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An empirical study of the relationship between women director and corporate social responsibility performance: insights from China.

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Abstract

Title: An empirical study of the relationship between women director and corporate social responsibility performance: insights from China.

Background and Problem Discussion: Globally, women directors are increasingly recognized and valued for their governance and decision-making abilities, and their impact on CSR performance has become the focus of academic attention. However, the proportion of female directors in China remains below the global average and grows slowly. At the same time, there is a stark contrast between a range of serious social issues arising from China's fast-growing economy and the low level of CSR performance. Both the Chinese government and social organizations seek ways and measures to improve CSR performance effectively, and Chinese academics are beginning to study CSR from a corporate governance perspective. However, there are few studies on the relationship between women directors and CSR performance in Chinese listed companies. Therefore, against this background, a valuable research question to explore the impact of women directors' participation in corporate governance on CSR in China.

Purpose: The study aims to examine the impact of women directors on CSR performance in Chinese listed companies and whether there is a positive relationship between the proportion of female directors and CSR performance.

Methodology: This study uses ordinary least squares regression to test the effect of the proportion of female directors on the board of directors on corporate social responsibility performance. The study also reduces the effect of endogeneity through PSM and uses robustness tests to ensure the reliability of the results. The data for the test study are uniformly sourced from the CSRMAR database, and the scope of the study is A-share companies on the Shanghai and Shenzhen exchanges from 2015 to 2020. CSR performance uses Hexun ratings as an indicator.

Findings: The results of OLS regression, PSM, and robustness tests indicate a significant correlation between the percentage of women directors and CSR performance, showing that the higher the proportion of women directors, the higher the organization's CSR performance. In addition, the study found no association between the presence or absence of women directors and CSR performance in China's listed corporations.

Originality: This study is unique in that it examines the relationship between board diversity and CSR performance using the most recent data available for listed companies in China. The study includes a six-year sample of 18,775 observations of the most recent listed companies in China. In addition, while similar Chinese studies commonly use lagged variables for one period to reduce the effect of endogeneity, our study uses nearest neighbor propensity score matching to reduce the effect of endogeneity issues, and also does lagged variables and a shortened sample time approach for robustness testing.

Implication: Our results have significant implications for corporate governance and lawmakers. According to the findings of the study, a greater share of female directors is related with improved corporate social responsibility performance. In contrast, the current level of board gender diversity in China is still relatively low, and women are much less likely to be directors than men. The results provide new incentives for companies to promote the rights and interests of female employees, while prompting companies to designate clear policies to safeguard the avenues of advancement for female employees. Policymakers have also gained more evidence to push for legal reforms to clarify the proportion of women directors required in corporate governance. This all helps to drive CSR in Chinese companies.

Keywords: CSR, Board gender diversity, women directors.

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1. Introduction

The financial scandals of listed companies represented by Enron that erupted at the beginning of the 21st century and the global financial crisis of 2008 triggered international reflections on CSR and corporate governance, especially with regard to the gender-diverse composition of the board (Terjesen et al., 2009). The significance of CSR is precisely to operate business not to maximize short-term corporate profits but with the long-term goal of social issues and sustainable development as a corporate obligation. According to McWilliams and Siegel (2001), CSR is the act of promoting certain social goods beyond corporate interests and legal requirements. However, Adams and Funk (2012) argue that the increasing homogenization of men-dominated boards of directors is crucial for the frequent occurrence of critical events such as scandals in these companies. In contrast, women have a stronger sense of risk aversion than men, are more cautious in their decision-making, and try to avoid the bad social reputation of the company as much as possible (Lv, 2019). Ray (2005) suggests that this may be due to the different leadership styles of women and men, with women directors being more democratic and socially engaged than men. Liao et al. (2015) argue that stakeholders may view gender-diverse boards as an indicator that these companies have higher levels of social responsibility and management. Moreover, some of the existing literature does indicate that the presence of women director may increase a company's stakeholder engagement (Willows and Van der Linde, 2016; Bear et al., 2010). Landry et al. (2016) study shows that the higher the proportion of women on a company's board, the more likely the company is to maintain a good record at the level of ethics, employee welfare, and social responsibility. As a result, international calls for gender diversity on boards of directors have also become increasingly urgent. Research on the impact of women directors on corporate governance and CSR performance has gradually become a topic of interest worldwide.

Our research was centered on China[1] based on the reality of CSR and board gender structure in China. Having analyzed the fundamental circumstances in China, we argued that there is room for further advancement in this area. On the one hand, we found that China's performance in CSR still need improvement. The emergence of severe social issues such as environmental pollution, food safety incidents, product quality, and labor rights accompanied China's rapid economic development, making it urgent to promote corporate social

[1] This paper is based on mainland China. All subsequent references to "China" are to mainland China. The sample companies are from the Shanghai Stock Exchange and Shenzhen Stock Exchange of China.

responsibility (Lv, 2019). Chinese regulators have required companies listed on the Shanghai Stock Exchange's "SSE Corporate Governance Panel" and the Shenzhen Stock Exchange's "Shenzhen 100 Index" to disclose CSR reports since 2008 (Huang & Zhou, 2015). Porter and Kramer (2006) explain the need for companies to integrate a social perspective into the core framework of strategy, i.e., the success of business and society are mutually reinforcing. Strategic CSR can gain a competitive advantage for companies. However, the high CSR demand in China contrasts with the low level of CSR performance, and the CSR performance of Chinese companies is still at a preliminary stage. The overall level of CSR performance of Chinese listed companies is low, and the level of disclosure varies widely (Lv, 2019).

On the other hand, according to the Deloitte report[2] (2022), progress in improving the number of women on corporate boards has been plodding. Women's global average of board seats has increased by only 2.8% since the sixth edition of the Women in the Boardroom report, released in 2019, and is now only 19.7%. Compare this to France, a leader in boardroom equality, which has an average of over 43% women on its board, the EU overall average of 30.7%, and Asia, which only has an overall average of 11.7% women on boards (Deloitte report, 2022). Meanwhile, China still has no regulatory requirements for boardroom gender diversity, so the average percentage of women on boards is only 12.64%, far below the world average (Deloitte report, 2022). Besides, according to the Global Gender Gap Report (2021) published by the Global Economic Forum, China ranks 107 out of 156 countries (the lower the ranking, the wider the gender gap), and China's performance in the ranking is regressing for the 13th consecutive year. Moreover, from this report's research on economic participation and work area, China's labor market participation rates for women and men are 68.6% and 82.8%, respectively (ranked 72), women's projected earnings are 61% of men's (ranked 76), and women make up only 16.8% of management (ranked 132).

From the above description, we can find that there is still much room for improving the gender structure of executives and boards in China. Some organization in China is also making efforts in this area. The Xiangmi Lake Women Directors Initiative was launched at the Board Diversity Forum in Shenzhen at the end of 2020, which clearly states that "by 2025, there will be at least one woman director and at least 20% of women on boards". Although the percentage of women on boards in China is still low compared to Europe and

[2] In February 2022, Deloitte released the latest seventh edition of the Women in the Boardroom report, which explores the issue of gender parity in the boardroom by taking stock of the number and percentage change of women directors and women CEOs and CFOs in 10,493 companies in 51 countries around the world.

the US, many Chinese listed companies are actively creating a gender-diverse corporate culture is a good trend (Deloitte Women in the Boardroom report, 2022). Our study focuses on the impact of the gender structure of directors of listed companies on CSR, which has a positive impact on both women's participation in work and the promotion of CSR in society.

In addition, China still has a research gap in CSR and board gender diversity. When we used the keywords "Gender diversity," "CSR," "Board," and "China " in Google Scholar, we found few studies that only addressed the relationship between women directors and CSR performance. Considering the rapid development of CSR practices in China and worldwide, examining the relationship between gender diversity and CSR performance in China using the most recent data from listed companies is relevant. Besides, Chinese law does not have specific requirements on gender on the boards of directors of listed companies. Research can provide empirical evidence for the development of relevant laws.

Therefore, we use gender traits as the basis of our study, with the purpose of examining the impact of women directors on Chinese listed company's CSR performance. In addition, this study further aims to explore the relationship between women directors and CSR performance, and whether there is a positive correlation between the proportion of women directors and CSR performance.

