmat</i> | 0.066 | 0.023 | 0.030 | 0.045 | 0.061 | 0.078 | 0.145 |
| <i>Lsize</i> | 22.863 | 1.492 | 19.784 | 21.811 | 22.751 | 23.805 | 26.949 |
| <i>Mb</i> | 1.985 | 1.187 | 0.843 | 1.192 | 1.598 | 2.285 | 7.071 |
| <i>Lev</i> | 0.501 | 0.198 | 0.063 | 0.358 | 0.518 | 0.655 | 0.853 |
| <i>Roa</i> | 0.052 | 0.051 | -0.088 | 0.019 | 0.043 | 0.076 | 0.226 |
| <i>Acc</i> | -0.001 | 0.732 | -62.703 | -12.212 | 0.005 | 9.765 | 30.879 |
| <i>Fixratio</i> | 0.257 | 0.190 | 0.002 | 0.104 | 0.214 | 0.383 | 0.766 |
| <i>Growth</i> | 0.161 | 0.302 | -0.427 | -0.006 | 0.121 | 0.268 | 1.659 |
| <i>Age</i> | 11.74 | 5.41 | 1 | 7 | 12 | 16 | 25 |
| <i>Soe</i> | 0.652 | 0.476 | 0 | 0 | 1 | 1 | 1 |
| <i>CeoChair</i> | 0.164 | 0.137 | 0 | 0 | 0 | 0 | 1 |
| <i>Audit</i> | 0.159 | 0.366 | 0 | 0 | 0 | 0 | 1 |

Table 4. Correlation analysis of the variables.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 1. <i>NCKEW</i> | 1.000 | | | | | | | | |
| 2. <i>DUVOL</i> | 0.607 *** | 1.000 | | | | | | | |
| 3. <i>CSR</i> | -0.003 *** | -0.140 *** | 1.000 | | | | | | |
| 4. <i>IC</i> | -0.052 *** | -0.071 *** | 0.152 *** | 1.000 | | | | | |
| 5. <i>DTurnover</i> | -0.049 *** | -0.129 *** | 0.094 *** | 0.176 *** | 1.000 | | | | |
| 6. <i>Return</i> | -0.076 *** | -0.059 *** | 0.087 *** | 0.112 *** | 0.437 *** | 1.000 | | | |
| 7. <i>Sigmat</i> | -0.187 *** | -0.223 *** | 0.132 *** | 0.236 *** | 0.386 *** | 0.401 *** | 1.000 | | |
| 8. <i>Lsize</i> | 0.014 * | 0.132 *** | -0.466 *** | -0.330 *** | -0.217 *** | -0.196 *** | -0.285 *** | 1.000 | |
| 9. <i>Mb</i> | -0.061 *** | -0.252 *** | 0.200 *** | 0.487 *** | 0.312 *** | 0.209 *** | 0.348 *** | 0.414 *** | 1.000 |
| 10. <i>Lev</i> | -0.070 *** | -0.086 *** | 0.089 *** | 0.072 *** | 0.056 *** | 0.079 *** | 0.084 *** | 0.489 *** | 0.484 *** |
| 11. <i>Roa</i> | 0.118 *** | 0.128 *** | -0.014 | -0.339 *** | -0.141 *** | -0.198 ** | -0.174 *** | -0.066 *** | -0.403 *** |
| 12. <i>Acc</i> | 0.026 | 0.035 | -0.018 | -0.023* | -0.031 | -0.029 | -0.023 | -0.128 | -0.203 |
| 13. <i>Fixratio</i> | -0.024 | -0.003 | 0.070 ** | 0.024 | 0.052 | 0.041 | 0.043 | 0.105 *** | 0.198 *** |
| 14. <i>Growth</i> | 0.020 | 0.055 *** | -0.033 * | -0.095 *** | -0.119 | -0.107 | -0.132 | -0.016 | -0.053 *** |
| 15. <i>Age</i> | 0.047 | 0.088 | -0.008 | -0.037* | -0.046 | -0.053 | -0.040 | -0.185 *** | -0.206 *** |
| 16. <i>Soe</i> | -0.015 | -0.008 | 0.130 ** | 0.071 *** | 0.069 | 0.061 | 0.058 | 0.319 *** | 0.269 *** |
| 17. <i>CeoChair</i> | 0.011 | 0.007 | -0.019 | -0.019 | -0.020 | -0.018 | -0.021 | -0.079 *** | -0.129 *** |
| 18. <i>Audit</i> | -0.016 | -0.066 | 0.328 | 0.249 *** | 0.215 *** | 0.237 *** | 0.229 *** | 0.469 *** | 0.207 *** |

