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Corporate Social Responsibility Information Disclosure and Corporate Fraud—"Risk Reduction" Effect or "Window Dressing" Effect?

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Abstract: We examine the impact in Chinese capital markets of publishing information on corporate fraud in a corporate social responsibility (CSR) report. We develop and test two competing hypotheses of "risk reduction" and "window dressing". Based on the listed company's CSR report, we analyze the effect of CSR disclosure on the commission of corporate fraud, fraud detection and the severity of corporate fraud. The research results show that after controlling for the firms' characteristics and corporate governance factors, the CSR report's information disclosures have a significantly negative relation to corporate fraud. Specifically, the CSR report's publication reduces the information asymmetry between the insiders and the stakeholders, thus decreasing the tendency to commit fraud. Our findings support the risk reduction hypothesis but not the window dressing hypothesis. Further research shows that firms with a good CSR disclosure practice have a lower probability of committing corporate fraud and have fewer types of fraud violations, thereby mitigating the severity of corporate fraud.

Keywords: corporate social responsibility; corporate fraud; risk reduction; window dressing

1. Introduction

Fraudulent cases in the Chinese capital markets have occurred frequently in recent years and have greatly jeopardized the market order, seriously undermined investor confidence and caused serious social consequences. In particular, the "vaccine scandal", which erupted in July 2018, triggered anger and dissatisfaction in the whole society. The Changchun Changsheng Bio-tech Company has become the target of public fury for falsifying production data and making substandard DPT (diphtheria-pertussis-tetanus) vaccines that were given to children. This bad behavior of seeking illegal profits by endangering the public's life and health is undoubtedly the result of the lack of corporate social responsibility and the loss of a moral bottom line. Therefore, how to treat the relationship between corporate social responsibility and corporate fraud and in turn how to prevent and detect corporate fraud is worthy of further study.

Beginning in 2008, China's listed companies began to issue Corporate Social Responsibility reports (CSR reports), revealing the company's achievements and detailing their social responsibility. Corporate Social Responsibility reports were used to assess the company's CSR performance in eight categories: the natural environment, shareholders, creditors, employees, customers, suppliers, social communities and other stakeholders. The information in the Corporate Social Responsibility report provides a useful and important way to understand the company's situation as presented through a mechanism other than the annual financial report provided by the listed company. However,

an empirical analysis of the role of CSR in corporate governance issues faces two opposing hypotheses. The first hypothesis of CSR disclosure is the "risk reduction" effect: When a company, in accordance with the regulations of the CSRC (China Securities Regulatory Commission), invests more resources to undertake social responsibility and the timely release of social responsibility reports, it not only reflects the company's good corporate culture and high ethical standards [1] but also reduces the chances of concealing bad news for investors. Meanwhile, the CSR report contains the firm's social responsibility information that can make internal governance of the company more transparent, reducing the incentives for hidden fraud within the management and the possibility of earnings manipulation [2]. When balancing the interests of all parties, senior managers are supposed to combine the company's development strategy with corporate ethics and culture, integrate it into all aspects of corporate governance and corporate behavior, enhance social trust, deepen customer loyalty, and focus on financial and nonfinancial indicators. In pursuit of the common realization of economic interests and noneconomic interests, the possibility of harming the interests of every group will be relatively low. Therefore, the possibility of corporate fraud is relatively low. The second hypothesis of CSR disclosure is the "window dressing" effect. Although CSR performance is a perfect way to shape a company's good public image, it can also be used to whitewash the improper operation of the company's management and to hide the unethical behaviors of the company's executives [3]. Moreover, Prior et al. [4] believe that executives who have already committed profit manipulation are more inclined to actively undertake and participate in social responsibility practices, win the public goodwill and reduce their sensitivity to the changes in the company's financial indicators. According to the "window dressing" effect of social responsibility information disclosure, the CSR report can be used as a tool to cover up negative news inside the company, diverting the attention of the public and regulatory agencies, who will pay less attention to the investigation of corporate business activities and to the disclosure of corporate fraud to the public [5]. It can be seen that the "risk reduction" and "window dressing" effect of CSR disclosure has a completely opposite impact on corporate fraud: the "window dressing" hypothesis holds the view that CSR disclosure is positively correlated with corporate fraud, while the "risk reduction" hypothesis supports that CSR disclosure is negatively correlated with corporate fraud. Therefore, in China's capital markets, the determination of which effect is primarily manifested by the relationship between CSR disclosure and corporate fraud still deserves our in-depth discussion.

Judging from the existing research results, foreign scholars have begun to pay attention to the relationship between corporate social responsibility and corporate fraud from two perspectives. On the one hand, from the perspective of corporate ethics culture, Harjoto [6] believes that reflecting that executives have high moral values, a company's high level of social responsibility can reduce the probability of corporate fraud and relieve the severity of corporate fraud. Rodgers et al. [7] emphasizes that corporate social responsibility helps to correct and clarify the ethical position of company employees, thereby improving the company's internal control system, enhancing the security and convenience of internal governance, enabling better detection of the fraud motive and effectively stopping the fraud incident. On the other hand, from the perspective of corporate reputation and considering the serious consequences of the social impact, Lahlou et al. [8] found that many companies are voluntarily taking social responsibility and reporting CSR information, potentially enhancing the value of the company's intangible assets by creating a corporate image of integrity, building the company's social reputation, and increasing investment in human capital. In addition, high levels of corporate social responsibility can also benefit stakeholders, as well as increase a company's competitive advantage and attract competitive institutional investors [9]. Therefore, the great benefits of CSR performance have a certain buffering effect on the negative impact of corporate fraud. When corporate fraud is investigated and exposed, it will trigger serious public opinion and a reputation crisis, leading to a sharp rise in the risk of production stagnation, performance decline, and a crash in the company's stock price: this is not conducive to the long-run development strategy of the company. However, corporate social responsibility can improve the image of the company in the public mind,

leaving room for buffering the collapse of corporate reputation, alleviating the serious consequences and reducing the high costs that the company will have to face. Bae et al. [10] believe that the buffer effect of CSR engagement before and after fraud is different. Before the company's fraud, the company actively assumes social responsibility, can effectively buffer the social public opinion and reputation crisis caused by corporate fraud in the short term, and alleviate the impact on the company's stock price and operating performance. For companies that have committed fraud, starting socially responsible behavior after a crisis has been an ineffective means of repairing the companies' damaged reputation or has even made the situation worse, which is not useful for maintaining the stability of the companies' performance or stock price.

At present, there have been few literature studies on corporate social responsibility and corporate fraud focusing on the Chinese capital markets. As scholars have mainly focused on social responsibility and corporate earnings management, there has been a lack of articles directly discussing the relationship between CSR disclosure and corporate fraud. Although illegal earning managements, such as excessive earnings management, earning control and financial cheating, are all included in the category of corporate fraud, the research on corporate fraud covers more types of corporate fraud and reflects more serious social problems. Therefore, we are going to examine the relationship between corporate social responsibility behavior and corporate fraud behavior in China, enriching and expanding the existing research literature and clarifying the impact and impact mechanism of social responsibility information disclosure on corporate fraud. This will enable us to propose targeted comments and policy recommendations for the prevention and detection of corporate fraud. Inspired by Harjoto's study [6], we believe that a company with a higher level of CSR performance tends to have lower fraud motives. However, unlike his research method, we use the CSR report disclosure to assess a company's CSR performance and mainly use a Bivariate Probit model with partial observability to conduct the empirical tests. Combining the actual situation of corporate governance and corporate social responsibility development in China, we classify a corporate fraud case into two stages, namely, fraud commission and fraud detection, so that drawing conclusions applicable to the Chinese capital markets, we can examine the "risk reduction" and "window dressing" hypotheses of CSR disclosure on corporate fraud and can further explore their impact on the severity of fraud.

The four main contributions of our study are as follows: First, our study enriches the empirical research of the existing literature on corporate fraud prevention and detection. Based on the subjective factors affecting corporate fraud, we focus on the CSR report's disclosures to assess the CSR behaviors that represent corporate ethics. Since the fraud investigation and detection process is not perfect and it will take a certain period to reveal corporate fraud, corporate fraud can be divided into two interrelated processes: fraud commission and fraud detection. The partially observable Bivariate Probit model is used to effectively estimate the two processes. It better solves the unobservable problem of the samples that have committed fraud but that have not been investigated and exposed, effectively avoiding the selection bias caused by the not directly observable part of the statistical sample. Second, we empirically test whether CSR disclosure has a "risk reduction" effect or a "window dressing" effect on the fraudulent behaviors of Chinese listed companies. By using the special characteristics of the Bivariate Probit model, we can simultaneously test the two effects: the "risk reduction "effect acts on the process of fraud commission, and the "window dressing" effect acts on the process of fraud detection. The empirical results show that CSR disclosure can significantly reduce the firms' incentives to commit fraud but has no significant impact on the probability of fraud detection, which means that the "risk reduction" effect, not the "window dressing" effect, represents the dominant impact of CSR disclosure on Chinese corporate fraudulent cases. Third, with reference to the provisions of the Securities Law, we subdivide the fraudulent behavior of Chinese listed companies into 9 types and consistent with the method developed in Harjoto study [6], we count the number of violation types committed by corporate fraud to measure the severity of corporate fraud. Using the Poisson distribution model to regression test, we found that the disclosures in corporate social responsibility reports can reduce the severity of corporate fraud and mitigate the negative social impacts. Fourth,

based on total assets, we divide the companies into large-scale companies and small-scale companies to conduct a group regression: we are still able to draw the conclusion that the "risk reduction" effect of CSR disclosure can be expressed in both groups and that CSR disclosure more significantly decreases the propensity of corporate fraud. Furthermore, using different data and methods to test the robustness of the empirical results, we once again confirm that "risk reduction" is the dominant effect of CSR disclosure and that companies that publish CSR reports have less incentives to commit fraud; therefore, the publishing of the CSR report mitigates the severe intensity of corporate fraud.