The study contributes to enrich the gender-related findings in upper echelon theory and provides empirical evidence for the relevant theory in emerging economies, particularly in mainland China. As most of the existing studies in the area of the impact of women directors on CSR suggest a positive relationship between women directors and CSR issues (Boulouta, 2013; Ibrahim and Hanifa, 2016;Kruger, 2009). Therefore, our study is also under the assumption of such a positive relationship, which could provide a basis for promoting gender diversity in the boards of directors of Chinese listed companies and motivate companies to advance corporate governance. Also, the study will help to promote the development of gender equality legislation in China. The study analyses data collected by the China Securities Market and Accounting Research Database (CSMAR) on listed companies in mainland China and uses the Hexun Index of Chinese listed companies to measure the CSR performance. The current study was conducted from 2015 to 2020 for A-share listed companies in China's Shanghai and Shenzhen markets and excluded companies with special treatment (ST) and financial companies like accounting and reporting for financial companies differs from other sectors, resulting in 18,775 observations.

The remainder of this paper is presented as follows. The following section briefly reviews the relevant literature and develops hypotheses related to women directors and corporate social responsibility. The third section is the methodology describing the research design, the database, and the variables. In the fourth section, we present the empirical results obtained. The fifth section discusses the findings of the study, which consider policy implications and directions for further research. The last part gives a brief conclusion to the whole study.

2. Literature review and hypothesis development

2.1 Theoretical Framework

We argue that multiple theoretical concepts are needed to provide a more comprehensive perspective to explain and study the complex relationship between women directors and corporate social responsibility. The upper echelon theory provides a managerial perspective on this area of research. CSR relies on the decisions and governance of corporate management, and the upper echelon theory suggests that the traits of senior managers influence their strategic choices and, thus, corporate behavior (Hambrick & Mason, 1984). Thus, the commitment to social responsibility and the CSR performance from women directors should have more long-term focus and a broader perspective. However, the upper echelon theory only explains how women directors influence CSR in terms of their personal background characteristics. In addition, according to social role theory and Feminist Care Ethics, female directors display different managerial traits than men (Boulouta, 2013). These two female traits-related theories provide a sociological and psychological and ethical perspective on this area of study. Stakeholder theory is an essential framework for measuring CSR performance and, therefore, most CSR research relies on stakeholder theory (Freeman, 2010). Because corporate boards are responsible for managing the interests of all stakeholders, companies with gender-diverse boards are more committed to creating a positive corporate image and are better informed about broader societal needs, thereby securing stakeholder outcomes (Nordberg, 2008). Stakeholder theory opens up new perspectives for theoretical research in this field in the terms of organizational management and business ethics.

2.1.1 Upper echelon theory

Our study builds on the upper echelon theory by examining the performance of CSR using gender as a critical aspect of directors' demographic characteristics and looking for evidence from the most recent data from China. Academics have studied the relationship between corporate managers and CSR using upper echelon theory. Based on upper echelon theory, Petrenko et al. (2016) investigated the impact of CEO's personal mind off needs and image issues on CSR. In general, the impact of management demographic characteristion on corporate decisions and behavior has been widely confirmed. (Finkelstein & Hambrick, 1990; Chatterjee & Hambrick, 2007).

Thomas and Simerly (1995) studied CSR from the upper echelon theory perspective and found that executives' background and tenure are determinants of CSR performance. The upper echelon theory focuses on the impact of demographic characteristics such as age, gender, education, and tenure of the executive team on corporate behavior and is an important research component in organizational behavior (Hambrick & Masohn, 1984). Given management's limited rationality, Hambrick and Masohn (1984) argue that the formulation and selection of corporate strategy reflect executives' behavioral tendencies, which are influenced by their superficial characteristics such as age, education, and gender, deeper characteristics such as values, personality, and emotions, and personal experiences such as political experience, and academic experience. In addition, Ely (1995) examines the ways in which women's participation in organizations' higher echelons affects their social constructs of gender difference and gender identity while they are at work. According to the findings of the research, gender was shown to be an important independent variable in organizational research (Ely, 1995).

Sambharya (1996) applies upper echelon theory to the context of international business and investigates the influence that the international expertise of top management team (TMT) members has on the international diversification strategy of a given organization. The upper echelon theory suggests that top management's cognitive base and values can be replaced by easily observable and accessible demographic characteristics (including age, gender, tenure, education, and career experience) and can effectively influence firms' strategic choices (Hambrick & Masohn, 1984).

2.1.2 Female traits-related theories

The social role theory and the feminist care ethics, which are related to female traits, provide the theoretical basis for women directors to influence CSR from sociological and psycho-ethical theoretical perspectives respectively. In corporate governance and decision making, women directors pay more attention to social responsibility performance, such as employees and stakeholder satisfaction, rather than just financial performance (Boulouta, 2013). Women directors often act in a compassionate, kind and democratic manner because such behaviour is more consistent with their 'gender roles' in order to gain positive social perceptions and recognition (Heilman and Chen, 2005).

The social role theory perspective argues that society's gender role divisions drive behavioral differences between genders and shape the expectations individuals set for themselves and others regarding gender roles (Eagly and Wood, 1999). In traditional gender-inherent perceptions, leadership roles are defined as individual types with masculine characteristics (Eagly and Karau, 2002). Ryan and Haslam (2007) state that a male manager demonstrates his leadership when he displays a tough and assertive style, but the social expectation that women should be kinder and more caring. So if a women manager adopts the same management style, it is perceived as a behavior that does not match her social role as a woman and negatively evaluates her leadership abilities (Boulouta, 2013). This division of social roles also leads to different social expectations for men and women, that women are perceived as socially oriented and nurtured rather than performance oriented and competitive (Boulouta, 2013). Therefore, when women are leaders, their leadership style is also more collaborative, democratic, participatory and communal in order to prove themselves and more in line with social expectations (Issa and Fang, 2019).

Feminist Care Ethics argues that women's more humanistic and empathetic nature makes it easier for women to build good relationships with stakeholders when they are directors, emphasize social responsibility, and make more CSR-friendly decisions. Feminist care ethics is an essential branch of feminist ethics, which argues that women tend to view morality as a responsibility to others and identify emotionally with the idea of relational and responsible care more than men (Gilligan, 1993). After psychological research, Hoffman (2000) argues that the moral obligations and ethical behaviors that people exhibit when helping others are almost always related to their capacity for empathy. Slote (2007) stated that empathy is the main mechanism of compassion, caring and benevolence in the "ethics of caring" and called it "empathic caring". Sturmer et al. (2005) further suggest that empathy is an emotional response that includes sympathy and concern when helping someone in distress. According to Willer et al. (2012), women are also more likely to be driven by empathy, have higher levels of morality than men, and women are more likely to be involved in donation or social service activities.

Although most of the research on these two female traits-related theories is decades old, psychological and behavioral shaping is the result of long-term effects. Decades ago are when these directors were children or adolescents, a time when their perceptions were being shaped, and their current behavioral patterns and inherent perceptions are not completely changed by the rapid development of the Chinese economy in a short period. Therefore, the above theoretical research remains persuasive. Their findings confirm the positive impact of women directors on CSR performance by participating in corporate governance and corporate decision-making with an interpersonally oriented leadership style that conforms to female traits.

2.1.3 Stakeholder Theory

Stakeholder theory provides a basis for examining which aspects of CSR performance are influenced by women directors, including specifically shareholder responsibility, employee responsibility, consumer rights responsibility, environmental responsibility, and philanthropic responsibility. Some scholars argue that there is a natural fit between the concept of CSR and the interests of stakeholders (Carroll 1991; Parmar et al., 2010). The essential focus of the corporate social responsibility philosophy is to provide primary benefits to the company's stakeholders, such as employees, shareholders and the social environment (Srivastava, 2012). Stakeholder theory suggests that the survival of a company is closely related to the interests of individuals or organizations (Freeman, 2010). The development of a company depends on the support of individuals and organizations, and only by satisfying the interests of all stakeholders can a company achieve healthy and sustainable development with the resources provided by society (Yasser et al., 2017). Stakeholder theory emphasizes that managers must reconcile the company’s objectives with the demands and expectations of various stakeholders (Carroll, 1991; Freeman, 2010; Parmar et al., 2010).

According to Bear et al. (2010), companies with more women directors can provide a broader perspective that allows the board to assess the needs of different stakeholders better, and as a result, the board's ability to effectively address CSR may be enhanced. Also, women tend to be more social focused in their decision-making than men's. Therefore, women directors are more sensitive to the wishes of different stakeholder groups, and are more able to promote companies to solve CSR issues (Issa & Fang, 2019). The participation of women directors in corporate governance can effectively facilitate effective communication between the board and the various stakeholders (Pucheta-Martínez et al., 2018).