Table 4. Cont.

| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|-------------|------------|------------|------------|------------|------------|------------|------------|-----------|-------|
| 10.Lev | 1.000 | | | | | | | | |
| 11.Roa | −0.434 *** | 1.000 | | | | | | | |
| 12.Acc | −0.029 *** | 0.193 *** | 1.000 | | | | | | |
| 13.Fixratio | 0.014 | −0.155 *** | −0.178 *** | 1.000 | | | | | |
| 14.Growth | −0.009 | 0.084 *** | 0.017 *** | −0.001 | 1.000 | | | | |
| 15.Age | −0.263 *** | 0.136 *** | 0.109 | −0.044 ** | 0.007 | 1.000 | | | |
| 16.Soe | 0.231 *** | −0.147 *** | −0.193 *** | 0.185 *** | −0.034 * | −0.269 *** | 1.000 | | |
| 17.CeoChair | −0.098 *** | 0.056 *** | 0.078 *** | −0.056 *** | 0.108 *** | 0.009 | −0.218 *** | 1.000 | |
| 18.Audit | 0.207 *** | −0.053 *** | −0.069 | 0.053 *** | −0.059 *** | −0.017 | 0.183 *** | −0.043 ** | 1.000 |

Note: This table presents Pearson correlation coefficients between the variables. The sample included 2747 firm-year observations between 2009–2015. * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

4.2. Effect of CSR on Crash Risk

Table 5 reports the results of the regression analysis on the relationship between CSR and firm-specific crash risk after controlling for other potential determinants of price crash risk. Because we used panel data to study the relationship, Hausman tests were employed to examine which model was better (i.e., the fixed effects model or the random effects model). The test results are shown in Table 5. The $\chi^2(10)$ value in column 1 is 591.67, the $\chi^2(10)$ value in column 2 is 715.47, and the value of Prob > χ^2 are both 0.000. So we used the fixed effect model for regression. The regression results suggested that CSR was negatively associated with one-year-ahead crash risk via *NCSKEW* and *DUVOL*. Column 1 indicates that CSR was significantly and negatively associated with *NCSKEW*. The correlation coefficient was -0.002 , which means that an increase in one SD in CSR in year t was associated with a decrease of 0.002 in *NCSKEW* in year $t + 1$ year. Column 2 suggests that an increase of one SD in CSR in year t was associated with a decrease of -0.007 in *DUVOL* in year $t + 1$. As to the other variables (i.e., *NCSKEW*, *DTurnover*, *Return*, *Sigma*, and *Lev*) in year t , they were significantly and negatively associated with both *NCSKEW* and *DUVOL* in year $t + 1$; however, *Lsize* and *Roa* were significantly and positively associated with both crash risk variables.

Table 5. Regression analysis of the effect of corporate social responsibility on stock price crash risk.

| Dependent Variables | Independent Variables | |
|--------------------------------------|-------------------------------------|------------------------------------|
| | (1) | (2) |
| | <i>NCSKEW</i> _{<i>t</i>+1} | <i>DUVOL</i> _{<i>t</i>+1} |
| <i>CSR</i> _{<i>t</i>} | −0.002 ** (−2.42) | −0.007 *** (−5.86) |
| <i>NCSKEW</i> _{<i>t</i>} | −0.089 *** (−4.51) | |
| <i>DUVOL</i> _{<i>t</i>} | | −0.122 *** (−6.59) |
| <i>DTurnover</i> _{<i>t</i>} | −0.049 *** (−2.69) | −0.120 *** (−8.03) |
| <i>Return</i> _{<i>t</i>} | −2.801 *** (−7.45) | −3.631 *** (−9.02) |
| <i>Sigma</i> _{<i>t</i>} | −1.233 *** (−3.76) | −1.302 *** (−6.65) |
| <i>Lsize</i> _{<i>t</i>} | 0.057 *** (2.95) | 0.048 *** (3.54) |
| <i>Mb</i> _{<i>t</i>} | −0.147 (−1.45) | −0.889 *** (−12.12) |
| <i>Lev</i> _{<i>t</i>} | −0.313 *** (−2.83) | −0.234 *** (−2.71) |
| <i>Roa</i> _{<i>t</i>} | 1.394 *** (3.56) | 0.349 * (1.77) |