The rest of the paper is organized as follows: Section 2 describes the theoretical analysis and the research hypothesis; Section 3 presents the variable selection and model setting; Section 4 discusses the hypothesis test and results analysis of the CSR disclosure effect; Section 5 presents the robustness test; Section 6 concludes and proposes policy recommendations.

2. Literature Review and Research Hypotheses

2.1. Literature Review of Corporate Fraud

The existing studies on the analysis of the motivation and the main factors that result in corporate fraud have mainly focused on three perspectives: internal governance, economic cycle and regulatory environment. From the perspective of internal governance, these studies consider the influence of the company's shareholding structure, internal control environment, strategic policy, executive traits and internal relations. Chen et al. [11] asserts that state-controlled enterprises (State), whose controlling shareholders are government departments, are subject to stricter supervision and management and that the possibility of fraud commission for these enterprises is relatively low. Unlike a small-scale company (Size), a large-scale company with a great amount of total assets and very complex business operations and management has a greater tendency to implement fraud. The number of directors on the board (Board) reflects the scale of the company's internal governance, and a certain size of the board structure will reduce financial fraud incidents. Khanna et al. [12] find that if the current CEO of the company also serves as an executive manager (Duality) or has an employment relationship with other executives, the probability of fraudulent behavior will increase significantly. As the company directors' social capital matters, socially connected directors makes the internal relationship of business management more complicated, reducing the probability of a company's fraud being audited and in turn reducing the cost of fraud that the company will suffer. Kuang and Lee [13] examine that chain directors have a certain contagion effect and corporate fraud will be transmitted through the network of chain directors.

From the perspective of the relation between the economic situation and corporate fraud, we should consider the impact of the business cycle or the industry cycle (Tobin's Q) on a company's investment and financing process and the influence of investor cognitive bias. Povel et al. [14] suggest the existence of an inverted U-shaped relationship between the motive of corporate fraud and the industry cycle and that the company will have a strong motive for fraud when its performance is procyclical (rising when the economy is expanding and falling during recessions) as the investors relax their supervision. In addition, Wang [15] points out that an industry's development trend has an influence on corporate fraud and that the relationship is also nonlinear. When investors think that the industry is booming, the company's fraud tendency is rising, but if the degree of prosperity is particularly high, it will reduce the motivation to commit corporate fraud.

From the perspective of the relation between corporate fraud and the regulatory environment, we attempt to analyze industry regulation based on financial indicators and the business activities among markets. Fraudulent companies have better cash assets, a higher level of corporate leverage in China [16] and a lower return on assets [15] than non-fraudulent companies have. Less cash assets and more capital expenditures will lead to a larger uncertainty in future cash flows, thus creating a motive for fraud. When the company's profitability (ROA) is low and the asset-liability ratio (LEV) is high, such companies are considered to be under greater pressure to maintain their financial performance to

obtain more financing. Companies that have mergers and acquisitions cases are subject to scrutiny by the SEC (Securities and Exchange Commission), analysts, institutional investors and social media. M&As receive much more attention and can be more easily observed and regulated. The more active the M&A transactions are, the more easily corporate fraud is detected and punished [15]. In addition, using the volatility of stock prices (VOL) to measure the abnormal fluctuation can often explain the legal risks faced by the company [17]. The sharp fall in stock prices may be caused by insiders selling shares in advance [18], which is often more likely to attract the attention of the market and regulators. If a company creates a higher expectation of its business performance by misleading the market and if the performance realization then turns out to be relatively bad, an abnormal ROA (abROA) occurs. This will attract more attention and investigation from outside investors to determine the reason why the company failed to meet the expected performance and will increase the probability of fraud detection. Based on the above analysis, in this paper, when discussing the effect of CSR disclosure on corporate fraud, we should consider and control the influences of the above factors in order to obtain more stable results.

2.2. Conceptual Framework and Hypothesis Development

Corporate fraud incidents can be divided into two processes: fraud commission and fraud detection. Fraud commission occurs through the behavior of the company's management. The detection of fraud is pursued through the behavior of the regulatory agency and is also affected by the fraud commission. In the statistical analysis, the company's fraud commission behavior cannot be observed directly. We can only observe the case in which the fraudulent behavior has been committed and has subsequently been investigated. This partial observability problem shows that the probability of committing fraud is not the same as the probability of detected fraud [12,13,15]. We believe that the "risk reduction" effect of CSR disclosure affects the process of fraud commission and that the "window dressing" effect of CSR disclosure affects the process of fraud detection. The theoretical analysis and hypothesis development are as follows:

2.2.1. The "Risk Reduction" Effect of CSR Disclosure

We are going to develop the "risk reduction" hypothesis according to the internal and external influences of company that CSR disclosure can reveal. Based on the corporate internal governance analysis, CSR reports reflect the company's corporate ethics culture that will guide the company's executive decision-making behavior in a proper way, and higher ethical standards can consciously prevent fraudulent violations [6,7,19]. Based on the corporate external governance analysis, CSR reports increase the transparency of corporate information, affect external investors and the stakeholders' perception and judgment of company value and company image, and mitigate corporate fraud that may occur due to information asymmetry [2,20].

An analysis shows that the internal effects of CSR disclosures reduce the risk of corporate fraud. The relationship between ethical behavior and corporate culture within the company's internal organization was originally developed from the social psychology literature. Social psychology research finds that group culture influences the group members' individual ethical decision-making [21]. Trevino [22] points out that the thoughts and behaviors of individuals in an organization are influenced by the organization's culture and that individuals can act and behave according to different standards derived from the environment and socialization process in the organization. The economics literature points out that corporate culture is an unwritten cooperation agreement shared and maintained by senior managers and employees [23]. Carroll [24] defines the company's ethical management as a professional behavior in which company managers follow ethical principles and make decisions that are consistent with public recognition. The behavior of company executives reflects the company's social ethics, and the executives are supposed to take an active part in public activities to satisfy the legitimate interests of the company's stakeholders. The existing literature on corporate social responsibility research also shows that there is a correlation

between corporate social responsibility and corporate ethical behavior. Carroll [25] indicates that corporations are responsible for public activities since the society supports corporations to survive and develop. In addition to its economic and legal responsibilities, the enterprise should fulfill its obligation to consider social interests, solve social problems related to the company's business and development, and make independent decisions that follow ethical principles. A strong corporate culture plays an important role in establishing corporate ethical behavior [26], and corporate ethical intensity activities have a significant impact on the company executives' and the employees' own ethical behavior decisions [27]. The lack of social morality behaviors by managers and employees is caused by the failure of the internal organizational culture of the company [28].

Genest [29] indicates that according to employee surveys, corporate social responsibility can reflect the employees' social values. Baumgartner [30] demonstrates the direct link through standardized management practices between corporate culture and corporate social responsibility activities. Enterprises engaged in more charitable donation activities often create a good internal atmosphere in the company and cultivate company employees with a high corporate ethical culture. Social responsibility information disclosure can reflect the moral value of a corporate internal governance culture that guides managers' minds and behaviors, and it will directly or indirectly affect the emergence of corporate fraud violations. Hoi et al. [31] find that the company's exercise of social responsibility is a responsible attitude towards shareholders and stakeholders. This is another manifestation of corporate culture.

Other analyses focus on how the external effects of CSR disclosure inhibit corporate fraud. Making the internal information of corporate governance more transparent and reducing the tendency of executives to use internal information to cover up negative news, the CSR report conveys to the public information that is different from the information in the company's financial report [20]. Kim et al. [19] indicate that if senior management is effectively involved in the disclosure of social responsibility reports, the possibility of earnings manipulation will be avoided as much as possible. On the other hand, since the CSR report releases more nonfinancial information disclosures of the company, demonstrating the company's commitment to investing in and contributing to social welfare, corporations spare no effort to present to the public a good corporate image and to convey the existence of a good corporate ethics culture, which will increase the costs of and reduce the engagement in fraudulent practices caused by information asymmetry, such as internal informed trading, tax evasion [31], and earnings manipulation [19]. Meanwhile, a company's image of social responsibility effectively limits top management's illegal behaviors of selective information disclosure and negative information management. Lizzeri [32] starts his study from the investor's point of view. By understanding the company's nonfinancial information from the social responsibility report, external investors can indirectly observe more information of the corporate internal governance and gain a better sense of the financial stability of the business. This enables the investors to make reasonable investment decisions and the company to maintain a relatively stable financial and profitability level, greatly reducing the risk of corporate fraud caused by the financial crisis. Based on these extant studies, we can form the first hypothesis:

H1: *CSR disclosure helps reduce the incentives for corporate fraud.*

2.2.2. The "Window Dressing" Effect of CSR Disclosure

Quan et al. [33] studying the risk of a stock price collapse, define the CSR reports as a tool for Chinese companies. They indicate that executives use the CSR report to enhance their professional reputation and fulfill their own personal interests but that the usage of the CSR report in this manner potentially threatens the interests of stakeholders. The disclosures of the charitable donations of listed companies can be used to improve company reputation and can then divert public attention to cover up the fraud of the company. Tian et al. [34] also indicate that disclosure of social responsibility information may be used by some companies as a tool to cover up their fraud, divert public attention,

and evade fraud. Therefore, some scholars believe that management discloses social responsibility information in order to whitewash the problems in business operations, that is, the management's actions are manifestations of the "window dressing" effect of CSR disclosure [5,34]. Based on the "window dressing" hypothesis, companies may use the means of publishing social responsibility reports to intentionally conceal and disguise negative news that will not be easily detected by investors or regulators.