In addition, women directors bring more diverse backgrounds and professional experience to the board (e.g., greater involvement in voluntary and charitable organizations after obtaining higher education), which may encourage directors to listen to a broader range of stakeholders' perspectives and engage in more open dialogue (Issa and Fang, 2019). More women directors lead them to communicate effectively with stakeholders and build better connections, assess the needs of different stakeholder groups, improve the board's ability to address CSR effectively (Boulouta, 2013), and increase orientation towards CSR practices (Ntim and Soobaroyen, 2013).

2.2 Previous Empirical Research and Hypothesis Development

The positive association between women directors and CSR performance is supported by a large number of empirical research. This is in addition to the theoretical viewpoint of femininity and social roles, which can explain the influence of women directors on CSR performance.

The results of empirical research conducted by AI et al. (2019) show that organizations with women directors are more likely to disclose CSR data and adhere to industry best practices. There is a positive impact of women directors on increasing the number of CSR reports, managing public expectations, and maintaining the company's reputation and legitimacy in society. Issa and Fang (2019) used qualitative and quantitative research methods to explore the relationship between the number of women on boards of directors and the extent to which corporations report on CSR in Arab nations. Firstly, they made a text analysis of the explanatory variable CSR performance level. Secondly, they investigated the effect of women directors on CSR performance through ordinary least square method regression. They found that the unique psychological characteristics, leadership style, and ethical values of women directors strongly influence a company’s behavior on CSR (Issa and Fang, 2019). An empirical study conducted on Spanish-listed firms by Valls Martinez et al. (2019) found that increasing the proportion of women on corporate boards can increase CSR responsibility performance, increase socially responsible investment, and ultimately improve corporate financial performance. The study from Palestine shows that gender diversity in management positively impacts corporate sustainability performance, although this relationship is not significantly correlated (Zaid et al.,2020). According to empirical studies from China, companies with women CEOs perform better in social responsibility (Gulzar et al., 2019). They also emphasize the significance of women leadership, noting that women leadership and board gender diversity are both critical for CSR (Gulzar et al., 2019).

In addition, the effectiveness of women directors' influence on CSR behavior is related to the number of women directors. Fernandez-Feijoo et al. (2012) explore the impact of the number of women directors on changes in national reporting at the country level. This effect is achieved by including at least three women on the board. Fernandez-Feijoo et al. (2012) find that women directors reduce masculinity and individualism's impact on CSR performance. Post et al. (2011) found in a study on board composition and corporate fulfillment of environmental social responsibility in the United States that companies with three or more women directors performed better on environmental CSR. Bear et al. (2010) discovered that having more women directors may increase board awareness of CSR projects and provide viewpoints on CSR challenges. Additionally, gender diversity on the board of directors may enhance communication and conversation among corporate directors, making it easier to handle social responsibility concerns Bear et al. (2010). Konrad et al. (2008) also found that when there are at least three women on the board, the ability of these women directors to ask challenging questions about CSR and solve the problem increases.

Based on previous research, we can know that the influence of women directors on corporate CSR performance is not limited to the presence of women directors, but the number and proportion of women directors are critical to the study of this issue. The effectiveness of the women directors on corporate CSR performance is more significant when women directors move from a minority group to an equal presence with the male group. Combining all above literature we develop the following two hypotheses:

- H1a: The presence of women directors is positively correlated with the CSR performance.
- H2b: The proportion of women directors is positively correlated with the CSR performance.

3. Method

3.1 Data collection

We selected the research data from the A-share listed companies in Shanghai and Shenzhen, China, from 2015 to 2020. In China, annual reports of listed companies are disclosed from January 1 to April 30, which means that data for 2021 can not be available for research. For this reason, we set the deadline for data collection at 2020 to use the most recent data possible. The China Stock Market & Accounting Research Database contains all of the explanatory and control variables (CSMAR). To eliminate influence from extreme values, we perform winsorization on all continuous variables between 1% and 99%.

We screened the initial sample to prevent anomalous data from impacting the study's findings, and eventually got 18775 observations. First, we removed firms with special treatment (ST) and have eliminated 1,085 ST samples from the 2015-2020 data. In the Chinese stock market, companies that are assessed to be in financial distress based on a set of criteria are subject to mandatory special treatment (ST) by the China Securities Regulatory Commission (Kim et al., 2016). It indicates that the company has an abnormal condition in financial or other matters, which may impact the accuracy of the study results. Second, we specified the industry scope of the sample to exclude finanial companies. A total of 556 observation related to the financial industry were excluded. Financial company, represented by banks, provide intermediary services between borrowers and lenders (Hancock, 1985). Becht et al. (2011) point out that there are differences between bank governance and other industries. Financial regulation and policy are also beginning to recognize the special characteristics of banks (Becht et al., 2011).. The accounting and reporting of such companies are different from other industries and should be significantly different in the analysis. It should be noted that some of the samples are companies in addition to special treatment companies and companies in the finance industry, and there are 28 such samples. We ended up with unbalanced panel data, including a wide range of industries, and the industry distribution is shown in Appendix 1.

Table 1 The data filtering process

Summary of sample selection I	
All observation samples between 2015-2020	**20388**
Less:	
*ST observation	(1085)
Observation in the finance industry	(556)
Add: *ST+Finance	28
Final sample	**18775**

Summary of sample selection II

Year	Raw data	*ST	Finance	*ST+Finance	Final data
2015	2758	177	78	5	2508
2016	2985	180	88	5	2722
2017	3415	183	92	5	3145
2018	3520	183	98	5	3244
2019	3668	184	102	5	3387
2020	4042	178	98	3	3769
Total	20388	1085	556	28	18775

3.2 Measurement of variables

3.2.1 Dependent variable

The companies' CSR performace is the dependent variable in this study. In empirical studies, many scholars have studied the CSR performance by drawing on CSR indices issued by third-party professional rating agencies. Issa and Fang, 2019; Gulzar et al., 2019) These studies illustrate the validity of using CSR indices from rating agencies in this type of research.

In this study, we use the index of Hexun of Chinese listed companies to measure CSR performance. Our motivation for using the index of Hexun is twofold. First, most studies on CSR use either the Rankins CSR ratings or the Hexun index in China. Whereas Rankins CSR ratings' evaluation is based on social responsibility reports issued by listed companies, for listed companies that do not specifically issue social responsibility reports, Rankins CSR ratings' data will result in some listed companies not being included in the study sample. At the same time, the 2020 Rankins CSR ratings were not available during the research phase. To make the sample interval longer, we chose the six-year CSR indicators from Hexun to measure the CSR performance. Second, Hexun.com's comprehensive social responsibility score for China's listed firms serves as a barometer of corporate social responsibility performance. On the basis of social responsibility reports and financial statements from publicly traded companies in China, this score rated companies on five dimensions: shareholder, employee, supplier, customer and consumer rights and interests; environmental responsibility; public responsibility. Under the five scoring dimensions, Hexun has created secondary and tertiary indicators to provide a comprehensive assessment of CSR. There are 13 second-level and 37 third-level indicators, which are relatively comprehensive and detailed. (Professional measurement system for listed companies' social responsibility reports, 2022). The Hexun scoring system can be found in Appendix 2.

3.2.2 Independent variable

We use two variables to describe gender diversity among corporate directors, the dummy variables, the presence of women director (FE) and the proportion of women directors (Ferat). According to prior studies, there are several ways to assess female directors. First is dummy variable female director presence. Second is the number of female directors. (Bear et al., 2010), and third is the proportion of female directors. (Ntim and Soobaroyen, 2013; Williams, 2003). Many studies also incorporate different factors as explanatory variables at the same time to demonstrate the robustness of the results. The percentage of female directors is the primary independent variable in this study, with other factors being employed to ensure the study's robustness (dummy variable women presence or absence). Using both dummy and continuous variables facilitates the study of the estimated effects of discrete and continuous variables of women directors on the CSR performance.

3.2.3 Control variables

To study the influence of women directors on the CSR performance in listed companies, we controlled for other factors that may impact CSR to make our findings more accurate. We referred to the literature to identify the following control variables (see Table2).

Nature of company This variable is a dummy variable that takes the value of 1 if the firm is a state-owned enterprise and 0 otherwise. In the context of China's socialist economic system, the government encourages state-owned enterprises to be pioneers in CSR fulfillment. As a result, society expects a higher CSR performance from SOEs, and they are under more pressure to disclose CSR than non-SOEs.