Table 5. Cont.

| Dependent Variables | Independent Variables | |
|--------------------------------|--|---|
| | (1) <i>NCSKEW</i> _{<i>t+1</i>} | (2) <i>DUVOL</i> _{<i>t+1</i>} |
| <i>Acc</i> _{<i>t</i>} | 0.008 (1.29) | 0.005 (1.08) |
| Constant | −0.872 ** (−2.47) | −0.749 *** (−3.02) |
| Year FE | Yes | Yes |
| Industry FE | Yes | Yes |
| N | 2747 | 2747 |
| R ² | 0.074 | 0.094 |
| F-Value | 34.77 | 47.29 |
| Hausman test | 591.67 *** | 715.47 *** |

Note: This table presents the regression results of the effect of corporate social responsibility (CSR) scores on firm-level stock price crash risk. The sample included 2747 firm-year observations between 2009–2015. The two-tailed *p*-values, based on standard errors adjusted by a two-dimensional cluster at the firm and year levels, are reported in parentheses. * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

Overall, the results in Table 5 suggest that higher socially responsible listed companies have a lower future stock price crash risk. The results support the assumption in H1a that CSR reduces the risk of a stock price crash. This suggests that CSR enhances shareholder interests in the Chinese stock market. As CSR can improve information transparency, it can objectively reduce the likelihood of managers hoarding bad news, thus reducing firm-specific stock price crash risk.

4.3. Endogeneity

The above analysis suggests a negative relation between CSR and one-year-ahead crash risk. However, considering the endogeneity of the conclusions is necessary. For this reason, we used two approaches to control the endogeneity. We introduced an instrumental variable and used the 2SLS instrument variable method to control endogeneity. We also used the generalized method of moments (GMM).

The first approach used was the 2SLS instrumental variables method. As previously reported [5], we used the average CSR score of other firms in the same industry as the instrumental variable (CSR_HAT). Columns 1 and 2 in Table 6 report the results of the instrumental variables approach. From the correlation coefficients, CSR_HAT was significantly negatively associated with both *NCSKEW* and *DUVOL*. This suggests that the negative relation between CSR and future crash risk holds after controlling for endogeneity based on the 2SLS instrumental variables method.

The second approach was the dynamic panel GMM approach. As previously reported [43], we used the GMM to control endogeneity. As can be seen from columns 3 and 4 of Table 6, the Arellano–Bond test value of AR(1) was 0, while the Arellano–Bond test value of AR(2) was large, which supports the existence of first-order serial correlation of the residual term and the absence of second-order serial correlation. At the same time, the Sargan test also shows that the use of instrumental variables in the model was valid as a whole, there was no over-identifying problem, and there was no reason to reject the validity of instrumental variables. In addition, columns 3 and 4 in Table 6 also report the results from the dynamic GMM estimation. From the correlation coefficients, CSR is significantly negatively associated with both *NCSKEW* and *DUVOL*. The results suggest that the negative relation between CSR and future crash risk holds after controlling for endogeneity based on the dynamic GMM estimator.

Altogether, considering possible endogeneity, both the 2SLS instrumental variables method and the GMM continue to support the conclusion, meaning the conclusion that CSR reduces the stock price risk in the Chinese stock market is statistically robust.

