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Board gender diversity and corporate social responsibility

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Abstract

Based on a total of 1,590 listed non-financial firms on the Taiwan Stock Exchange and the Taipei Exchange (formerly the Over The Counter securities market) covering the period of 2007~2020, this study examines whether firm's performance on Corporate Social Responsibility (CSR) is affected by corporate board gender diversity. Based on the Upper Echelons Theory, the Agency Theory and the Resource Dependence Theory, increasing the number of female director to achieve higher level of gender diversity brings forth traits such as compassion, kindness, helpfulness, empathy, interpersonal sensitivity, a willingness to nurture, and a greater concern for others' well-being. These traits help firms form policies that prioritize stakeholders' welfare. Moreover, board gender diversity corresponds to a more diverse and broad background, understanding and experience of business operations, enabling firms to better understand where the key interest groups they face are and what they value. This allows firms to make more effective and better-performing decision in CSR. Through correlation analysis and multiple regression estimation, the principal outcome shows that greater degree of board gender diversity is associated with better CSR performance, confirming the hypothesis that a more gender diversified board enhances the efficiency of monitoring and advising function of board and then forming corporate strategies and implementations toward a better stakeholders' management.

Keywords Board gender diversity, Corporate social responsibility

Introduction

After the 1997 Asian financial crisis, "strengthening corporate governance mechanisms" was considered a remedy for firms to withstand crises. The 1998 Ministerial Conference of the Organization for Economic Cooperation and Development (OECD) further revealed that one of the key factors preventing Asian firms from enhancing international competitiveness was the malfunctioning of corporate governance. Following the series of corporate scandals and accounting frauds triggered by the 2001 Enron case in the United States, the U.S. government took proactive measures to address corporate governance issues, leading to the enactment of the Sarbanes-Oxley Act (SOX Act). The board of directors is a crucial component of internal corporate governance mechanisms. It serves as the highest decision-making body within a corporation, holding the core of power over various corporate decisions. In addition to its role in nominating top management, the board of director also provides advising and monitoring function on the management (Fama and Jensen, 1983). The effective functioning of the board has a significant impact on the quality of managerial decisions and the stability of a corporation's operations and outcomes. As a result, the media and the academics attribute numerous corporate scandals to the underperformance of corporate boards (Claessens, Djankov and Lang, 2000).

With the changing values of the public, the female's awareness is gradually on the rise, leading to an increasing number of women participating in corporate governance and decision-making. They take on roles as director, independent director and top management within corporation. Governments across countries are

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also actively encouraging corporation to improve gender diversity in line with gender mainstreaming principles to achieve gender balance. On April 17, 2014, Taiwan established the "Women on Boards" alliance, initiated by nine female business leaders and scholars. The "Women on Boards" alliance aims to promote government legislation to increase the number of female director in public and private enterprises and the ratio of female director and other top-tier positions. It emphasizes that the formation of this alliance is not about replacing men but about breaking the invisible "Glass Ceiling" that exists for women in the workplace. In the business world, it has already taken shape that firms with female director outperform those without them. Today's business intelligence has well understood that women bring diverse perspectives, experience, and knowledge to the business, helping corporation reduce risk and enhance long-term competitiveness. The era of male dominance in top positions of large corporation is shifting, with women making a significant impact as director, reflecting a global trend.

Women worldwide have demonstrated outstanding performance in various workplaces. Inclusion in the *Forbes*'s 2017 list of "The World's 100 Most Powerful Women In 2017" features executives like Sheryl Sandberg, COO of Facebook, Mary Barra, CEO of General Motors, Susan Wojcicki, CEO of YouTube, and Lisa Su, CEO of Advanced Micro Devices (AMD). Taiwan's first female president, Ing-wen Tsai, and entrepreneurs like Xuehong Wang, named among the "50 Most Powerful Women in Business" globally, further underscore the advent of a new era for women in the business world. Concurrently, gender diversity in corporate board holds significant importance. According to research from Credit Suisse covering 2,360 publicly traded corporations from 2005 to 2011, corporations with female director, particularly those with market capitalization below $1 billion, outperformed those without female director by an average of 17%. For corporations with market capitalization over $1 billion with female director, this outperformance increased to 26%. In July 2012, after Marissa Mayer took over as CEO of Yahoo, the corporation's sales grew by 4%, and its stock price surged by 30%. This marked the first sales growth in four years for the corporation, indicating effective leadership. Statistical data from Taiwan's Financial Supervisory Commission in 2016 revealed that the average return on equity for typical listed corporations was approximately 4.01%. Corporations with female director saw a substantial boost, reaching a return on equity of 6%. This data suggests that the characteristics and contribution of women have a positive impact on a corporation's decision-making and operation consequences.