Size of the company This variable takes the logarithm of the firm's total assets reported at the end of the current period. Empirical studies by Belkaoui & Karpik (1989, 47) demonstrate that managers of larger firms prefer "outlays for social performance that defers reported earnings from current to future periods." Lepoutre & Heene (2002) point out that many convincing empirical studies have demonstrated the impact of firm size on CSR. Small company size creates barriers to corporate social responsibility. However, this effect should be differentiated according to specific conditions, and firms can still fulfill their social responsibility by overcoming limiting barriers. (Lepoutre & Heene,2002). A study by Udayasankar (2008) found that firm size and CSR show a U-shaped correlation, with large and small firms having sufficient motivation to engage in CSR while medium-sized firms have relatively weak motivation. However, according to Baumann-Pauly et al. (2013), the relationship between business size and CSR is indirect. This effect depends mainly on certain specific traits that come with the firm size that favor or disfavor the fulfillment of corporate social responsibility.

Profitability Return on assets is used to determine a company's profitability. Belkaoui and Karpik (1989) found that there is a correlation between CSR and business profitability. According to Khojastehpour and Johns (2014), CSR has a considerable impact on a company's profitability. Due to the link between the two, it is crucial to consider the influence that profitability may have on CSR and consequently to account for it.

Leverage This control variable takes the total liabilities/total assets value at the end of the general industry period. Jensen & Meckling (1976) argued that if firms have a higher level of financial leverage, they will have a stronger incentive to disclose information about the firm and thus reduce agency costs and the cost of capital. Their study of the relationship between social disclosure, social performance, and economic performance. Belkaoui & Karpik (1989) show that the level of leverage affects CSR. The empirical results suggest that the level of leverage affects managers' accounting choices.

Board size This control variable takes the total number of board members of the firm at the end of the reporting period. The increase in board size facilitates mutual monitoring among directors and helps to safeguard the common interests rather than the interests of individuals.

Top 10 Shareholders This control variable reveals the degree of concentration of ownership. Fan & Wong (2002) suggest that if the ownership is too concentrated, the majority shareholders are more likely to use their power to benefit, thus affecting the corporate social responsibility behavior.

Table 2 Definition of variables

Variables definition (Letters in brackets are shorthand for variables in the empirical study)	
Dependent variables	
Quality of CSR disclosure (CSR)	Corporate social responsibility index evaluated by Hexun
Independent variables	
Proportion of female director (Ferat)	Percentage of female directors on the board of directors
Presence of female directors (FE)	1 if a female director exists in the firm, 0 otherwise.
Control variables related to company characteristic	
Firm size (Size)	The logarithm of total assets at the end of the year
Age (Age)	The total year of establishment to the end of 2020
Nature of company (SOE)	1 if company is stated-owned, 0 otherwise
Firm's financial performance (ROA)	Net income over total assets return on assets (ROA)
Company debt ratio (Leverage)	Ratio of total debt scaled by total assets at the end of the year
Control variables related to ownership characteristics	
Board Size (Board)	Total number of directors disclosed by the company at the end of the year
Board independence (IDrat)	Ratio of independent directors on the board of directors
The CEO power (Duality)	1 if the corporate CEO and corporate chairman positions are the same person, 0 otherwise
Shareholders (Top10shareholder)	Value of shares held by top 10 shareholders divided by total market value of the company

3.3 Model

3.3.1 Ordinary least squares

A model was established for empirical analysis to study the effect of women directors on the quality of CSR performance. According to Overland & Samani (2021), the variables related to board structure do not change significantly enough overtime for the fixed effects model to be applicable for dealing with this type of panel data. According to our data, the degree of change in the number and proportion of women on the board of directors over six years is also minimal, and we choose to build an OLS model for empirical study.

In the equation below, subscript i represents company i, subscript t represents the year, $\boldsymbol{\alpha}$ represents the constant term, and $\boldsymbol{\varepsilon}$ represents the error term. CSR is a dependent variable, i.e. CSR performance, sex is the core independent variable, i.e., percentage of women director, and control is a series of control variables. We focus on the estimated effect of sex on CSR, i.e., β_1.

$$CSR_{it} = \alpha + \beta_1 sex_{it} + \sum_{2}^{n} \beta_n control_{it} + \varepsilon \quad (1)$$

3.3.2 Propensity-score matching

To contend with the endogeneity problem, we introduced PSM as the causal inference method in this study. Paul & Donald (1983) proposed the PSM, consisting of the following core steps: 1. Calculate the probability of each sample receiving the intervention by controlling for a set of variables in a Probit model to derive a propensity score. (Equation 2) 2. Matching control group samples with similar probabilities of receiving the intervention to experimental group samples to form a statistical control group for each other. 3. Using the difference in outcome variables between the experimental and control groups after matching as the mean treatment effect of the intervention (Equation 3).

$$P\,(T_i = 1) = \beta\, Control_i + \varepsilon_i \quad (2)$$

$$A = E\,(Y_1 \,|\, T = 1, P) - (Y_0 \,|\, T = 0, P) \quad (3)$$

$Control_i$ is a set of control variables and T is the intervention variable in the equation above. T = 1 is the experimental group, T = 0 is the control group. P denotes the propensity score value. Here we focus on the average treatment effect of the intervention, i.e., A. There are three measures of treatment effect exist for A: Average Treatment Effect (ATE), Treatment Effect on the Treated (ATT), Average Treatment Effect on the Untreated (ATU). This study focuses on the expected difference in the experimental group receiving the intervention compared to those not receiving the intervention, i.e., the ATT outcome.

4. Empirical Results

4.1 Descriptive Statistics

4.1.1 Descriptive Statistics of Key Variables

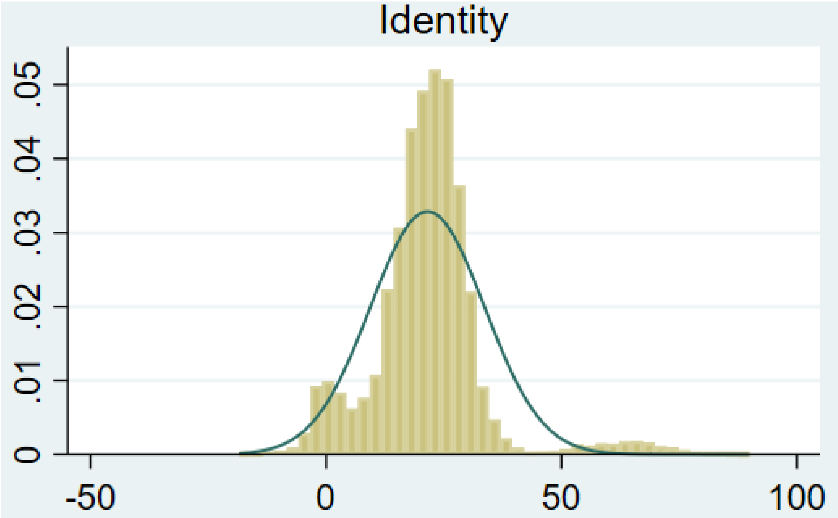
Table 3 Descriptive Statistics of control variables

Table: Descriptive Statistics

VarName	Obs	Mean	SD	Min	Max
CSR	18775	21.5416	12.1440	-18.4500	90.0100
Ferat	18775	0.1867	0.1454	0.0000	0.8571
FE	18775	0.8018	0.3986	0.0000	1.0000
Fenum	18775	1.5391	1.1901	0.0000	8.0000
Board	18775	8.4359	1.6585	3.0000	17.0000
IDrate	18775	0.3776	0.0559	0.1667	0.8000
Duality	18775	0.3002	0.4584	0.0000	1.0000
Top10shareholder	18775	59.3915	15.0076	1.3103	101.1600
Age	18775	19.2942	5.6103	3.8247	63.0411
IPOAge	18775	10.6648	7.8617	0.0000	30.0548
SOE	18775	0.3258	0.4687	0.0000	1.0000
ROA	18775	0.0420	0.0870	-2.2454	4.4890
Leverage	18775	0.4150	0.2925	0.0084	28.5477

Table 3 shows the mean, standard deviation, minimum and maximum values for all variables in the sample of 18775. We can first discover the characteristics of the dependent and independent variables. The range of *CSR* scores is 0-100. The average CSR score of Listed Companies in China is 21.54, indicating that Chinese companies perform poorly in undertaking corporate social responsibility. According to figure 1 below, the distribution of sample data is relatively concentrated and can be regarded as a normal distribution.