Table 6. Regression analysis to address endogeneity concerns.

| Dependent Variables | Independent Variables (IV) | | | |
|------------------------------|--|--------------------------------------|--------------------------------|-------------------------------|
| | (1) (Industry IV) $NCSKEW_{t+1}$ | (2) (Industry IV) $DUVOL_{t+}$ | (3) (GMM) $NCSKEW_{t+1}$ | (4) (GMM) $DUVOL_{t+1}$ |
| CSR_HAT_t | −0.001 ** (−2.06) | −0.005 *** (−4.57) | | |
| CSR_t | | | −0.005 *** (−2.86) | −0.0015 *** (−7.93) |
| $NCKEW_t$ | −0.089 *** (−4.51) | | −0.108 *** (−4.74) | |
| $DUVOL_t$ | | −0.122 *** (6.59) | | −0.158 *** (7.94) |
| $DTurnover_t$ | −0.041 *** (−2.67) | −0.131 *** (5.72) | −0.048 *** (−2.67) | −0.109 *** (−4.83) |
| $Return_t$ | −2.798 *** (−6.91) | −3.474 *** (−8.15) | −2.541 *** (−5.96) | −4.502 *** (−9.48) |
| $Sigma_t$ | −1.194 *** (−3.06) | −1.219 *** (−3.45) | −1.229 *** (−3.21) | −1.234 *** (−6.09) |
| $Lsize_t$ | 0.063 *** (3.18) | 0.052 *** (3.76) | 0.039 ** (2.58) | 0.034 *** (2.90) |
| Mb_t | −0.176 (−1.58) | −0.903 *** (−12.73) | −0.103 (−1.38) | −0.624 *** (−7.06) |
| Lev_t | −0.402 *** (−3.34) | −0.253 *** (−2.98) | −0.282 *** (−2.70) | −0.193 ** (−2.15) |
| Roa_t | 1.267 *** (3.01) | 0.356 * (1.79) | 0.638 *** (2.74) | 0.103 * (1.82) |
| Acc_t | 0.008 (1.18) | 0.005 (1.07) | 0.008 (1.16) | 0.005 (1.05) |
| Constant | −0.846 *** (−2.87) | −0.809 *** (−3.11) | −0.523 *** (−3.42) | −0.397 *** (−4.88) |
| Year FE | Yes | Yes | Yes | Yes |
| Industry FE | No | No | No | No |
| N | 2747 | 2747 | 2747 | 2747 |
| R ² | 0.057 | 0.073 | — | — |
| F-Value or chi2-Value | 27.83 | 36.71 | 1304.37 | 1695.68 |
| Arellano–Bond test for AR(1) | — | — | 0.000 | 0.000 |
| Arellano–Bond test for AR(2) | | | 0.701 | 0.722 |
| Sargen test- <i>p</i> | — | — | 0.811 | 0.795 |

Note: This table presents the regression results of the effect of corporate social responsibility (CSR) scores on firm-level stock price crash risk using the 2SLS instrumental variables method and the generalized moment estimation method (GMM). The sample included 2747 firm-year observations from 2009–2015. The two-tailed *p*-values, based on standard errors adjusted by a two-dimensional cluster at the firm and year levels, are reported in parentheses. * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

4.4. Mediating Effect of Internal Controls on the Relationship between CSR with Stock Price Crash Risk

Table 7 reports the results of the mediating effect test of internal controls. In this paper, we used the Sobel test method introduced by Baron and Kenny [42] to confirm the mediating role of internal controls on the relationship between CSR and stock price crash risk. For the first step, columns 1 and

2 of Table 7 were the same as columns 1 and 2 in Table 5, which means CSR was significantly and negatively associated with both *NCSKEW* and *DUVOL*. The second step, column 3, indicates that CSR was significantly and positively associated with *IC*. The correlation coefficient was 0.023, which means that an increase of one SD in CSR in year t was associated with a decrease of 0.023 in *IC*. The results suggest that higher socially responsible listed companies have higher quality internal controls. For the third step, columns 4 and 5 show the correlation coefficient and significance level between CSR and *NCSKEW* and *DUVOL* with the addition of the mediation factor *IC*. *IC* was significantly and negatively associated with both *NCSKEW* and *DUVOL*, and the correlation coefficients were -0.031 and -0.361 , respectively. In the same regression models, CSR was also significantly and negatively associated with both *NCSKEW* and *DUVOL*, and the correlation coefficients were -0.002 and -0.007 , respectively. So, based on the step-by-step test method in Baron and Kenny [42], we determined that *IC* plays a partial mediating role between CSR and stock price crash (*NCSKEW* and *DUVOL*). By further Sobel testing, the Z -value in column 4 is -3.044 and the Z -value in column 5 is -3.402 , and the significance levels are both below 1%.