There has been a rich discussion and examination in existing research regarding the impact of having female director in corporation. The potential benefits include the following (Chen, 2016). Firstly, female director often exhibits a higher sensitivity to social and environmental issues (Williams, 2003). Appointing female director enhances a firm's commitment to and decision-making quality concerning social and environmental issues, resulting in a better reputation among stakeholders (Bear, Rahman and Post, 2010; Branco and Rodrigues, 2008). Secondly, a survey conducted by the UK Government Equalities Office in 2010 revealed that 59% of respondents believed that management teams composed of only one gender tend to have overly uniform thinking, making it challenging to achieve objective analysis and leading to poorer decision-making outcomes. Miller and Triana (2009) suggest that heterogeneous groups, with different backgrounds, education, and experience, bring diverse perspectives to the decision-making process. Fondas (2000) points out that female director, particularly external female director, provide a more independent viewpoint and stance to the board. The participation of women in the boardroom breaks the "old boy network," which might exert pressure on male directors to coordinate and conform (Perrault, 2015). Kramer, Konrad, Erkut and Hooper (2006), Adams, Gray and Nowland (2010), Carter, Simkins and Simpson (2003) provided similar statements.

Thirdly, women possess inherent traits that differ from men, and they tend to be more interdependent, compassionate, and tolerant (Adams and Funk, 2012). This predisposition aids in information and perspective acquisition and promotes collaboration. The skills and abilities that women excel in during leadership are complementary to those of men. Research by Bart and McQueen (2013) found that women prefer a cooperative approach to decision-making, which enables them to make fair decisions when competitive interests are at stake. Kramer et al. (2006) highlight that female directors bring a cooperative leadership style to the boardroom, making board members more willing to listen to one another's opinions and reach more comprehensive decision. Fourthly, considering the outstanding performance of women in various fields and their capabilities, businesses that incorporate gender diversity as a factor in director appointments have a greater opportunity to promote more outstanding talent. Boards with gender diversity are more likely to create a richer information environment, reducing the cost of information collection for the corporation (Gul, Srinidhi and Ng, 2011). Westphal (1999) suggests that appointing more female directors tend to think outside the traditional framework and that female directors are usually willing to provide guidance and advice to

subordinates, bringing new perspectives and injecting fresh energy into the corporation.

Fifthly, the experience women have in their everyday roles, such as household shopping and general consumer needs, are increasingly important in industries that are becoming more consumer-centric. Female directors' knowledge and life experience provide unique insights into consumer decision-making, offering valuable input to the corporation's strategy (Bilimoria and Wheeler, 2000; Campbell and Minguez-Vera, 2008; Carter, Simkins and Simpson, 2003). Sixth, Kramer et al. (2006), Campbell and Minguez-Vera (2008) and Nielsen and Huse (2010) argued that female directors provide effective monitoring, thereby compensating for deficiencies in external governance. Therefore, when corporations have a higher proportion of female director, they can effectively control board decisions and corporation operations, ultimately enhancing the efficiency of corporate monitoring and contributing to improved corporate performance.[1] Seventh, most studies showed that female executives often adopt more conservative corporate strategies (Huang and Kisgen, 2013) and their corporations have higher survival rates (Faccio, Marchica and Mura, 2016). Female executives tend to employ more conservative accounting policies (Byoun, Chang and Kim, 2011; Francis, Hasan, Park and Wu, 2015).

However, some studies also point out certain disadvantages of female participation in board (Prihatiningtias, 2012; Dobbin and Jung, 2011). First, there is a bias against female board member in the market, possibly due to the fact that the majority of investors are male, and they often hold negative stereotype about women in senior management positions. Bigelow and Parks (2006) found that male investors in the United States are willing to invest three times more money in corporation led by men than in those led by women. This male dominance attitude among investors is even more pronounced in emerging economies. Haslam, Ryan, Kulich, Trojanowski and Atkins (2010) argued that boards with only male member receive higher evaluations than those with female member, which could lead to a negative perception of corporation with women on the board. Having more female board member has been associated with lower performance and reduced accounting returns (Darmadi, 2011; Minguez-Vera and Martin, 2011) and may lead to a loss of overall shareholder value (Bøhren and Strøm, 2010).