Figure 1 Distribution of CSR

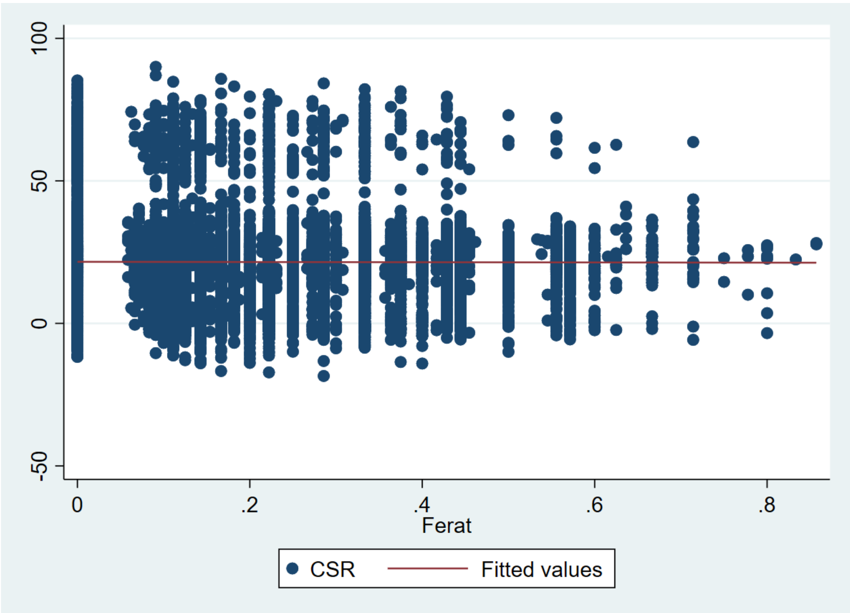


The mean percentage of women in the sample is 18.67%, with a standard deviation of 0.1454. A minimum value of 0 indicates that there are companies with no women directors and a maximum value of 85.71. The mean of Ferat indicates that men are still dominant on the board of directors. Morgan Stanley Capital International (MSCI) released the progress report on the proportion of women directors in 2021 on March 7, 2022. According to the research, the proportion of women directors in publicly traded Chinese companies climbed to 13.8 percent in 2021, up from 13.0 percent in 2020. Since the sampled data exclude the ST companies in A share, which is the companies with abnormal financial or other conditions, the proportion of women directors in the sample is 18.7%, much higher than the overall data. According to the report, the proportion of female directors in Chinese publicly traded companies has climbed every year since 2016 by more than five percentage points. *Fe* is a dummy variable that reflects whether there are women directors in the company. According to descriptive statistics, about 20% of companies do not have women directors. *Fenum* said the number of women directors. The average is 1.5, indicating that there are 1.5 women directors on the board of directors of each listed company. Compared with the size of the board (3-17 people), the proportion of women on the board is still much lower than that of men.

Second, we can see the firm characteristics of the sample in Table 3. The average listing *Age* of the sample companies is about ten years, as the development of China's financial market is relatively late. Moreover, due to the transformation of the market economy in China since the 1980s, the age of most sample formulas is short, and the average is only 20 years. According to the age and listing years of the sample companies, most of the companies in the sample are in the embryonic and growth stage, so they may have limited ability to undertake CSR. Besides, the standard deviation of company *size* is 0.58, indicating that listed companies' scale varies greatly. *ROA* indicates the company's profitability, and the profitability of most companies in the sample is positive. 32.6% of the companies in the sample include state-owned shares.

Third, some characteristics of the sample board structure can also be obtained from Table 3. Usually, independent directors can improve corporate governance, avoid fraud and restrict power (Cullinan et al., 2019). *IDrat* shows that the proportion of independent directors in Chinese listed companies is 37.8%. According to Chinese law, the proportion of independent directors of listed companies needs to exceed ⅓ (Company Law of the People's Republic of China, 2018). Therefore, the proportion of independent directors in the sample data slightly exceeds the minimum limit by law. According to the data, about 30% of Chinese listed companies have one chairman and CEO, which will lead to excessive CEO power and a lack of constraints. In such companies, the CEO's personal choice may significantly impact the company's CSR performance. Moreover, the shareholding ratio of the top ten shareholders is about 59%, which can obtain absolute control of the company.

Figure 2 Scatter diagram of CSR performance and women director proportion on the board



The scatter plot illustrates the correlation between the percentage of female directors and CSR performance. There is a horizontal correlation between the number of female directors and corporate social responsibility (CSR). The aforementioned number does not indicate that the proportion of women directors has a significant impact in promoting corporate social responsibility. We need to analyze further whether there is a significant linear relationship between the proportion of women directors and CSR through the model.

4.1.2 The impact of the existence of women directors

Table 4 T-test on average CSR by the existence of women directors

Table: Two-sample t test with equal variances

Group	Obs	Mean	Std. err.	Std. dev
0	665	19.28411	.3689327	9.513886
1	3104	20.1198	.1658096	9.237842
Combined	3769	19.97235	.1513438	9.291327
diff		-.8356982	1.3968453	

diff = mean (0) – mean (1)		t = -2.0159
H0: diff = 0		Degrees of freedom = 3767
Ha: diff < 0	Ha: diff ! = 0	Ha:diff > 0
Pr (T < t) = 0.0176	Pr(|T| > |t|) = 0.0353	Pr (T > t) = 0.9824

In this part, we use the t-test to judge whether the CSR of listed companies with women directors is significantly higher than that of companies without women directors. Since the sample data includes the data of China's A-share listed companies from 2014 to 2020, to avoid the duplicate issue of the sample companies in the repeated data, the sample data of 2020 is selected for this test. According to the results of the t-test, at the 95% confidence level, the CSR performance of companies with women directors is better than that of companies without women directors.

4.2 Pearson Correlation

The correlation coefficient matrix can show the correlation between the variables. Also, correlation analysis can provide a preliminary check of the multicollinearity problem between variables. The coefficient indicates the degree of association between the variables. The possibility of multicollinearity increases as the correlation coefficient between two variables increases. Gujarati and Porter (1999) showed that coefficients above 0.8 may have multiple co-linearity problems. From Table 5, it can be tentatively judged that there is no severe multicollinearity in the data. Combined with the VIF multicollinearity test in *Table 6*, there is no serious problem with multicollinearity in the sample because the VIF in the variable is less than 10. The VIF values for the variables range between a maximum value of 1.80 and a minimum value of 1.11.

According to Pearson correlation study, the presence of women directors and the percentage of women directors link negatively with CSR performance, however the association is not statistically significant. Moreover, there is a significant positive correlation between company size, state-owned holding ratio, corporate profitability, and corporate CSR performance.

Corporate governance characteristics, such as the proportion of independent directors, the size of the board of directors, and the concentration of ownership, are significantly positively correlated with CSR performance. A substantial negative link exists between the CEO's position as chairman of the board and the CSR performance of the organization.

Table 5 Pearson Correlation analysis

Table: The correlation matrix for the variables

	CSR	FE	Ferat	Board	IDrate	Duality	Top10	Size	Age	SOE	ROA	Leverage
CSR	1											
FE	-0.0060	1										
Ferat	-0.0045	0.6381***	1									
Board	0.0669***	0.0323***	0.1479***	1								
IDrate	-0.0150**	0.0349***	0.0715***	0.5320***	1							
Duality	-0.0169**	0.0370***	0.1055***	0.1765***	0.1047***	1						
Top10shareholder	0.2120***	0.0005	0.0048	0.0172**	0.0290***	0.0500***	1					
Size	0.2022***	0.0904***	0.1681***	0.2836***	-0.0005	0.1954***	0.1133***	1				
Age	0.0214***	-0.0003	-0.0152**	0.0950***	0.0217***	0.1332***	0.1599***	0.1603***	1			
SOE	0.0498***	0.0917***	0.1779***	0.2721***	0.0437***	0.3055***	0.0270***	0.3736***	0.2373***	1		
ROA	0.4478***	0.0186**	0.0332***	0.0193***	0.0021	0.0622***	0.2290***	-0.0148**	0.0792***	0.0943***	1	
Leverage	0.0886***	0.0350***	0.0784***	0.1105***	-0.0050	0.0984***	0.0730***	0.3316***	0.1276***	0.1920***	0.3636***	1

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

Table 6 Multicollinearity test

Table: VIF values of variables

Variable	VIF	1/VIF
Ferat	1.800	0.554
FE	1.740	0.576
Board	1.670	0.600
IDrate	1.460	0.685
Size	1.420	0.704
SOE	1.350	0.743
Leverage	1.320	0.758
ROA	1.230	0.816
Duality	1.130	0.882
Top10share~r	1.110	0.904
Age	1.110	0.904
Mean	VIF	1.390