Altogether, internal controls play a significant partial mediating role between CSR and the risk of stock price crash (*NCSKEW* and *DUVOL*). In the Chinese capital market, this means that managers of listed companies will perform CSR for the benefit of shareholders, which includes implementing quality internal controls in the companies, thereby reducing the stock price crash risk. The results support the H2a assumption that CSR reduces the risk of stock price crash by increasing the efficiency of internal controls.

Table 7. Regression analysis of the mediating effect of internal controls in the relationship between CSR and price crash risk.

| Dependent Variables | Model (1) | | Model (5) | Model (6) | |
|--|---|--|-------------------------------------|---|--|
| | Independent Variables | | Independent Variables | Independent Variables | |
| | (1) | (2) | (3) | (4) | (5) |
| | <i>NCSKEW</i> _{$t+1$} | <i>DUVOL</i> _{$t+1$} | <i>IC</i> _{t} | <i>NCSKEW</i> _{$t+1$} | <i>DUVOL</i> _{$t+1$} |
| <i>CSR</i> _{t} | -0.002^{**} (-2.42) | -0.007^{***} (-5.86) | 0.023^{***} (4.72) | -0.002^{**} (-2.37) | -0.007^{***} (-5.92) |
| <i>IC</i> _{t} | | | | -0.031^{***} (-3.98) | -0.361^{***} (-4.91) |
| <i>NCSKEW</i> _{t} | -0.089^{***} (-4.51) | | | -0.096^{***} (-4.81) | |
| <i>DUVOL</i> _{t} | | -0.122^{***} (-6.59) | | | -0.118^{***} (-6.37) |
| <i>DTurnover</i> _{t} | -0.045^{***} (-2.65) | -0.115^{***} (-6.98) | | -0.049^{***} (-2.71) | -0.118^{***} (-6.99) |
| <i>Return</i> _{t} | -2.433^{***} (-2.98) | -3.510^{***} (-8.19) | | -2.836^{***} (-7.69) | -3.570^{***} (-8.01) |
| <i>Sigmal</i> _{t} | -1.205^{***} (-3.19) | -1.127^{***} (-5.64) | | -1.231^{***} (-3.75) | -1.250^{***} (-3.96) |
| <i>Lsize</i> _{t} | 0.057^{***} (2.95) | 0.048^{***} (3.54) | -0.030^{***} (-11.48) | 0.053^{***} (2.66) | 0.037^{***} (2.63) |
| <i>Mb</i> _{t} | -0.147 (-1.45) | -0.889^{***} (-12.12) | | -0.081^* (-1.77) | -0.896^{***} (-11.92) |
| <i>Lev</i> _{t} | -0.313^{***} (-2.83) | -0.234^{***} (-2.71) | 0.083^{***} (4.52) | -0.323^{***} (-2.59) | -0.189^{**} (-2.17) |
| <i>Roa</i> _{t} | 1.394^{***} (3.56) | 0.349^* (1.87) | -1.171^{***} (20.36) | 1.915^{***} (4.19) | 0.190^* (1.69) |

Table 7. Cont.

| Dependent Variables | Model (1) | | Model (5) | Model (6) | |
|-------------------------------------|-------------------------------------|------------------------------------|-------------------------------|-------------------------------------|------------------------------------|
| | Independent Variables | | Independent Variables | Independent Variables | |
| | (1) | (2) | (3) | (4) | (5) |
| | <i>NCSKEW</i> _{<i>t</i>+1} | <i>DUVOL</i> _{<i>t</i>+1} | <i>IC</i> _{<i>t</i>} | <i>NCSKEW</i> _{<i>t</i>+1} | <i>DUVOL</i> _{<i>t</i>+1} |
| <i>Acc</i> _{<i>t</i>} | 0.008 (1.32) | 0.005 (1.07) | | 0.008 (1.30) | 0.005 (1.21) |
| <i>Fixratio</i> _{<i>t</i>} | | | −0.005 (−0.38) | | |
| <i>Growth</i> _{<i>t</i>} | | | 0.010 *** (3.44) | | |
| <i>Age</i> _{<i>t</i>} | | | −0.002 *** (−4.38) | | |
| <i>Soe</i> _{<i>t</i>} | | | 0.009 (1.37) | | |
| <i>CeoChair</i> _{<i>t</i>} | | | −0.005 (−0.67) | | |
| <i>Audit</i> _{<i>t</i>} | | | 0.037 *** (4.47) | | |
| Constant | −0.872 ** (−2.47) | −0.749 *** (−3.02) | 5.793 *** (94.30) | −0.705 * (−1.85) | −2.809 *** (−4.86) |
| Year FE | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes |
| N | 2747 | 2747 | 2747 | 2747 | 2747 |
| Adjusted R ² | 0.074 | 0.094 | 0.261 | 0.088 | 0.099 |
| F-Value | 34.77 | 47.29 | 96.98 | 35.01 | 42.86 |
| Sobel Z-Value | — | — | — | −3.044 *** | −3.402 *** |