However, these existing studies fail to consider that concealing bad news and making false statements about corporate financial status are types of corporate fraud, which will result in stock price volatility more directly than will the release of the CSR report. We believe that the "window dressing" effect of social responsibility information disclosure only affects the process of corporate fraud investigation. The publication of CSR reports by listed companies will increase the company's exposure to the public, thereby increasing the supervision and review by the public, which will increase the possibility of fraud detection and make it difficult to conceal the bad information of the investigation. In addition, note that in the Chinese capital markets, companies that have been investigated for fraudulent violations have been able to improve their credibility and repair their public image by taking on more social responsibilities and paying attention to the social welfare of stakeholders. This approach is reasonable and compliant and is not inconsistent with the research perspective of our analysis. Based on the above mechanism analysis, the second hypothesis of this paper is proposed:

H2: *There is no "window dressing" effect of CSR disclosure, as the CSR report's publication has no effect on increasing the difficulty of fraud detection.*

2.2.3. Further Discussion on the Disclosure Effect of CSR

Corporate fraud is defined as behavior in which the serious consequences are known but that is still engaged in to defraud stakeholders by the provision of intentional fictitious information, concealment or a delay in information disclosure or by other illegal activities related to the company's operations. Using the "Securities Law", "Shanghai Stock Exchange Listing Rules", "Shenzhen Stock Exchange Listing Rules" and the CSMAR listed company fraud database, we subdivide the fraudulent behavior of Chinese listed companies into 9 categories: fictitious profits, false records, postponed disclosures, major omissions, false disclosures, misappropriation of company assets, insider trading, illegal trading of stocks and noncompliance guarantees. Judging from the fraud cases of listed companies that have actually occurred and been investigated by the supervisory authority, the same case often shows multiple types of coexisting fraud. It can also be seen in the descriptive analysis of Tables 2 and 3 that the total number of fraud types committed far exceeds the number of fraudulent cases. This is because in a large number of cases, listed companies do not only commit one type of fraud, and different frauds are interrelated. For example, the misappropriation of company assets, insider trading, and the illegal trading of stocks are often accompanied by false disclosures or concealed disclosures of company information. In the Chinese capital markets, not only are there a large number of companies involved in fraud, but also the severity of the corporate fraud is very serious. Therefore, to define the severity of fraud, we attempt to further identify the types of fraud involved in one fraudulent case [6]. Based on the analysis of the impact mechanism of listed companies' CSR disclosure on corporate fraud as stated in Hypothesis 1 and Hypothesis 2, we assert that the positive effects of CSR disclosure will also affect the severity of corporate fraud. Above all, the third research hypothesis is drawn:

H3: *CSR disclosure helps reduce the severity of corporate fraud.*

The company's size will affect the company's disclosure policy [13,15,19]. On the one hand, there are pressures from the social and regulatory levels. Larger companies often have corporate

demonstration effects, as these companies are frequently exposed to the media and the public. In addition, the relationship between the company's daily economic activities and social interests has received much attention, thus promoting the passive sharing to a certain extent of more social responsibilities. Smaller companies have less external pressure to undertake social responsibility, and their disclosure of social responsibility information more reflects the subjective initiative of the company to actively assume social responsibility. On the other hand, all other things being equal, larger companies enjoy more abundant social resources, can cope with the increased costs of social responsibility, and can thus reduce the additional costs of CSR disclosure. Small companies do not have such resource advantages, and their cost burden of information disclosure is relatively high. Therefore, it is of practical significance to explore the positive effects of CSR disclosure according to different company scales. The disclosure of social responsibility information by smaller companies can reflect that they attach more importance to the construction of corporate ethics culture and can also reflect their subjective willingness to pay more attention to stakeholders' interests. Thus, the fourth hypothesis of this paper is as follows:

H4: *The CSR disclosure of a smaller-scale company has a more pronounced positive effect on reducing corporate fraud than that of a larger-scale company.*

3. Research Methodology

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

3.1. Sample Selection and Data Source

In this section, using the CSMAR (China Stock Market and Accounting Research) Research Data Services database to obtain information on the fraud committed by listed companies, we select the listed companies of the Shanghai and Shenzhen A-shares from 2009 to 2017 as the research object. With reference to the relevant literature, we conduct the following screening and pretreatments. (1) In order to ensure that the financial data of each corporate is available and reliable, we eliminate the stock, bank and financial institution corporates of the financial industry [35]. (2) We remove the samples of ST stocks and the delisted stocks which are financially abnormal and are easily get into business distress. (3) We delete the firm-year observation which has a lot of missing values to maintain the integrity and consistency of the whole sample [36]. (4) Considering to alleviate the interference of the extreme outliers on parameter estimation, we conduct the tailing adjustment (Winsorize) on the continuous variables at two-way 1% quantiles, respectively, to replace the extreme values and get the 1th and 99th percentiles of the variables [35]. Finally, we manually match the company with CSR disclosure data from CSMAR and corporate financial data from the iFind database. As a result, we construct a sample of the annual observations of 16,270 companies and that consists of 2250 fraud cases. We perform the regression analyses on STATA 14.0 software package.

3.1.1. Dependent Variables

With reference to the method of Khanna et al. [12], Kuang and Lee [13], Wang [15], Wang et al. [37], Chen et al. [38], we use the variable Z_{it} to indicate that the listed company has committed fraud and has been detected. When the listed company i is investigated for fraudulent activities in year t, $Z_{it} = 1$; $Z_{it} = 0$ when there is no fraudulent activity.

T_{it} indicates the intensity of the corporate fraud. With reference to the method of Harjoto [6], Cumming et al. [39], we categorize the type of convicted crimes into 9 categories and count the number of types of fraud involved in a case to measure the intensity of corporate fraud: the value of T_{it} is equal to the types of convictions received by company i in year t. By definition, the greater the value

of Tit is the more types of fraud committed by a fraudulent case and the greater the severity of the corporate fraud.

3.1.2. Independent variables

According to the information in the corporate social responsibility report of listed companies in the CSMAR database, we define a binary dumb variable for the CSR disclosure status [2,33,34]. When CSRit equaled one, it indicated that the listed company i had issued a social responsibility report in year t; otherwise, CSRit equaled zero.

Finally, with reference to the relevant study [2,35,40,41] for robustness testing, Runling Global Rating Data (RKS) is used to measure the quality of the corporate social responsibility information disclosure. RKS manages a score system for the different aspects of CSR from the perspective of all stakeholders. RKS Rating score consists of three first-level indicators: "Macrocosm Indicator" (M), "Content Indicator" (C), and "Technique Indicator" (T). "Macrocosm" is composed of three second-level indicators: the overall strategy, governance, and CRS disclosure. "Content" is composed of four second-level indicators: economic performance, labor and human rights, consumption and community participation. "Technique" is composed of three second-level indicators: the depth, coverage, and consistency of CSR report.

3.1.3. Control Variables

Based on the existing research [6,11–15,37,38] and combined with the actual situation of listed companies in China, we include a set of firm-specific variables from perspective of internal governance, financial status, and regulatory environment. We consider that firms has a longer length of time to market (Year) are rich in experience to take the business risk and handle it [6]. When the CEO also serves as the company general manager (Duality), the power of decision-making, strategy execution, and supervision are all given to one person. Since the excessive power of management will weaken the corporate internal control mechanism, the abuse of power or even the cause of illegal behaviors by CEO may occur. Based on this consideration, the situation that the chairman also serves as the general manager (Duality) need to be controlled [11,36].

We believe that state-owned companies (State) and companies that have large number of board directors (Board) are able to perform strong internal governance system, which will reduce the risk of fraudulent behaviors [11–13,38]. While large scale firms (Size) with a great amount of total asset have more complex business operations, it will provide opportunities to commit illegal behaviors. In accordance with the relevant studies of Harjoto [6], Chen et al. [11], Kuang et al. 2017, [13], Chen et al. [38], we select the company research and development expenditure (R&D), profitability ratio (Return on assets, ROA) and abnormal ROA (abROA) to measure corporate operating performance and business condition. And select the amount of Total cash and cash equivalents (Cash), the proportion of total liabilities relative to total assets (Leverage ratio, LEV), the standard deviation of daily stock returns (VOL) to measure corporate financial constraints and future cash flow. Companies facing business difficulties and financial difficulties have the higher risk of corporate fraud. Accordingly, we use the market value of a company divided by its assets' replacement cost to calculate Tobin's Q value. Meanwhile, we control for the auditors' reputation using a dummy variable equals to 1 if the auditor is one of the Big Four auditors (Deloitte, Ernst & Young (EY), KPMG and PricewaterhouseCoopers (PwC)) [6,11,13]. We also control for the type of audit opinion to reflect any unqualified opinion with additional language or an adverse opinion from the auditors (Type) and a dummy variable that equals 1 if the company announce the merger and acquisition event (M&A) [6,15]. Table 1 provides the names, definitions and source of all control variables.