4.3 OLS regression result

Table 7 OLS Regression result of CSR reporting index

Table: Pooled OLS Regression Result

	CSR	CSR
Ferat	1.3591***	
	(2.8349)	
FE		0.0949
		(0.5648)
Board	0.0017	-0.0078
	(0.0320)	(-0.1473)
IDrate	-1.8228	-1.7285
	(-1.2644)	(-1.1990)
Duality	0.0010	0.0149
	(0.0062)	(0.0967)
Top10shareholder	0.0386***	0.0386***
	(7.9968)	(8.0094)
Size	4.5236***	4.4933***
	(28.8205)	(28.6579)
Age	0.0300**	0.0306**
	(2.2408)	(2.2853)
SOE	0.5942***	0.5528***
	(3.5197)	(3.2824)
ROA	92.6227***	92.6564***
	(81.9596)	(81.9751)
Leverage	-4.8269***	-4.8521***
	(-10.9499)	(-11.0070)
_cons	-28.2719***	-27.7454***
	(-17.2418)	(-16.9646)
Year/Industry	Controlled	Controlled
N	18775	18775
r2	0.4173	0.4171
r2_a	0.4163	0.4161

*** *p<0.01,* ** *p<0.5,* * *p<0.1*

Table 6 reports the results of the OLS multiple regression of women directors and CSR performance. Columns 1 and 2 use the proportion of women directors (Ferat) and the women director dummy variable (FE) as the test variables, respectively. This study found that, without removing the endogeneity problem caused by sample self-selection, the results in the first column show that the proportion of women directors (Ferat) has a favorable effect on the company's CSR at a 1% level of significance. The result supports our hypothesis H1b. In terms of explanatory variables FE, the presence of women directors on the board of directors has a favorable but non-significant effect on corporate CSR. The impact of board gender diversity on CSR has to take complete account of the proportion of women, not just the presence or absence of women directors, which rejects our hypothesis H1a

Among the control variables, the results of the two regressions remained broadly consistent. There is a statistically significant positive correlation between business size and CSR at the 1% level of significance. It suggests that the larger the organization, the better its CSR performance. Moreover, in the models, ROA has a significant positive impact on CSR, at the level of 1%, which shows that companies with higher profitability are more willing to undertake corporate social responsibility. Besides, there is a significant relationship between Government-owned companies and CSR at 1% significant level. Among the corporate governance variables, the proportion of board independent directors and the shareholding ratio of the top 10 shareholders have a significant positive impact on CSR. The results of the control variables were generally consistent with the findings of previous studies in the literature.

4.4 Endogeneity

During the study, we foresee an endogeneity problem. The problem of endogeneity is prevalent in empirical studies, and it suggests that explanatory variables are correlated with random disturbance terms. According to Tingbani et al. (2020), firms with high social responsibility tend to have higher levels of gender diversity. Moreover, gender diversity can contribute to corporate social responsibility performance. This suggests that the causal relationship between the two may be contrary to our hypothesis. In addition, some omitted control variables may affect the accuracy of our results. For this reason, we use the propensity score matching method to try to mitigate the effect caused by endogeneity by matching similar samples. We also performed a balance test for matching.

First, we created a dummy variable for the proportion of women directors (Ferat20), which takes the value of 1 when the proportion of women directors in the firm is greater than or equal to 20%, and 0 otherwise. This proportion is mainly referenced to the mean value of the proportion of women directors in the sample (18.67%). PSM compares whether there is a difference between the two groups by dividing the sample into those with more than 20% women directors and those with less than 20%, while controlling for other variables consistently, to compare whether there is a difference between the two groups of the sample. This approach allows the difference in CSR performance between the experimental and control groups to come from the core variables only.

In table 8, t=2.3>2.58 implies that the variable Ferat20 is significantly positively associated with CSR performance at the 5% level of significance, which further validates hypothesis H1b. Besides, we also intervened based on the presence of the variable women director. The results show that t = 1.2, there is no significant relationship between the presence of women directors and CSR.

Table 8：Result of PSM

Table: Treatment effects of core independent variables on CSR performance

	Proportion of female director (Ferat20)			Existence of female director (FE)		
Sample	Treated	Controls	T-stat	Treated	Controls	T-stat
Unmatched	21.5837957	21.5068063	0.43	21.5055029	21.6876592	-0.82
ATT	21.5727601	21.1502298	2.30**	21.5040178	21.1751706	1.20
	Off support	On support	Total	Off support	On support	Total
Untreated	1,806	8,483	10,289	8	3713	3721
Treated	653	7,833	8,486	16	15038	15054
Total	2,459	16,316	18,775	24	18751	18775

At the same time, it is necessary to check whether the PSM is valid or not. Here we are mainly concerned with the validity of the matching process for Ferat20. Appendix 3 shows the test of the joint support hypothesis. It indicates that although the propensity scores are not evenly distributed, there is joint support between the experimental and control groups for most of the values of the propensity scores. Appendix 4 compares standard deviations of control variables before and after nearest neighbor matching. There is a substantial decrease in the standard deviations of the control variables after matching. The absolute values of standard deviations of all control variables are less than 10%. Based on the above analysis, we assume that PSM for Ferat20 passed the balance test.

4.5 Robust test

To ensure the robustness of the study's findings, we did three robustness analyses and obtained generally consistent findings. The proportion of women directors and CSR performance shows a significant positive relationship but differ slightly in significance. At the same time, the presence of women directors and CSR performance did not find a significant correlation.

4.5.1 Clustered standard error

Table 9：Regression result of clustered standard error

Table: Cluster Result		
	CSR	CSR
Ferat	1.2356**	
	(2.0988)	
FE		0.0350
		(0.1623)
Board	0.0326	0.0231
	(0.5295)	(0.3749)
Duality	-0.0163	-0.0041
	(-0.0889)	(-0.0224)
Top10shareholder	0.0405***	0.0406***
	(6.2442)	(6.2588)
Size	4.5292***	4.4984***
	(20.6276)	(20.5078)
Age	0.0266	0.0272
	(1.5116)	(1.5446)
SOE	0.5555**	0.5151**
	(2.3202)	(2.1556)
ROA	91.0660***	91.0822***
	(66.9750)	(67.0321)
Leverage	-4.8043***	-4.8236***
	(-8.2231)	(-8.2499)
_cons	-29.2426***	-28.6603***
	(-13.6322)	(-13.4110)
Year/Industry	Controlled	Controlled
N	18775	18775

*** $p<0.01$, ** $p<0.5$, * $p<0.1$

Cluster standard errors can correct for the within-group autocorrelation problem and provide one way of robustness testing for the study. Table 9 shows that the results are broadly consistent with the OLS regression. The coefficient of Ferat is 1.2356, and the t-value is 2.0988. The significant positive relationship between the proportion of women directors and CSR is unchanged, but the Cluster result is significant at the 5% level. The presence of women directors(FE)has no significant impact on CSR performance. FE. The FE coefficient is 0.035, and the t-value is 0.1623. This result is also in agreement with the OLS results. In addition, company size (Size), return on assets (ROA), and the shareholding ratio of the top 10 largest shareholders (Top10shareholder) still have a significant positive impact on CSR at 1% significant level.

4.5.3 Reduce sample time period

The initial sample data range of this paper is 2015-2020. In order to eliminate the impact of the trade war between the United States and China and the spread of covid-19 on the performance of companies in corporate social responsibility, we chose a shorter sample interval for the robustness test. According to the robustness test results（Appendix 6）, the mixed linear regression model still supports the positive impact of the proportion of women directors on corporate social responsibility performance. From Appendix 6, the coefficient of percentage of women directors is 1.8289 with a t-value of 1.8148, which is significantly positively correlated at the 10% level. The coefficient of the presence of women directors (FE) is 0.0774 with a t-value of 0.2305. In line with the OLS regression results, there is no correlation between the two.

4.5.4 Winsorize

If the sample size is large, to prevent the influence of outliers on the research results, the tail of continuous variables is usually replaced. In this case, there are 18775 groups of sample data after excluding ST shares. Therefore, the data may contain extreme values, which will affect the applicability of the conclusion. Therefore, this study Winstonized the sample data. Replace a value less than 1% of the percentile with a value of 1%. Replace values greater than 99% of the percentile with a value of 99%. The results are based on those shown in the 4.3 OLS regression and are not repeated here.

In conclusion, this study employs an OLS model to investigate the connection between women directors and the level of corporate social responsibility (CSR) performance, and it makes use of PSM to match the core variable Ferat20 with CSR in order to mitigate the effect of endogeneity. The findings support our second hypothesis, which states that there is a favorable connection between the percentage of female directors and the performance of corporate social responsibility initiatives. In addition, the first hypothesis is not supported since there is no non-significant link between the presence of women directors and CSR performance. This indicates that the first hypothesis cannot be supported.