Note: This table presents the regression results of the effect of corporate social responsibility (CSR) scores on firm-level stock price crash risk, the results of corporate social responsibility (CSR) on internal control (IC), and the results of corporate social responsibility (CSR) and internal control (IC) on firm-level stock price crash risk. The sample includes 2747 firm-year observations between 2009–2015. The two-tailed *p*-values, based on standard errors adjusted by a two-dimensional cluster at the firm and year levels, are reported in parentheses. * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

4.5. Moderating Effect of Internal Controls on the Relationship between CSR with Stock Price Crash Risk

Table 8 reports the results of the test of the moderating effect of internal controls. The aim of the test was to investigate whether the relationship between CSR scores and stock price crash risk varied with the level of internal controls. As mentioned in the H3 reasoning process, the establishment of high-level internal control systems provides a favorable environment for CSR to play a positive role. Corporate information transparency improved, management opportunism was suppressed, so the role of CSR in reducing the stock price risk may be more significant. To test the hypothesis, we used two methods. First, we re-performed the Equation (4) regression analysis after partitioning the sample based on the median values of the IC variables, reported in the results in columns 1–4 of Table 8. We found that CSR was more significantly and negatively associated with crash risk (both *NCSKEW* and *DUVOL*) when firms had a higher-quality internal control system. Second, we added the interaction of CSR × IC into Equation (4) for re-performing the regression analysis. The results are reported in columns 5 and 6 of Table 8. We found that the interaction of CSR × IC was significantly and negatively associated with both *NCSKEW* and *DUVOL*, and the correlation coefficients were −0.004 and −0.127, respectively. The correlation coefficient of the interaction between CSR and IC was negative, which indicates that CSR had a stronger negative correlation with the risk of a stock price crash under higher levels of IC. This result was consistent with that of the first approach.

Table 8. Regression analysis of the moderating effect of internal controls on the relationship between CSR and price crash risk.