Table 1. Control Variable Definitions.

Variable	Definitions	Source
Year	The number of years since a firm's IPO	iFinD
Duality	Indicator that equals one if a firm's CEO also serves as the general manager from the previous year and zero otherwise	CSMAR
State	A dummy variable that equals 1 if the controlling shareholder is state-owned and zero otherwise	CSMAR
R&D	R&D expenditure divided by total assets from the previous year	iFinD
Board	Natural log of the number of board directors from the previous year	CSMAR
Size	Natural log of total assets from the previous year	iFinD
Tobin's Q	The market value of a company divided by its assets' replacement cost from the previous year	CSMAR
Cash	Total cash and cash equivalents divided by total assets from the previous year	iFinD
LEV	Leverage, defined as total debt divided by total assets, as of the previous fiscal year end	iFinD
ROA	Return on assets, defined as net income before extraordinary items divided by total assets as of the previous fiscal year end	iFinD
Big4	A dummy variable that equals 1 if the firm's auditor is one of the Big Four auditors from the previous year and that equals zero otherwise	iFinD
Type	A dummy variable that equals 1 if the auditor issued an unqualified opinion with additional language or an adverse opinion from the previous year and that equals zero otherwise	iFinD
M&A	A dummy variable that equals 1 if the company announced the merger and acquisition event from the previous year and that equals zero otherwise	CSMAR
abROA	"Abnormal ROA" is defined as the regression residual term εi,t from the previous year, where $ROA_{i,t} = \beta_0 + \beta_1 ROA_{i,t} + \beta_2 ROA_{i,t} + \varepsilon_{i,t}$	Compute
VOL	The standard deviation of daily stock returns from the previous year	iFinD

3.2. Model Specification

3.2.1. Bivariate Probit Model with Partial Observability

According to the above analysis, fraud commission and fraud detection are two distinct but interrelated processes of corporate fraud. We can only observe the fraud that has been committed and subsequently been detected, referring to the simultaneous occurrence of the two processes. According to Chen [42], the probability of the simultaneous occurrence of the two variables should be estimated by the Bivariate Probit model. Since it is impossible to count the amount of fraud committed by companies that have not been investigated for fraudulent behavior, the Bivariate Probit model with partial observability is needed for accurate estimation. Therefore, we should use this model to verify Hypothesis 1 and Hypothesis 2 [12,13,15,37,38]. Let F_i denote the occurrence of a fraudulent event and D_i denote the detection of the fraudulent event. $F_i = 1$, indicating that the company i actually has committed fraud; otherwise $F_i = 0$; $D_i = 1$ indicates that the fraudulent behavior of company i has been detected; otherwise, $D_i = 0$. Therefore,

$$F_i = x_{F,i} b_F + m_i \quad (1)$$

$$D_i = x_{D,i} b_D + n_i \quad (2)$$

Let μ_i and ν_i represent the residuals of the two equations, and assume that they follow a normal distribution. If the two processes affect each other, the correlation coefficient $\rho \neq 0$.

Let $Z_i = F_i \times D_i$ denote the situation when F_i and D_i occur at the same time. In reality, only $Z_i = 1$ can be observed, that is, the company has a fraudulent operation and it has been detected; Alternatively, $Z_i = 0$, that is, the company has no fraudulent behavior, or the company fraud has not been investigated. Let Φ denote the cumulative distribution function of the standardized two-dimensional normal distribution. Then, the expressions of the probability of Z's occurrence are

$$P(Z_i = 1) = P(F_i D_i = 1) = P(F_i = 1, D_i = 1) = \Phi(x_{F,i}, \beta_F, x_{D,i}, \beta_D, \rho) \quad (3)$$

$$P(Z_i = 0) = P(F_i D_i = 0) = P(F_i = 0, D_i = 0) + P(F_i = 1, D_i = 0) = 1 - \Phi(x_{F,i}, \beta_F, x_{D,i}, \beta_D, \rho) \quad (4)$$

The log likelihood function for this model is:

$$\begin{aligned} &L(\beta_F, \beta_D, \rho = 0) = \sum \log(P(Z_i = 1)) + \sum \log(P(Z_i = 0)) \\ &= \sum \{Z_i \log[\Phi(x_{F,i}, \beta_F, x_{D,i}, \beta_D, \rho)] + (1 - Z_i) \log[1 - \Phi(x_{F,i}, \beta_F, x_{D,i}, \beta_D, \rho)]\} \end{aligned} \quad (5)$$

The parameter estimation of the model is performed by the maximum likelihood of the function.

Therefore, the probability of event Z's occurrence can be expressed as follows: P(Z) = P(F)P(D | F). To fully recognize the two processes, the variables contained in $x_{F,i}$ and $x_{D,i}$ need to be defined and distinguished. In addition, fraud commission and fraud detection are two interrelated processes. We shall divide the influence factors into three categories: factors that affect the probability of fraud commission P(F) alone, factors that affect the probability of fraud detection P(D | F) alone, and factors that can affect the two process simultaneously. The concrete explanation of these influence factors is as follows.

The factors that affect the probability of corporate fraud, that is, the variables that only affect the estimation equation of P(F), include the disclosure of corporate social responsibility mainly explored in this paper, as well as other specific corporate characteristics and financial indicators, such as the length of time to market (Year), the position of executives (Duality), the nature of the company (State), cash status (Cash), R&D investment (R&D), liabilities (LEV) [23], profitability (ROA) [12,19] and audit unit (Big4) [6,19]. All of these factors influence the propensity and motivation to engage in corporate fraud behavior.

The factors that affect the probability of fraud detection, that is, the variables that only affect the estimation equation of P(D | F), mainly include variables that are difficult to control within the company but can be observed and discovered by the regulator, such as the type of audit opinion (Type), M&A activity, fluctuations in stock returns (VOL), and excess asset returns (abROA). The negative items or materials cited by the auditor, such as misreporting, underreporting, and unqualified assessments, will attract the attention of a regulator [6]. Abnormal fluctuations of corporate profitability and stock prices [27] and M&A activities expose the company to social concerns and increase its chances of being monitored, which will in turn increase the probability of fraud detection [15].

Factors that affect the fraud commission and fraud detection simultaneously, that is, the variables appearing in the P(F) and P(D | F) estimation equations at the same time include, in particular, the ex-ante factors of fraud, such as company size (Size), board size (Board), and the company's Tobin's Q ratio, which not only affect the company's fraud tendency but also attract the attention of regulators. Large-scale companies have relatively perfect internal governance and supervision mechanisms and have large social resources and relationship networks to deal with risks and resolve crises [13,15,19] In these companies, the boards of directors are large in scale, and the checks and balances of internal rights are more closely regulated. At the same time, the media and the public are highly concerned with the activities of these companies [12,13], Tobin's Q, which reflects the overall business performance and capabilities of the company, will affect the company's tendency for fraud commission and the possibility of fraud investigations [14].

Here, we can conclude that the estimation equations for Hypothesis 1 and Hypothesis 2 are as follows:

$$\begin{aligned} F_{i,t} = {} & \alpha_0 + \alpha_1 CSR_{i,t-1} + \alpha_2 Year_{i,t-1} + \alpha_3 Duality_{i,t-1} + \alpha_4 State_{i,t-1} + \alpha_5 R\&D_{i,t-1} + \alpha_6 Cash_{i,t-1} \\ & + \alpha_7 Big4_{i,t-1} + \alpha_8 LEV_{i,t-1} + \alpha_9 ROA_{i,t-1} + \alpha_{10} Size_{i,t-1} + \alpha_{11} Board_{i,t-1} + \alpha_{12} Tobin'sQ_{i,t-1} + \varepsilon_{i,t-1} \end{aligned} \quad (6)$$

$$\begin{aligned} D_{i,t} = {} & \beta_0 + \beta_1 CSR_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Board_{i,t-1} + \beta_4 Tobin'sQ_{i,t-1} + \beta_5 Type_{i,t-1} + \beta_6 M\&A_{i,t-1} \\ & + \beta_7 VOL_{i,t-1} + \beta_8 abROA_{i,t-1} + \varepsilon_{i,t-1} \end{aligned} \quad (7)$$

When investigating the occurrence of fraud and auditing, we analyze the impact of ex-ante factors. All explanatory variables and control variables are treated with lag phase one.

3.2.2. Poisson Regression Model

For the verification of Hypothesis 3, the severity of the dependent company fraud ($T_{i,t}$), which is a nonnegative count dependent variable, is reflected by counting the total number of fraud types committed by a company. Woodridge [43] pointed out that the count variable has nonnegative, discrete and finite features, consistent with the characteristics of the Poisson distribution (only continuous variables can follow the normal distribution). The analysis of the count data is performed using Poisson regression. Taking the CSR disclosure as the main explanatory variable and considering the other relevant factors as control variables, the estimation equation of Hypothesis 3 can be obtained as follows:

$$T_{i,t} = \gamma_0 + \gamma_1 CSR_{i,t-1} + \sum_{j=2}^{n} \gamma_j Control\ Variables_{i,t-1} + \varepsilon_{i,t-1} \quad (8)$$

When examining the number of types of fraud involved, the effect of pre-existing factors on the estimation equation is considered. All explanatory variables and control variables are treated with a lag phase.