5. Discussion and conclusion

5.1 Key findings

One of the primary goals of this experiment was to discover how women directors affect the CSR performance of Chinese listed companies. The study addressed two main questions: Do women directors impact the CSR performance of Chinese companies? How do women directors impact CSR performance in Chinese companies? There are two explanatory variables in the study, the proportion of women directors and the dummy variable of the presence of women directors. The results of OLS regression, PSM, and robustness tests indicate a strong association between the proportion of women directors and CSR performance, supporting hypothesis 1b. It suggests that the higher the proportion of women directors, the better the company performs in terms of CSR. However, not all of the results were significant. The study did not demonstrate a significant correlation between the presence or absence of women directors and CSR performance in listed companies in China. This result negates hypothesis 1a. Moreover, the data suggest that the impact of company characteristics on corporate CSR is also significant. This includes company size, inception time, the nature of the company, the level of profitability, and the level of leverage, all of which significantly impact CSR performance in Chinese listed companies.

5.2 Critical discussion

Our findings show the absence of a significant correlation between the presence of women directors and CSR performance, while a strong positive association between the proportion of women directors and CSR performance is similar to the findings of Zaid et al. (2020) from Palestine. As in the case of Palestine, although the traditional social perception of gender roles in China has limited women's career development, women directors are more committed to care ethics, and the more communal and social gender role attributes are seen as initiators of positive strategic interests in the corporate governance and decision-making. Thus, as society progresses, Chinese women gradually gain social recognition for their abilities in the workplace.

For specific, firstly, hypothesis 1a: the presence of women directors is positively correlated with the CSR performance; but we obtained a contrary result, where the presence of women directors is not positively but not significantly correlated with CSR performance in listed companies in China. In contrast, Nadeem et al. (2017), Fuente et al. (2017), and Zahid et al. (2020) find that the presence of women directors on board matters, as even a small representation of women can have an impact on corporate CSR and that there is a positive and significant association. However, the reason for our result may be that while only one woman director of a minority group may also have a positive impact on a company's CSR issues, she is more likely to face greater challenges (Bear et al., 2010). Because the pressure of social convergence encourages alignment with the majority opinion, minorities are less likely to express their voices, and groups may only take it as a tokenistic opinion and not take it seriously (Konrad et al., 2008). According to Zaid et al. (2020), the limitations of women's participation in the boardroom compared to their men counterparts, in Palestinian companies, the low number of women directors on the board is the main reason why it is difficult to have a significant impact on the sustainability performance and decision making of the company. China, which is also a developing country and an emerging economy, has a low number of women directors on boards in listed companies in China, the average number of women directors is only 1.5 compared to the size of the board (3-17). Studies by Fernandez-Feijoo et al. (2012), Post et al. (2011), and Konrad et al. (2008) all suggest that their impact on CSR is realized when there are at least three women on the board and that the company performs better in terms of CSR. As the average number of women directors of listed companies in China is well below three, no legislation or policy has been passed in China to establish a quota for women to serve on corporate boards. As Lv (2019) argues, this paradox of the strong rise of women's power in Chinese business and the fact that the value of women directors is not yet fully perceived makes it difficult for their voices and corporate governance ideas to be heard and to have a real impact on CSR performance.

Secondly, hypothesis 1b, the proportion of women directors is positively correlated with the CSR performance; which is consistent with our findings. Valls Martinez et al. (2019) provide evidence from Spanish listed companies through empirical studies, as well as Bear et al. (2010) and Landry et al. (2016), who all find that the higher the proportion of women on a company's board, the more likely the company is to improve their CSR performance and become resident on lists of best corporate citizens and best companies to work for. Companies with more women directors may enhance communication and dialogue between company directors, may provide new perspectives on issues encountered in CSR, make it easier to address CSR issues, and increase the board's overall perception of CSR (Bear et al., 2010). Fernandez-Feijoo et al. (2012) also found that with an increase in women directors the negative impact of masculine individualism on CSR performance was reduced. Moreover, companies with a higher proportion of female board members have higher levels of charitable giving, which may also sensitize boards to CSR initiatives (Bear et al., 2010). These previous studies support our findings. We can reasonably argue that the reason for getting this positive result is in terms of socio-economic development in China. According to Lv (2019), Chinese women have emerged strongly in the business world and the value of women's participation in corporate governance is highly visible. 14 of the 50 most influential women in business in the world were from China in 2017 (including Hong Kong and Taiwan), accounting for 28%, and the labor force participation rate of Chinese women was over 63% in 2016 (the world average is less than 50%) (Lv, 2019). These reasons allow women to play a broader and less restricted public role in society (Issa and Fang, 2019).

In addition, from the results, there is an unexpected finding and suggests that company characteristics, such as company size, time of incorporation, nature of the company, level of profitability, and level of leverage, have a significant impact on the CSR performance of Chinese listed companies. The reason for the result may be that companies with larger market capitalization usually attract more social attention, and therefore they place more emphasis on CSR performance. Ali et al. (2017) found that some company characteristics drive CSR disclosure, such as profitability and corporate governance mechanisms. Several studies have confirmed that firm size and CSR levels are positively correlated (Giannarakis, 2014; Brammer and Pavelin, 2008). In other words, larger, more market-capitalized firms are more able to reduce the cost of CSR disclosure, they are inclined and able to engage in more CSR. This is because CSR enhances a company's reputation and brand, increases stakeholder trust, and helps companies build long-term viability in the marketplace (Abbott and Monsen, 1979; Perrini, 2005). As a result, larger firms may benefit more by enhancing their CSR performance. On the other hand, the impact of women directors on CSR can be influenced by the business environment and the firm's ability to operate (Lv, 2019). Lv (2019) also suggests that the more CSR responsibility is undertaken, such as in state-owned enterprises, and the poorer the CSR performance, such as in manufacturing firms, the more significant the influence of women directors on CSR's positive governance role is evident. Therefore, we can propose that the significant effect of company characteristics and the company's nature on CSR performance also makes women directors more likely to choose such large, well-run, and stronger social responsibility-oriented companies for their role in CSR.

5.3 Implication of study

The research contributes to the expansion of the existing theory by proving, in the context of the Chinese market, that CSR ratings are strongly and favorably connected to the proportion of women serving on a company's board of directors. (Al et al., 2019; Issa and Fang, 2019; Martinez et al., 2019). The data contributes a more precise understanding that the impact of board gender diversity on CSR needs to be achieved through a certain percentage of women directors. These Chinese empirical evidence results are consistent with findings from other countries or regions. (Konrad et al., 2008; Post et al., 2011; Fernandes-Deijoo et al., 2012). Boulouta (2013) states that women are more concerned about the quality of their work and stakeholder satisfaction. The acting style gives an advantage to corporate governance and allows companies with a high proportion of women to have a higher level of CSR performance. Moreover, this positive impact may stem from the issue of voice.When there are a sufficient number of women directors in a company, the function that they play there may be brought into focus, and their voices will be heard to the appropriate degree. (Konrad et al., 2008).

This study not only theoretically complements the existing research on Chinese listed companies. Moreover, it has important implications for corporate governance as well as policymakers. On the one hand, it helps company management focus more on board structure and the role of women in the company. The positive impact of women on CSR performance may further affect the company's reputation (Bear et al., 2010) and positively impact financial data and stock value (Fombrun, 2006). As a result, investors add more tools to judge a company's potential through these studies. When a company has better gender diversity in its board structure, this is seen as having the potential to achieve a better corporate reputation and financial performance. Additionally, this study suggests that enterprises should provide more education, training, development, and advancement opportunities for women employees to leverage the value of women in the company and to ensure equal access to advancement. Besides, Human resources training programs in Chinses listed companies should be made equally accessible to women.

On the other hand, the study provides an essential basis for policymakers to promote gender diversity on the boards of directors of Chinese listed companies. A recent Deloitte (2022) report shows that the average percentage of women directors in China is only 12.64%, well below the world average. Improving this phenomenon requires not only the optimization of the board structure by the companies themselves, but also the relevant laws and regulations can change the status more favorably. The government can increase the protection of women's employment, improve the environment for Chinese women to seek education and employment, reduce unfair treatment, and increase the employment rate of women. In addition, the state can regulate the gender structure of corporate management by enacting relevant laws and regulations to increase the proportion of women directors in China.