| Dependent Variables | Independent Variables | | | | | |
|-------------------------------|--|--|---|---|-------------------------------------|------------------------------------|
| | (1) (IC < Median) <i>NCSKEW</i> _{t+1} | (2) (IC ≥ Median) <i>NCSKEW</i> _{t+1} | (3) (IC < Median) <i>DUVOL</i> _{t+1} | (4) (IC ≥ Median) <i>DUVOL</i> _{t+1} | (5) <i>NCSKEW</i> _{t+1} | (6) <i>DUVOL</i> _{t+1} |
| <i>CSR</i> _t | −0.001 (−0.28) | −0.003 *** (−2.95) | −0.004 (−1.50) | −0.009 *** (−3.84) | −0.029 ** (−2.44) | −0.067 *** (−2.88) |
| <i>IC</i> | | | | | −0.160 (−1.45) | −0.109 (−1.43) |
| <i>CSR*IC</i> | | | | | −0.004 ** (−2.41) | −0.014 ** (−2.02) |
| <i>NCKEW</i> _t | −0.060 ** (−2.12) | −0.127 *** (−4.62) | | | −0.095 *** (−4.80) | |
| <i>DUVOL</i> _t | | | −0.076 *** (−2.96) | −0.006 * (−1.71) | | −0.116 *** (−6.22) |
| <i>DTurnover</i> _t | −0.039 *** (−2.78) | −0.109 *** (−5.96) | −0.053 *** (−3.01) | −0.130 *** (−9.05) | −0.048 *** (−2.68) | −0.121 *** (−8.11) |
| <i>Return</i> _t | −2.693 *** (−6.49) | −2.994 *** (−4.30) | −2.901 *** (−9.22) | −4.231 *** (−12.08) | −2.789 *** (−7.41) | −3.640 *** (−9.39) |
| <i>Sigma</i> _t | −1.210 *** (−3.03) | −1.045 *** (−3.46) | −1.273 *** (−3.98) | −1.317 *** (−6.84) | −1.235 *** (−3.78) | −1.311 *** (−6.71) |
| <i>Lsize</i> _t | 0.063 ** (2.20) | 0.044 * (1.76) | 0.008 (0.40) | 0.010 (0.54) | 0.052 *** (2.60) | 0.036 ** (2.37) |
| <i>Mb</i> _t | −0.033 (−1.32) | −0.012 (−0.44) | −0.102 *** (−5.96) | −0.055 *** (−2.67) | −0.078 (−0.75) | −0.889 *** (−12.12) |
| <i>Lev</i> _t | −0.143 (−0.84) | −0.560 *** (−3.04) | −0.276 ** (−2.43) | −0.087 (−0.62) | −0.320 *** (−2.57) | −0.195 ** (−2.24) |
| <i>Roa</i> _t | 1.229 ** (2.31) | 1.941 *** (2.96) | 1.231 *** (3.46) | 1.251 ** (2.50) | 1.928 *** (4.21) | 0.142 (1.44) |
| <i>Acc</i> _t | 0.006 (1.09) | 0.004 (1.19) | 0.011 (1.56) | 0.006 (1.39) | 0.008 (1.28) | 0.005 (1.03) |
| Constant | −1.269 ** (−2.14) | −0.545 (−1.03) | −0.313 (−0.79) | −0.185 (−0.46) | −0.224 (−1.49) | −0.352 (−1.21) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 1373 | 1374 | 1373 | 1374 | 2747 | 2747 |
| R ² | 0.044 | 0.078 | 0.065 | 0.102 | 0.088 | 0.101 |
| F-Value | 10.02 | 18.62 | 15.07 | 24.90 | 30.69 | 38.06 |

Note: This table presents the regression results of the effect of corporate social responsibility (CSR) on firm-level stock price crash risk with different IC levels. The sample includes 2747 firm-year observations between 2009–2015. The two-tailed *p*-values, based on standard errors adjusted by a two-dimensional cluster at the firm and year levels, are reported in parentheses. * Statistical significance at the 10% level. ** Statistical significance at the 5% level. *** Statistical significance at the 1% level.

Altogether, by using the two methods, we drew the conclusion that internal controls also have a significant moderating effect on the relationship between CSR and stock price crash (*NCSKEW* and *DUVOL*). With higher levels of internal controls, CSR was more effective at reducing the risk of a stock price crash. The results support the H3a assumption that CSR more significantly reduces the risk of a stock price crash under an efficient internal control system.

5. Conclusions

Sustainable development is an important content of scientific development and a major issue of the times. As the main body of the economy and society, in order to maintain competitiveness in the fierce market competition and achieve sustainable development, enterprises must actively perform

their CSR while growing, and closely integrate their own development with social progress. Therefore, at the present stage, it is of special significance for China to actively fulfill its CSR. Nowadays, in a period of economic and social transition, due to the imperfect system and the lack of supervision, some Chinese companies do not have a strong sense of CSR. They pursue profits in a one-sided way, focusing on private interests rather than public interests. This is not conducive to the good and fast development of the Chinese economy and society, and is also not conducive to the sustainable development of enterprises. The government should correctly guide enterprises to fulfill their CSR so as to promote sustainable development in China.

This study examined the effects of CSR on stock price crash risk and the role of CSR on the relationship between crash risk and internal controls. In the Chinese capital market, determining whether the company undertakes CSR to improve or harm shareholders' interests is of concern. If socially responsible companies maintain a high degree of financial reporting transparency, then bad news hoarding behavior will be exhibited. So, CSR should reduce the risk of a stock price crash. On the contrary, if managers are using social responsibility for their own benefit, they will hide bad news, and CSR should increase the risk of a stock price crash. Simultaneously, as Chinese government departments have been promoting internal control systems for enterprises, its role in eliminating the risk of stock price crash should also be examined.