4. Discussion

4.1. Descriptive Statistical Analysis

According to the definition and analysis of the fraudulent behaviors of listed companies in Section 2, we remove the cases that are illegal but not fraudulent, leaving a total of 2,250 corporate fraud cases. Table 2 summarizes the distribution of CSR disclosure and corporate fraud incidents of listed companies in different years in China. It can be noted that the proportion of listed companies that publish CSR reports has increased year by year but is still at a low level. Over the years, the proportion of corporate fraud has always remained at a high level.

Table 2. Annual distribution statistics of the overall sample.

Year	Corporate Fraud	Year	CSR
2009	7.71%	2008	10.30%
2010	6.49%	2009	21.73%
2011	8.61%	2010	29.03%
2012	13.12%	2011	28.70%
2013	14.60%	2012	29.39%
2014	15.10%	2013	30.19%
2015	21.97%	2014	30.70%
2016	18.13%	2015	31.52%
2017	15.26%	2016	31.41%

Table 3 lists the 9 categories of fraudulent behaviors and the proportion of each type of fraud. In general, companies with false records, postponed disclosures, major omissions, and illegal trading of stocks accounted for more than 30% of all fraud types. Other types of fraud are also more than 5%, which indicates that there are many forms of fraud in the Chinese capital markets. There is no dominant type of fraud, and often a case involves multiple types of fraud. Considerable supervision difficulties have emerged, as regulatory resources are limited and regulators cannot concentrate on certain types of fraud.

The sixth and seventh columns group the sample according to the dependent variables Z = 1 and Z = 0. We exhibit the mean of the variables under the occurrence of fraud and no fraud. From the comparison of the two columns of data, we find that the mean value of the CSR report disclosure, the state-owned enterprise nature, the cash assets, the four major audits, the company size, and the asset return rate of the fraudulent incident company are smaller than those of the company without fraud. However, the mean value of firm age, the duality, the R&D investment, the Tobin's q value,

the leverage ratio, the audit opinion type, the merger and acquisition reorganization, the stock price volatility, and the abROA of the fraudulent incident company are larger than those of the company without fraud. The seventh column reports the value of the t-test for mean differences between groups. Except for the R&D input variables, the t-test values for the mean difference between the groups of all other independent variables reached at least a 5% significance level. It is worth mentioning that the mean value of the CSR report's disclosures by the company's fraud sample group is 0.2099, which is lower than the overall sample mean level, indicating that the fraudulent company cannot fulfill its obligation to disclose and publish the CSR report. As this reflects a problem in the corporate ethics culture and the supervision system, we attempt to examine this problem.

Table 3. The Distribution Statistics of the Violation Types of Listed Companies.

Types of Fraud	Corporate Fraud
Fictitious Profits	5.97%
False Records	31.34%
Postponed Disclosures	54.86%
Major Omissions	46.82%
False Disclosure	16.28%
Misappropriation of company assets	6.94%
Insider trading	5.51%
Illegal Trading of Stocks	35.89%
Noncompliance Guarantees	4.04%

The descriptive statistics of the main variables are presented in Table 4. To reduce the influence of outliers on the regression coefficients, this study performed a 1% level of winsorizing on the extreme values on both sides of the sample distribution. The first column in Table 4 is the variable symbol, and the second to fifth columns report the mean, standard deviation, minimum, and maximum values, respectively, of our 16270 sample observations. Among them, the average value of CSR report disclosure is 0.2773, which means 27.73% of the listed companies in the sample disclosed information in their CSR report. The standard deviation is 0.4477, reflecting the low degree of CSR report disclosure in our country.

Table 4. Descriptive Statistics of the Sample.

Variables	All Sample				Z = 0	Z = 1	T-Test
	Mean	Std.	Min.	Max.	Mean	Mean	
CSR	0.2773	0.4477	0	1	0.2883	0.2099	0.0783 ***
Age	10.8112	6.0172	1	26	10.7596	11.1275	−0.3679 ***
Duality	0.1999	0.4000	0	1	0.1930	0.2427	−0.0497 ***
State	0.4902	0.4999	0	1	0.5093	0.3732	0.1361 ***
R&D	0.0114	0.0184	0	0.5629	0.0109	0.0112	−0.0003
Cash	0.1532	0.1283	−0.0072	0.6074	0.1541	0.1386	0.0156 ***
Big4	0.0614	0.2400	0	1	0.0667	0.0290	0.0376 ***
LEV	0.4867	0.2245	0.0585	1.2226	0.4810	0.5216	−0.0405 ***
ROA	0.0571	0.0695	−0.1976	0.3014	0.0594	0.0428	0.0166 ***
Size	22.0254	1.3320	18.8556	25.9240	22.0574	21.82	0.2277 ***
Board	2.1656	0.2020	1.0986	2.8904	2.1685	2.1477	0.0208 ***
Tobin's Q	2.1238	2.1269	0.1993	13.4141	2.0728	2.4420	−0.3692 ***
Type	0.0518	0.2216	0	1	0.0395	0.1266	−0.0871 ***
M&A	0.4968	0.5000	0	1	0.4921	0.5259	−0.0338 ***
VOL	2.9941	0.9061	1.2389	5.3134	2.9966	2.9987	0.0179 **
abROA	−0.0029	0.0686	−0.2543	0.2444	−0.0007	−0.0167	0.0159 ***

The first column is the variable name, and specific definitions of each variable are shown in Table 3. From the second to fifth columns are the mean, standard deviation, minimum and maximum values of the overall sample, respectively, and the sixth and seventh columns are the sample mean value of Z = 1 and Z = 0, respectively. The eighth column is the t-test value of the sample mean difference. ** denotes significance at 5%; and *** denotes significance at 1%.

Table 5 gives the results of the correlation coefficients between the dependent variables (Fraud and T_Fraud) and corporate social responsibility and the other control variables. The second column and the fourth column in Table 5 show that there is a negative relationship between CSR disclosure and corporate fraud and that there is also a negative relationship between CSR disclosure and the severity of fraud. Other control variables can also be a good explanation. In addition, in Table 5, we only summarize the results of the correlation analysis between corporate social responsibility and control variables. The unreported results show that the correlation coefficients between the independent variables are less than 0.3; the correlation is not strong and will not affect the significance of parameters in the model [36,41].

Table 5. Correlation Coefficients.

Variables	F (Fraud)	Variables	T (T_Fraud)
F	1	T	1
CSR	−0.0608 ***	CSR	−0.0527 ***
Age	0.0212 ***	Age	0.0302 ***
Duality	0.0432 ***	Duality	0.0330 ***
State	−0.0946 ***	State	−0.0742 ***
R&D	0.0068	R&D	−0.0033 *
Cash	−0.0442 ***	Cash	−0.0512 ***
Big4	−0.0545 ***	Big4	−0.0488 ***
LEV	0.0627 ***	LEV	0.0721 ***
ROA	−0.0831 ***	ROA	−0.0993 ***
Size	−0.0594 ***	Size	−0.0560 ***
Board	−0.0357 ***	Board	−0.0441 ***
Tobin's Q	0.0599 ***	Tobin's Q	0.0604 ***
Type	0.1365 ***	Type	0.1644 ***
M&A	0.0235 *	M&A	0.0271 ***
VOL	−0.0069 *	VOL	−0.0041
abROA	−0.0806 ***	abROA	−0.0956 ***

*, **, and *** indicate the level of significance of 10%, 5%, and 1%, respectively.

4.2. Regression Results

4.2.1. CSR Disclosure Effect

We utilize the Bivariate Probit model with partial observability to conduct an empirical test for Hypotheses H1 and H2. The regression estimation results are shown in Table 6. The first column is the independent variable of the empirical analysis, and the model 1 is the preliminary estimation using the Probit regression. When excluding the effect of other control variables, the model shows that the disclosure of corporate social responsibility reports was negatively correlated with the probability of fraud and that the significance reached 1%. Therefore, it is feasible to use the CSR report disclosure as the main explanatory variable of this paper. Column 3 shows the marginal effect of each variable at the sample mean. Model 2 is the estimation of the Bivariate Probit model with partial observability, column 4 is the estimation of the process of fraud commission and column 5 is the estimation of the process of fraud detection. In the regression results of model 2, after the control variable constraint is introduced, the influence coefficient of the main explanatory variable CSR is −0.0722, the marginal effect of the mean is negative, and the coefficient is −0.0247. We can conclude that CSR disclosure will significantly reduce the corporate fraud tendency and that a higher CSR disclosure causes a lower probability of fraud commission.

As for the impact of various control variables, the regression results are consistent with the relevant conclusions of the existing literature. Column 4 in Table 6 shows that the company's controlling shareholder (State), the cash asset scale(Cash), the return on assets (ROA), and "big four" audit (Big4) are significantly negatively correlated with the probability of fraud commission, while the firm age (Year), the executives' duality (Duality), and the asset-liability ratio (LEV) were significantly positively

correlated with the probability of corporate fraud. This is consistent with the research of existing researches [15,16,18]. According to the results in column 5, we find that M&A activity (M&A), the type of audit opinion (Type) and the Tobin Q ratio are significantly positively correlated with the probability of fraud detection. In Chinese capital markets, social media is highly concerned with the company's M&A activities and firms with higher M&A activities have a greater likelihood of fraud detection. Attracting more attention from regulatory bodies, the auditing opinions of professional institutions are highly authoritative. If the market value and replacement cost deviate too much, companies are more likely to be subject to stronger external regulation, as the regulatory authorities can easily detect and discover these abnormalities [6,15].