5.4 Limitation and future research

First, our research verifies the beneficial effect of women directors on CSR and demonstrates that this effect is proportional to the number of women directors. However, the theoretical foundations for why women directors can have a beneficial influence on CSR need further development. In other words, why are women more concerned with social duty, and why is this a regular occurrence? Future study may include substantial inter-disciplinary investigations in psychology and sociology. Second, the core variable of this paper is the proportion of women directors. Other demographic traits are not fully considered because it is beyond the scope of the study. For example, studies on women directors' educational experience, work experience, and age help complement relevant research on the relationship between board structure and CSR. Third, the study found that company size, company nature, and company profitability significantly impact CSR. Future research could refine this area by limiting the sample to conditions of a particular company trait—for example, the study of women directors and CSR performance in state-owned or non-state-owned companies. Fourth, we controlled for industry and year effects in this study, but did not specifically analyze industry variability. It is a direction for future research that considers the impact of industry differences on CSR performance and the differences in the impact of women directors on CSR in different industries. Besides, Our study is based on non-financial companies and for this reason the results do not explain all companies in China. Further research can also extend this scope to enhance the general applicability of the findings. Last but not least, our empirical result can not give a significant threshold value for the proportion of women directors to determine at which level the proportion of women directors begins to have a significant impact on CSR. It has been shown that three or more women board members have a significant impact on CSR performance. (Konrad et al., 2008; Post et al., 2011; Fernandes-Deijoo et al., 2012). However, similar studies do not indicate whether there would also be a threshold for the proportion of women directors. Further research is needed to establish the model to supplement this area with data from Chinese listed companies. It can help policymakers have a more precise basis for determining whether the proportion of women directors needs to be added to the legal requirements.

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Appendix

Appendix 1 Industry distribution

Distribution of firms by industry	
Mining	417
Electricity, heat, gas and water production and supply	623
Real estate	611
Construction	504
Transportation	550
Education	59
Residential services, repair and other services	3
Scientific research and technology services	228
Agriculture	202
Wholesale and retail	886
Water conservancy, environment and public facilities management	319
Health and social work	52
Culture, sports and entertainment	296
IT	1505
Manufacturing	12134
Accommodation and catering	37
Comprehensive	60
Lease	289
Total	**18775**

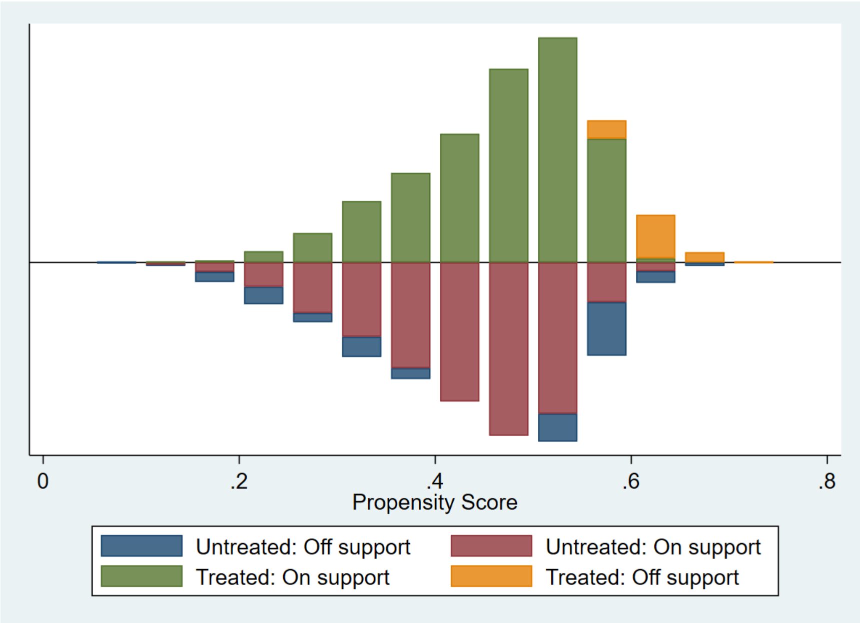
Appendix 2 Classification of CSR reporting indicators

1. Shareholder responsibility (30%)
    - A1: Profitability 10%
    - A2: Debt service capacity 3%
    - A3: Returns 8%
    - A4: Letter of disclosure 5%
    - A5: Creativity 4%
2. Employee responsibility (15%)
    - B1: Performance 5%
    - B2: Security 5%
    - B3: Caring for employees 5%
3. Supplier, customer, and consumer's rights and responsibility (15%)
    - C1: Quality of products and services 7%

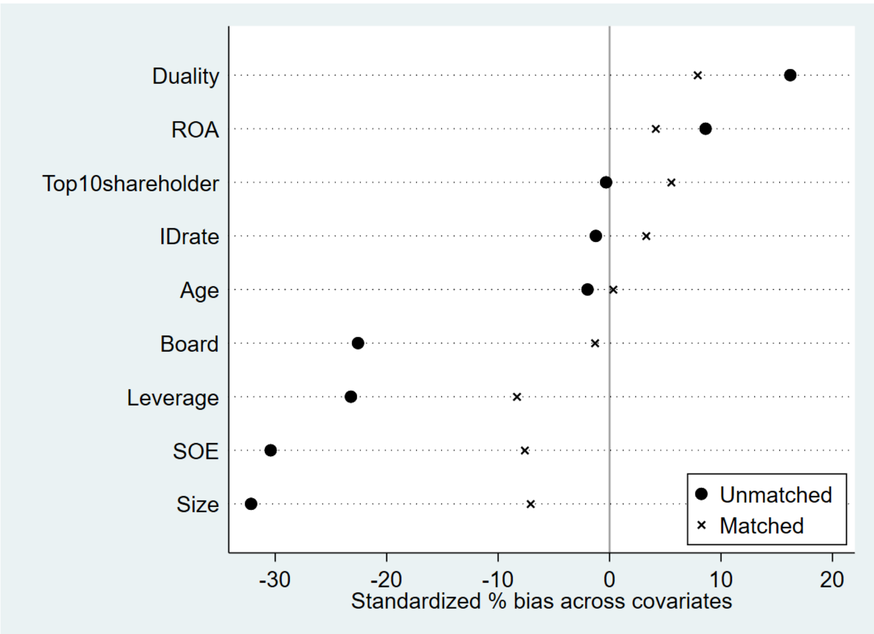
- C2: After Sales Service 3%
- C3: Integrity and Reciprocity 5%

4. Environmental responsibility (30% in manufacturing, 10% in services, 20% in other sectors)
   - D: Environmental Governance
5. Public responsibility (10% in manufacturing, 30% in services, 20% in other sectors)
   - E: Society Contributing value

Appendix 3 Propensity score



Appendix 4 Comparison of standard bias of control variables



Appendix 5 Regression result of lag one period

Table: Lag One Period Var

	CSR	CSR
Ferat	1.4524**	
	(2.4049)	
FE		0.3262
		(1.5457)
Board	0.0937*	0.0777
	(1.7323)	(1.4374)
Duality	0.0182	0.0340
	(0.0931)	(0.1738)
Top10shareholder	0.0911***	0.0912***
	(15.1976)	(15.1999)
Size	2.7588***	2.7401***
	(15.6571)	(15.5735)
Age	0.0241	0.0244
	(1.4420)	(1.4594)
SOE	0.4645**	0.4353**
	(2.1897)	(2.0574)
ROA	43.9698***	44.0066***
	(35.9627)	(35.9920)
Leverage	0.6048*	0.5961*
	(1.8941)	(1.8668)
_cons	-11.6378***	-11.2816***
	(-6.3464)	(-6.1832)
Year/Industry	Controlled	Controlled
N	14994	14994
r2	0.2315	0.2313
r2_a	0.2300	0.2298

Appendix 6 Regression result of reducing sample period

Table: Pooled OLS Regression Result 2015-2017

	CSR	CSR
Ferat	1.8289*	
	(1.8148)	
FE		0.0774
		(0.2305)
Board	0.0393	0.0252
	(0.4396)	(0.2824)
Duality	-0.0492	-0.0309
	(-0.1546)	(-0.0971)
Top10shareholder	0.0163*	0.0162*
	(1.6633)	(1.6563)
Size	7.5615***	7.5230***
	(23.4943)	(23.3850)
Age	0.0577**	0.0583**
	(2.0590)	(2.0783)
SOE	1.6492***	1.5942***
	(4.8235)	(4.6745)
ROA	106.5207***	106.6180***
	(38.9709)	(39.0050)
Leverage	-6.6140***	-6.6376***
	(-7.2533)	(-7.2783)
_cons	-57.0408***	-56.2280***
	(-18.0830)	(-17.9089)
Year/ Industry	Controlled	Controlled
N	8375	8375
r2	0.3025	0.3022
r2_a	0.3003	0.3000