Second, despite the active promotion of board gender diversity in Norwegian listed corporations through legislative quotas, the nominating process often results in less qualified female candidates being nominated, reducing the quality of female directors and diminishing their positive influences (Ahern and Dittmar, 2012). Tokenism theory discusses the notion that underrepresented minority groups in senior management positions, such as gender and race, may be perceived as "tokens" or "solos". The presence of a small number of women in leadership positions reinforces societal gender stereotypes. Women may be seen as "symbols", marginalized in male-dominated environments (Kanter, 2008). Ahern and Dittmar (2012) also found that the implementation of female director quotas in Norway led to a decrease in firm value. Board gender diversity may lead to increased internal conflicts, hinder board operational efficiency, lower decision-making quality, increase functioning costs of organization, and, subsequently result in a decrease in corporation value.

Third, if certain positive female traits are not managed properly, these traits may have negative effects. As mentioned in previous studies, female directors excel in monitoring and control roles, but overly intensive monitoring can reduce management incentives to share strategic information, leading to poor advising (Adams and Ferreira, 2007; Holmström, 2005). Adams and Ferreira (2009) suggested that board gender diversity does not necessarily improve performance. Furthermore, the implementation of female director quotas in corporations with strong corporate governance may lead to overregulation, potentially decreasing shareholder value. It may also encourage management myopia, resulting in reduced investments, especially in long-term, risky ventures such as corporate innovation (Faleye, Hoitash and Hoitash, 2011; Becker-Blease, 2011). Additionally, female directors tend to be more risk-averse and less confident (Croson and Gneezy, 2009), and are likely unwilling to undertake high-risk and unpredictable innovation activities (Galasso and Simcoe, 2011; Hirshleifer, Low and Teoh, 2012). Dargnies (2012) argueed that women lack experience in leadership positions and may have less motivation to

[1] Many existing studies indicate that board gender diversity has a positive impact on firms (Ahern and Dittmar, 2012; Matsa and Miller, 2013; Carter, Simkins and Simpson, 2003; Nielsen and Huse, 2010; Hafsi and Turgut, 2013; Galbreath, 2018). For instance, Adams and Ferreira (2009) found that female director promotes higher board attendance and increases the board's monitoring of the management. Gul, Srinidhi and Ng (2011) demonstrated that firms with gender-diverse board reflect more specific information in stock price, thereby increasing transparency of information among stakeholders. Liu, Wei and Xie (2014) showed a positive correlation between board gender diversity and firm performance. Galbreath (2018) also indicated that female director enhances financial performance through the positive influence on CSR. Carter, Simkins and Simpson (2003) found a significant positive relationship between female director and firm value. Levi, Li and Zhang (2014) found that female directors are less likely to engage in mergers and acquisitions (M&A) and, when they do, they pay lower M&A premiums, suggesting that female directors are better at avoiding erroneous M&A decisions, thereby creating value for shareholders. Isidro and Sobral (2015) found that the presence of female director enhances ethics and social responsibility, ultimately increasing firm value.

climb the corporate ladder, potentially undermining their effectiveness as board members.[2]

This study employs data from 1,590 non-financial industry listed firms on the Taiwan Stock Exchange and the Taipei Exchange between 2007 and 2020 to examine whether the board gender diversity influences its CSR performance. The potential contributions are following. First, while the stakeholders of a firm are wide-ranging, including not only shareholders and creditors but also employees, consumers, government and non-governmental organizations, upstream suppliers, and other external third parties who are potentially related to the firm's operations. This study decomposes one of overall CSR performance measure, namely, social contribution value, into four components, including the total amount of after-tax net income potentially paid to shareholders, the total amount of salaries/benefits paid to employees, the total amount of interest paid to creditors, and the total amount of taxes paid to the governments. The advantage of using these decomposed variables to measure CSR allows for a more comprehensive and detailed examination of the effect of board gender diversity on performance of various individual CSR aspects.

Secondly, this study takes a more nuanced approach by creating several variables proxed for the degree of board gender diversity. By observing the gender data of specific board members on an individual basis, this study constructs variables that measure whether a particular firm has female director, the number of female director, the female director ratio, the Blau Index of board gender diversity, whether the firm has female independent director. This approach provides a more comprehensive measure of the extent of female board member participation. Thirdly, this study constructs non-gender characteristic variables such as average board member's educational level, average tenure, and average board's meeting attendance rate. This is done to examine whether these characteristics strengthen or weaken the relationship between board gender diversity and CSR performance, thus uncovering the mechanisms through which board gender diversity contributes to improved firm's CSR performance.