Table 6. Bivariate Probit for the Probability of Fraud.

Variables	Model 1		Model 2		Model 3	
	P(Fraud)	MFX	P(F)	P(D | F)	P(F)	P(D | F)
CSR	−0.1202 ***	−0.0247 ***	−0.0771 ***		−0.2072 **	0.1681
	(−3.67)	(−3.29)	(−2.68)		(−1.75)	(1.11)
Age	0.0069 ***	0.0016 ***	0.0051 **		0.0049 **	
	(2.91)	(2.93)	(2.44)		(2.42)	
Duality	0.0741 **	0.0164 **	0.0512 **		0.0490 **	
	(2.33)	(2.15)	(2.03)		(2.01)	
State	−0.2992 ***	−0.0697 ***	−0.2173 ***		−0.2086 ***	
	(−10.49)	(−9.92)	(−4.68)		(−4.95)	
R&D	1.9102 **	0.28104	0.8762		0.8464	
	(2.23)	(1.32)	(1.37)		(1.37)	
Cash	−0.2831 **	−0.0637 **	−0.1987 **		−0.1909 **	
	(−2.41)	(−2.33)	(−2.21)		(−2.20)	
Big4	−0.3289 ***	−0.0595 ***	−0.1855 ***		−0.1772 ***	
	(−4.96)	(−3.85)	(−2.77)		(−2.88)	
LEV	0.2897 ***	0.1173 ***	0.3658 ***		0.3620 ***	
	(4.21)	(5.47)	(6.03)		(6.17)	
ROA	−1.1907 ***	−0.2396 **	−0.7470 **		−0.7886 ***	
	(−5.78)	(−1.97)	(−2.22)		(−2.37)	
Size	0.0210	0.0067 *	0.1864 ***	−0.2172 ***	0.1931 ***	−0.2294 ***
	(1.49)	(1.91)	(4.34)	(−4.79)	(4.47)	(−4.92)
Board	0.0010	−0.0003	−0.5176 **	0.6788 ***	−0.5093 **	0.6722 ***
	(0.01)	(−0.02)	(−2.54)	(2.70)	(−2.52)	(2.68)
Tobin's Q	0.0261 ***	0.0172 ***	−0.0030	0.0741 ***	−0.0025	0.0736 ***
	(3.65)	(5.07)	(−0.19)	(2.48)	(−0.17)	(2.58)
Type	0.5064 ***	0.3134 **		1.2835 **		1.3208 **
	(8.60)	(2.31)		(2.37)		(2.29)
M&A	0.0749 ***	0.0121 **		0.0495 **		0.0462 *
	(2.94)	(2.00)		(1.76)		(1.71)
VOL	−0.0342 **	−0.0139 ***		−0.0570 ***		−0.0556 ***
	(−2.32)	(−0.67)		(−3.33)		(−3.43)
abROA				−0.3775		−0.2565
				(−0.64)		(−0.44)
Constant	−1.5428 ***		−0.3551 ***	3.9639 ***		4.2508 ***
	(−4.75)		(−3.91)	(3.37)		(3.56)
Observations	16270		16270		16270	
Wald chi2	520.47		126.14		138.06	
Prob > chi2	0.0000		0.0000		0.0000	
Log likelihood	−6266.3426		−6235.1044		−6234.3758	

Each independent variable corresponds to two rows of results: the first row is the coefficient value, and the second row is the z-test value. * denotes significance at 10%; ** denotes significance at 5%; and *** denotes significance at 1%.

In addition, we can still conclude that larger-size companies have a higher probability of fraud commission and a lower probability of fraud detection. Larger firms with more complex operations provide opportunities for executives to commit fraud. Firms with a larger board size have a lower probability of fraud commission and a higher probability of fraud detection. This suggests that the strong internal governance structure of the board will reduce the possibility of fraud. In addition, companies with larger board sizes are more likely to attract public attention, and once management conducts fraudulent operations, it is more likely that these operations will be exposed. Overall, the regression results of Model 2 confirm that Hypothesis 1 is established: CSR disclosure will effectively reduce the probability of fraud commission, while not changing the significance and explanatory power of the other control variables.

In Model 3, to examine the "risk reduction" and "window dressing" effect of CSR disclosure simultaneously, we assume that the CSR disclosure can also affect the fraud detection process. The results are shown in Table 6. The test results of Model 3 show that CSR disclosure is negatively related to the probability of fraud and positively related to the probability of fraud detection, indicating that CSR disclosure increases corporate information transparency and social media exposure and then increases the possibility of being supervised and investigated. Although the positive impact of CSR disclosure on the company's fraud investigation process has not reached the 10% significance level, the empirical results do not show the existence of a "window dressing" effect. Therefore, we cannot consider the CSR report's disclosures as a tool for hiding the company's negative news in order to reduce the likelihood of fraud detection. Therefore, we can confirm that Hypothesis 2 is established.

4.2.2. CSR Disclosure and the Intensity of Fraud

According to the analysis of Tables 2 and 3 above, the total number of fraud types far exceeds the number of corporate fraud cases, indicating that a fraud case does not involve only one type of fraud and that there are interactions between different types of fraud. For example, illegal transactions that infringe on investor rights are often accompanied by false disclosures or concealed disclosures of company information. Therefore, the sample of research analysis can not only stay in a single fraud case of a single company but also has to further identify the types of fraud involved in one fraud case. Here, we count the types of fraud to measure the intensity of fraud and focus on the impact of CSR disclosure on the degree of corporate fraud severity. The Poisson regression model is used to test Hypothesis 3, and Table 7 shows the regression estimation results. The first column is the independent variable of empirical analysis, the second column is the coefficient estimated by Poisson regression, the third column is the calculation of the average marginal effect, and the fourth column is the value of the incidence rate ratio, indicating the times that the dependent variable changes as the explanatory variable changes one unit. When controlling the governance structure and financial indicator variables of the listed companies, CSR report disclosure has a negative correlation with the degree of corporate fraud intensity: the coefficient is −0.2207, and the significance reaches 1%. The coefficient of the average marginal effect is −0.077, and the IRR coefficient is 0.8019, indicating that firms with disclosures in their CSR report will reduce the number of fraud types by 20.8%. Overall, the regression results in Table 7 are consistent with the main conclusions of Harjoto [6]. The disclosure of social responsibility information by listed companies will effectively reduce the type of fraud and reduce the severity of corporate fraud, which confirms the rationality of Hypothesis 3.

Table 7. Poisson Regression for the T_Frauds.

Variables	T_Fraud	MFX	IRR
CSR	−0.2207 ***	−0.0770 ***	0.8019 ***
	(−3.01)	(−3.01)	(−3.01)
Age	0.0146 ***	0.0051 ***	1.0146 ***
	(2.89)	(2.89)	(2.89)
Duality	0.1126 *	0.0393 *	1.1192 *
	(1.74)	(1.74)	(1.74)
State	−0.4867 ***	−0.1699 ***	0.6146 ***
	(−7.98)	(−7.80)	(−7.98)
R&D	3.0455 *	1.0630 *	21.02047 *
	(1.86)	(1.86)	(1.86)
Cash	−0.7040 ***	−0.2457 ***	0.4946 ***
	(−2.76)	(−2.75)	(−2.76)
Big4	−0.8615 ***	−0.3007 ***	0.4225 ***
	(−5.42)	(−5.34)	(−5.42)
LEV	0.3884 ***	0.1356 ***	1.4230 ***
	(2.83)	(2.82)	(2.83)
ROA	−2.2906 ***	0.7995 ***	0.1012 ***
	(−5.18)	(−5.10)	(−5.18)
Size	0.0629 **	0.0219 **	1.0649 **
	(2.18)	(2.18)	(2.18)
Board	−0.2493 *	−0.0870 *	0.7793 *
	(−1.82)	(−1.81)	(−1.82)
Tobin's Q	0.0327 **	0.0114 **	1.0333 **
	(2.39)	(2.37)	(2.39)
Type	0.9454 ***	0.3301 ***	2.5745 ***
	(8.03)	(7.78)	(8.04)
M&A	0.2006 ***	0.0700 ***	1.2221 ***
	(3.66)	(3.74)	(3.66)
VOL	−0.0417	−0.0114 **	0.9591
	(−1.43)	(−1.43)	(−1.43)
Constant	−1.9451 ***		0.1430 ***
	(−2.92)		(−2.92)
Observations	16,270	16,270	16,270
Wald chi2	646.98		646.98
Prob > chi2	0.0000		0.0000
Log likelihood	−14,703.15		16,270

Each independent variable corresponds to two rows of results: the first row is the coefficient value, and the second row is the z-test value. * denotes significance at 10%; ** denotes significance at 5%; and *** denotes significance at 1%.