Our findings support the mitigating effect of CSR on stock price crash risk and the positive role of internal controls on the relationship between CSR and crash risk. Specifically, we found a significantly negative association between CSR and stock price crash risk, after controlling for other determinants of crash risk. In addition, our results remained robust after considering potential endogeneity, including using the 2SLS instrumental variables and GMM. Furthermore, we found that internal controls played a significant partial mediating role between CSR and stock price crash (*NCSKEW* and *DUVOL*). Internal controls have become an important method for Chinese companies to assume social responsibility and reduce their operating risk, especially the risk of a stock price crash. We also observed that internal controls have a significant moderating effect in the relationship between CSR and stock price crash (*NCSKEW* and *DUVOL*). In certain environments with higher levels of internal control, the positive effect of CSR was more obvious, and CSR more effectively reduced the company's stock price crash risk.

Our study adds to the growing CSR literature, expands upon the scope of CSR research, and enriches the understanding of CSR-relevant economic consequences. Our findings also complement the literature on the determinants of stock price crash risks. Combining CSR, as a corporate social behavior, with the level of internal control as an internal environment, our study analyzed their joint impact on the risk of a stock price crash. Our results help to better understand the causes of the risk of a stock price crash. In reality, the conclusions of this study provide a reference for Chinese managers, investors, and relevant government departments to evaluate the effect of CSR and internal controls, and provides regulators with a method to control abnormal fluctuations in the stock market. The relevant research results of this study have important reference value for investors, managers, and government departments in developing countries like China. For example, if corporate managers can take the demands of stakeholders seriously and pay attention to improving relations with investors, suppliers, consumers, etc., then CSR can not only enhance the brand image of the company, but also reduce the risk of stock price crash. For investors, it is possible to choose companies with higher CSR to invest in order to reduce the damage caused by the stock price crash to personal interests. For the government, however, focus of regulation should be on companies that perform poorly because they tend to cause volatility in the stock market.

Although our research contributes to the CSR literature in multiple ways, this study nevertheless faced some limitations. First, CSR was measured by the evaluation index of third-party rating agencies. While it seems appropriate to use this relatively authoritative measure in the Chinese context, and academics are also sympathetic to this method, the index still has certain defects in reflecting the actual social responsibility performance of listed companies in China. The reason is that the measure is based on the social responsibility reports disclosed by the listed companies themselves, and the

rating agencies have not evaluated the actual social responsibility activities of listed companies. In the future, it is necessary to use appropriate measurement methods to carry out empirical research. Second, our study included observations of 2747 listed companies over six years, which is not a high percentage. The reason was that the proportion of Chinese-listed companies that disclosed social responsibility reports was less than 50%, and RSK evaluation index is based on these social responsibility reports, so the evaluation index can not fully reflect the social responsibility performance of all listed companies in China. In the future, the sample of research can be extended to all listed companies. Third, this study examined the role of internal control on the relationship between CSR and the crash risk of a company's stock price, and verified the relevant assumptions, but companies with social responsibility may have done more than that to reduce stock price volatility. Therefore, it is necessary to further study the mechanism between CSR and the risk of stock price crash in the future, and to examine more external factors that cause the strength of this relationship.

In order to expand the CSR literature, future research needs to focus on various topics in the securities market. Future research needs to be based on long-term observation of the impact of CSR on the volatility of stock prices of listed companies, combined with China's special institutional and cultural background, to select more meaningful research topics. This will not only make an important contribution to understanding the economic consequences of CSR, but also reduce the volatility of Chinese capital markets. In addition, in future studies, we need to find more factors that affect the risk of a company's stock price crash, so as to increase the understanding of stock price crash and improve the model's interpretation of the crash risk.

Author Contributions: The manuscript was written through joint contributions from all authors. H.D.Y. put forward the theme, provided the case, writing the initial draft, and gave guidance to the problems during the work. W.J. conceived the theory part, designed the empirical study and revised the paper. Q.G.Y. put in a lot of effort on the introduction part, data collection and the format checking of the paper. All authors have given approval to the financial version of the manuscript.

Acknowledgments: The research for this paper was supported by the National Natural Science Foundation of China (No. 71472064).

Conflicts of Interest: The authors declare no conflicts of interest.

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