4.2.3. The Impact of CSR Disclosure on Companies of Different Sizes

Exploring the effect of corporate social responsibility information disclosure according to different company scale levels is a further supplement to Hypothesis 1 and Hypothesis 2. We define the average value of total assets in the overall sample as the grouping standard. The overall sample is divided into two groups, with companies with total assets above the average level belonging to the large-scale group and companies with total assets below the average level belonging to the small-scale group. Using the two groups of samples, we utilize the bivariate Probit model and the Poisson model again to test Hypotheses H1 and H3. It can be seen from the regression results in Table 8 that whether it is in a large-scale company or a small-scale company, the disclosure of social responsibility reports is negatively correlated with the probability of fraud and the degree of fraud intensity. We can again conclude that CSR disclosure has a negative impact on corporate fraud, which supports the "risk reduction" hypothesis. If we further study the empirical results, we find that the level of significance of small-scale companies is higher than that of the large-scale companies. This phenomenon exists because large-scale companies have high public attention, rich social resources, and complex internal

relationships. The information effect of publishing and disclosing social responsibility reports will be less significant for a large company than for a small company. Small-scale companies do not have many social resources and their cost of CSR disclosure is relatively high. The disclosure of social responsibility information by smaller companies can reflect that they attach more importance to the construction of corporate ethical culture. They are more willing to undertake social responsibility and concern the interests of stakeholders. Therefore, Hypothesis 4 is proved.

Table 8. The Results of CSR Disclosure Effects on Different Company Sizes.

Variables	Large-Scale Company			Small-Scale Company		
	Bivariate Probit		Poisson	Bivariate Probit		Poisson
	P(F)	P(D | F)	T_Fraud	P(F)	P(D | F)	T_Fraud
CSR	−0.1615 *		−0.1681 *	−0.1091 **		−0.1818 **
	(−1.17)		(−1.88)	(−2.28)		(−1.46)
Control Variables	V	V	V	V	V	V
Constant	1.9661 *	−1.6869 *	−1.9309 *	9.6113	−7.7653	−5.6007 ***
	(0.21)	(−0.30)	(−1.56)	(4.24)	(−5.09)	(−4.47)
Observations	7699		7699	8571		8571
Wald chi2	39.29		281.84	158.94		404.13
Prob > chi2	0.0040		0.0000	0.0000		0.0000
Log likelihood	−2745.1133		−6118.9486	−3481.5227		−8494.7477

Each independent variable corresponds to two rows of results: the first row is the coefficient value, and the second row is the z-test value. * denotes significance at 10%; ** denotes significance at 5%; and *** denotes significant at 1%.

5. Robustness test

5.1. Test the Interpretation Power of CSR Variable

During the hypothesis testing process, in order to highlight the importance of the publication of social responsibility reports by listed companies, we define the CSR disclosure as (0,1) dummy variables for an empirical analysis. Referring to the existing research on corporate social responsibility, most scholars use the Corporate Social Responsibility Rating Score (RKS) given by a third-party organization (Runling Global) as a proxy variable to measure the quality of social responsibility information disclosure of listed companies [2,33,35,36,40,41]. To ensure the full reliability of our research results, we combine the 2009–2016 corporate social responsibility score to examine the quality of information disclosure as a supplement to the previous conclusions. By introducing companies that have not disclosed social responsibility, we test the overall sample to determine whether the "risk reduction" effect of CSR disclosure is still effective.

Table 9 shows that CSR disclosure is negatively correlated with fraud commission and the intensity of corporate fraud and that the "risk reduction" effect of social responsibility information disclosure is significant, which is consistent with our conclusions. A firm's higher CSR score reflects the company's better social morality and better performance on social responsibility information disclosure, which helps to reduce the probability of fraud commission and reduce the severity of corporate fraud.

Table 9. The Results of Social Responsibility Rating Scores and Corporate Fraud.

Variables	Probit	Bivariate Probit		Poisson
	Y	P(D)	P(D | F)	T_Fraud
CSRS	−0.2669 ***	−0.1923 **		−0.6277 ***
	(−3.28)	(−2.27)		(−3.56)
Age	0.0058 **	0.0054 **		0.0110 **
	(2.36)	(2.16)		(2.13)
Duality	0.0738 **	0.0591 **		0.1096 *
	(2.26)	(1.96)		(1.67)
State	−0.2964 ***	−0.2521 ***		−0.4787 ***
	(−9.99)	(−4.23)		(−7.63)
R&D	0.9754	0.4393		1.1997
	(1.12)	(0.59)		(0.72)
Cash	−0.2952 **	−0.2362 **		−0.7079 ***
	(−2.43)	(−2.24)		(−2.69)
Big4	−0.2864 ***	−0.2038 ***		−0.7406 ***
	(−4.18)	(−2.57)		(−4.57)
LEV	0.3263 ***	0.4011 ***		0.5249 ***
	(4.47)	(5.67)		(3.56)
ROA	−1.1509 ***	−0.7329 **		−2.3003 ***
	(−5.19)	(−2.08)		(−4.83)
Size	0.0085	0.1833 ***	−0.2197 ***	0.0313
	(0.56)	(4.03)	(−4.51)	(1.00)
Board	0.0032	−0.5716 ***	0.7541 ***	−0.2351 *
	(0.05)	(−2.72)	(2.91)	(−1.68)
Tobin's Q	0.0172 **	−0.0026	0.0651 **	0.0144
	(2.31)	(−0.17)	(2.22)	(0.96)
Type	0.5256 ***		1.3954 ***	0.9617 ***
	(8.57)		(2.66)	(8.04)
M&A	0.0763 ***		0.0659 **	0.1987 ***
	(2.90)		(1.89)	(3.54)
VOL	−0.0040		−0.0277 ***	0.0402
	(0.24)		(−1.47)	(1.22)
abROA			0.5586	
			(−0.85)	
Constant		−3.1373 ***	3.6795 ***	−1.4465 ***
		(−2.86)	(2.90)	(−2.04)
Observations	14,881	14881		14,881
Wald chi2	468.39	112.38		603.85
Prob > chi2	0.0000	0.0000		0.0000
Log likelihood	−5887.6467	−5864.869		−13,927.843

Each independent variable corresponds to two rows of results: the first row is the coefficient value, and the second row is the z-test value. * denotes significance at 10%; ** denotes significance at 5%; and *** denotes significance at 1%.

5.2. PSM Test for "Risk Reduction" Effect

The panel data that is used in our empirical analysis is a nonrandom observation sample, that is, the financial data of each company in a year is not randomly distributed. Since only the specific indicators of each company in a certain year can be observed, we cannot observe any other possible financial status of this company in that certain year. Rosenbaum & Rubin [44] pointed out that this non-randomly acquired indicator will have a selective bias. In addition, the unbiased estimation of the coefficients will confuse the relationship between the main explanatory variable and the dependent variable. In our study, the coefficient of CSR might not accurately measure the "net effects" between CSR disclosure and the probability of corporate fraud [45,46]). Therefore, it might be arbitrary to assume that the disclosure of CSR will directly affect the probability of corporate fraud without considering the complex differences between control variables. To eliminate the sample selectivity bias

and further clarify the causal relationship between CSR disclosure and corporate fraud, the propensity score matching method (PSM) is used for our robustness testing.

First we utilize logit regression to estimate the grouping variable (dummy variable) to obtain the propensity score. The corresponding control variables of each sample with similar propensity scores have similar influence trends, and the differences among control variables are eliminated. Finally, the matched samples are again subjected to regression to investigate the causal relationship of research concerns [45]. In our study, we use the PSM method to match the company that issues the CSR report with the company that did not publish the CSR report and ensure that their propensity value (that is, the probability of issuing the social responsibility report) is the same or similar. Then, we obtain the two sets of samples: CSR disclosure (the experiment group) and CSR nondisclosure (the control group). In this way, the interference by control variables can be controlled if the propensity value of each sample is approximately equal to each other. In addition, the difference in the probability of fraud between the two groups can only be attributed to the difference between the experimental group and the control group, that is, whether or not the social responsibility information disclosure is performed. When the PSM operation is performed by software, the weighting index of each sample is generated while obtaining the propensity value of each sample and can be used in the subsequent causal regression test. Table 10 shows results of the regression from using the PSM method: we define the weight indicators of each sample according to the propensity value. In addition, the selective bias and trend difference of the control variables is eliminated.

Table 10. PSM Method for Determining the Probability of Corporate Fraud.

Variables	PSM Probit		PSM Poisson	
	Fraud	z-Value	T_Fraud	z-Value
CSR	−0.1699 ***	−5.40	−0.3201 ***	−4.72
Age	0.0153 **	6.23	0.0356 ***	7.21
Duality	−0.0369 *	−1.04	−0.0852	−1.18
State	−0.2866 ***	−9.90	−0.4662 ***	7.92
R&D	1.8415 **	2.03	2.8555	1.53
Cash	−0.5550 ***	−4.51	−0.9900 ***	−3.99
Big4	−0.2509 ***	−3.31	−0.6261 ***	−3.12
LEV	0.2058 ***	2.68	0.7993 ***	4.62
ROA	−1.0940 ***	−5.34	−2.5219 ***	−6.07
Size	−0.0992 ***	−6.26	−0.1707 ***	−4.79
Board	−0.2634 ***	−3.93	−0.4255 ***	−2.95
Tobin's Q	0.0309 ***	3.72	0.0962 ***	3.94
Type	0.6367 ***	8.87	0.6397 ***	4.84
M&A	0.1397 ***	5.27	0.3733 ***	6.31
VOL	0.0144	0.97	−0.0913 **	−2.50
Constant	1.5794 ***	4.50	3.2969 ***	4.34
Observations	16,045		16,045	
Wald chi2	532.21		497.75	
Prob > chi2	0.0000		0.0000	
Log likelihood	−6042.3021		−13,440.777	

*, **, and *** indicate the level of significance of 10%, 5%, and 1%, respectively.

Table 10 implies that CSR disclosure is negatively related with fraud and the severity of fraud and that the coefficients are −0.1699 and −0.3201. In the previous Tables 6 and 7, the regression coefficients of CSR are −0.1202 and −0.2207, respectively. Comparing the different result, we find that after removing the confusion of control variables, the coefficient of CSR decreases and the "risk reduction" effect of CSR disclosure has been improved. Corporate social responsibility report release and information disclosure can effectively reduce the probability of corporate fraud and mitigate the severity of corporate fraud. The results from the PSM method are also consistent with our results in Section 4.

5.3. Interpretation of Local Sample Observability by the Poisson Model

In the empirical test of Hypothesis 1 and Hypothesis 2, the partially observable bivariate probit model is used to better solve the problem of partial observability. For Hypothesis 3, this partial observability problem still exists. To solve this problem, we define a subsample group that only contains companies that have committed fraud and have been detected, while the fraud companies that have not been investigated can be eliminated. In this subsample, we repeat the empirical method of examining Hypothesis 3, and the regression results are listed in Table 11. The regression coefficient of CSR is −0.8066, the marginal effect is −0.2036, and the IRR value is 0.9225. CSR disclosure is negatively related to the severity of corporate fraud and the average number of fraud types in companies that make CSR disclosures is reduced by 8.8% more than in companies that do not disclose CSR information. The samples used in the analysis in Table 11 cover all companies that have been investigated for fraud cases and do not contain companies that have committed fraud but haven't been investigated. In this way, we can effectively eliminate the local unobservable biases in the overall sample and ensure the robustness of the regression results.

Table 11. Poisson Model test for subsample.

Variables	T_Fraud	MFX	IRR
CSR	−0.8066 **	−0.2036 **	0.9225 **
	(−1.71)	(−1.71)	(−1.71)
Control Variables	V	V	V
Constant	0.8053 ***		2.2374 ***
	(1.81)		(1.81)
Observations	2250	2250	2250
Wald chi2	646.96		646.98
Prob > chi2	0.0000		0.0000
Log likelihood	−14,703.683		16,270

Each independent variable corresponds to two rows of results: the first row is the coefficient value, and the second row is the z-test value. * denotes significance at 10%; ** denotes significance at 5%; and *** denotes significance at 1%.

5.4. Control of Annual Effects and Industry Effects

Due to the possible industrial effects and year effects in the sample data, some industries might face large corporate governance problems frequently and may be more prone to fraud than other industries are. At the same time, in different economic situations in different years, the company's economic environment is different, which will have an effect on their business behaviors. For example, in the global financial crisis in 2008, most listed companies faced financial problems. This may have been accompanied by a higher frequency of corporate fraud in 2008. On the basis of our empirical analysis, to test the industry effect and the year effect, the variables of the year and the variables of the industries of each company are respectively controlled, and the results of the H1 and H3 tests are summarized in Table 12. It can be seen from Table 12 that the estimation results still support our conclusion. The disclosure of the listed company's social responsibility report still has a "risk reduction" effect on corporate fraud and the severity of fraud, which is not affected by different years and different industry factors. Achieving a 5% significance level ensures the reliability of our research conclusions.

Table 12. The Results for Controlling Industry Effects and Annual Effects.

Variables	Industry Effects			Annual Effects		
	Bivariate Probit		Poisson	Bivariate Probit		Poisson
	P(F)	P(D | F)	T_Fraud	P(F)	P(D | F)	T_Fraud
CSR	−0.0678 ***		−0.2254 ***	−0.0946 **		−0.1637 **
	(−2.85)		(−3.07)	(−2.48)		(−2.27)
Control Variables	V	V	V	V	V	V
Constant	−1.8307 *	−1.6869 *	−1.9702 ***	−4.0551 ***	−7.7653	−0.2304
	(−1.79)	(−0.30)	(−2.86)	(−2.82)	(−5.09)	(−0.30)
Observations	16,270		16,270	16,270		16,270
Wald chi2	1455.13		708.48	468.96		919.87
Prob > chi2	0.0040		0.0000	0.0000		0.0000
Loglikelihood	−6214.1765		−14,661.75	−6081.4246		−14,197.908

Each independent variable corresponds to two rows of results: the first row is the coefficient value, and the second row is the z-test value. * denotes significance at 10%; ** denotes significance at 5%; and *** denotes significance at 1%.

6. Conclusions and Discussion

Our study focuses on Chinese A-share listed companies in 2008–2017 and defines corporate fraud as two processes of fraud commission and fraud detection. Based on the subjective factors affecting corporate fraud, we focus on the CSR disclosure to measure the CSR behaviors that represent corporate ethics. As the unobservable problem of the firms that have committed fraud but that have not been investigated and exposed still exists, we utilize a partially observable Bivariate Probit model to conduct regression. We are able to analyze the relationship between CSR report disclosure and corporate fraud, effectively avoiding the selection bias caused by the not directly observable part of the observations. By using the characteristics of the Bivariate Probit model, we simultaneously test that whether CSR disclosure has a "risk reduction" effect or a "window dressing" effect on corporate fraud. The "risk reduction "effect acts on the process of fraud commission, and the "window dressing" effect acts on the process of fraud detection. Then, we subdivide the fraudulent behavior into 9 types and use the Poisson model to test the mechanism of the impact of CSR disclosure on the severity of fraud. Further, we divide the companies into large-scale companies and small-scale companies to conduct a group regression. In the robustness part we test the interpretation power of CSR variable, conduct PSM test for "Risk Reduction" effect, modify the local sample observability problem by the Poisson model and exact the impact of annual effects and industry effects.

In general, we develop our research around corporate fraud issues in Chinese capital markets and draw the following conclusions. (1) The empirical results show that CSR disclosure can significantly reduce the firms' incentives to commit fraud but has no significant impact on the probability of fraud detection, which means that CSR disclosure shows a significant "risk reduction" effect but not the "window dressing" effect on Chinese corporate fraudulent cases. CSR disclosure by companies will increase the company's exposure to the public, thereby increasing the supervision by the public and the possibility of fraud detection. It will be impossible for company that have committed fraud to conceal and disguise bad news, which will not be easily detected by investors or regulators. (2) We found that the disclosures and release of the social responsibility report reduces corporate fraud tendency and reduce the types of fraud which means CSR disclosure has a negative effect on the severity of corporate fraud and can effectively mitigate the negative social impacts. (3) From the result of group regression: we are still able to draw the conclusion that the "risk reduction" effect of CSR disclosure can be expressed in both groups and that CSR disclosure more significantly decreases the propensity of corporate fraud. The CSR disclosure of a smaller-scale company has a more pronounced positive effect on reducing corporate fraud than that of a larger-scale company. Unlike larger companies, small

companies do not have such resource advantages, and their cost burden of CSR disclosure is relatively high. Therefore, the CSR disclosure by smaller companies can reflect that they attach more importance to the construction of corporate ethics culture and they are willing to care more about stakeholders' interests. (4) Using different data and methods to test the robustness of the empirical results, we once again confirm that "risk reduction" is the dominant effect of CSR disclosure. Companies that publish CSR reports have less incentives to commit fraud; therefore, the publishing of the CSR report mitigates the severe intensity of corporate fraud.

By researching the micro action mechanism of CRS disclosure, we can provide the following effective public policies to encourage CSR reports' issuance and to discourage fraudulent behaviors in Chinese capital markets: First, we must emphasize the importance of CSR reports to the construction of a corporate moral culture. We encourage listed companies to enhance their sense of responsibility as members of society, to combine their own development with the overall balanced development of society and to protect the interests of stakeholders in all sectors of society while pursuing their own economic benefits. Second, it is necessary to clearly define the content of social responsibility report and set the standards to help companies form a CSR disclosure strategic plan according to their business status. Disclosure should be made of the company's noncommercial contributions to shareholders, employees, products, society, environmental protection, and resource utilization including the protection of shareholders' rights and interests, the career development of employees, research and development investment in resource conservation environment, and social development funding. Third, the supervision and punishment of fraud caused by loss of corporate social responsibility should be strengthened. Whether it is the fraud that harms the interests of investors or it is the illegal behavior violating public health and safety, a zero tolerance to these corporate fraud behaviors should be maintained. Government and the regulatory authorities should spare no effort to purify the market environment, ensure the sound operation of the market mechanism, and maintain the seriousness and authority of the law and economic system.

Although our research contributes to the CSR and corporate fraud research in multiple ways, we acknowledge that there are still some limitations. First, we utilize the simplification method as a measure of corporate fraud and the intensity of fraudulent behaviors, and the Bivariate Probit model with partial observability to conduct regression analysis [11–13,15,37–39]. The main results are not completely free of partial observability concerns for sample selection bias. We have tried a lot of robustness discussion to explain, confirm and solve this problem. Improvements can be made in measurement methods and empirical tests if conditions permit, for example, legal environment is relatively perfect and preforms effective external supervisions, laws and regulations on corporate illegal behaviors to reduce the probability of fraudulent firms without being investigate. At this stage, this method is feasible and has a certain practical meaning. Second, we only perform empirical analysis on the positive effects of CSR among listed firms due to data availability. Future studies could expand to unlisted firms [47] especially the small and medium-sized enterprises. They are able to provide more concrete, rational and targeted suggestions for the guidance of CSR activity performance and regulations of corporate fraud in emerging markets.

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