[2] Adams and Ferreira (2009) found no significant relationship between board gender diversity and corporate performance. Empirical research by Wang and Clift (2009) surveyed large Australian companies and found that gender-diverse board had no significant impacts on financial performance indicators such as return on assets and return on equity. Many studies have shown that female director representation is not correlated with performance (Carter, D'Souza, Simkins and Simpson, 2010; Rose, 2007; Shrader, Blackburn and Iles, 1997), and in some cases may even decrease profitability and firm value (Matsa and Miller, 2013; Ahern and Dittmar, 2012). Carter et al. (2010) conducted research on listed firms on the S&P 500 index and find no significant relationship between board gender and ethnic diversity and financial performance.

The next section is hypothesis development, followed by the third section on the introduction of variables, econometric model, firm samples, and data resource. The fourth section presents empirical results, and the final section concludes with recommendations.

Literature review and hypothesis development

The development and regulation of board gender diversity

In recent years, many countries around the world have been enacting regulations related to board gender diversity. For example, Norway passed a law as early as 2003, requiring that 40% of directors of publicly listed corporations be female. In June 2022, the European Parliament and the Council of the European Union reached a significant gender equality agreement, stipulating that European Union-listed corporations must ensure that by the end of June 2026, at least 40% of non-executive directors (those who do not hold senior executive positions within the corporation) are female, or that women make up at least 33% of all board seats. Furthermore, in August 2021, the U.S. Securities and Exchange Commission required Nasdaq-listed corporations to appoint at least one female director and one director from an underrepresented minority or LGBTQ (a term that represents the non-heterosexual community) background, or face delisting. Clearly, gender diversity on corporate boards has become a focal point of attention in the corporate governance landscape in various capital markets worldwide.

According to Deloitte's 2022 report on "Women in the Boardroom", the study encompassed a total of 51 countries. The research revealed that, on average, the proportion of female director in 2021 was 19.7%. European corporations, for the most part, exceeded the global average for female board member, with France at 43.2%, Norway at 42.4%, and the United States at 23.9%. In contrast, corporations in Asia, the Middle East, and Latin America had lower averages, with Singapore at 17.6%, Hong Kong at 13.9%, China at 13.1%, Taiwan at 12.2%, Japan at 8.2%, and South Korea at 4.3%. The survey also indicated that "almost 30% of female director actively participate in the formulation of corporate governance, audit, nomination, compensation, risk, and other strategic or management policies".

In order to strengthen corporate governance, including the enhancement of board effectiveness, the Financial Supervisory Commission (FSC) of Taiwan encourages and supervises listed and publicly traded corporations to focus on the diversity of board members in terms of expertise and gender. The Taiwan Stock Exchange, in line with the FSC's policies, has been continuously improving the gender composition of the boards of publicly listed and OTC-listed corporations since 2013. In 2015, the "proportion of female director" was included as an

indicator in the "corporate governance evaluation" of these corporations, and the scoring criteria have been progressively raised each year. In 2019, the criterion was updated to include "at least one-third of board seats held by either gender" as part of the corporate governance evaluation. In late 2021, amendments were made to the "Corporate Governance Best Practice Principles for Public Companies", recommending that the proportion of female director should reach one-third of board seats. Additionally, in 2020, the FSC unveiled specific initiatives within the "Corporate Governance 3.0 - Sustainable Development Blueprint", which included "disclosure of board diversity information". Starting from 2022, publicly listed and OTC-listed companies are required to disclose information about the gender distribution on their boards in annual reports. By mandating the transparent disclosure of board diversity information, this aligns with the international trend towards promoting gender equality.

According to data from the Taiwan Stock Exchange, in 2022, the proportion of female director in Taiwan's publicly listed and OTC-listed companies was 14.47% and 15.48%, respectively. The growth has been relatively slow, with an increase of only 0.57% and 0.91% in 2022. Additionally, Taiwan's financial media has found that only 10% of publicly listed and OTC-listed companies have met the Taiwan Stock Exchange's 2021 recommendation of having one-third of their board seats occupied by female director. Board gender diversity has become a significant policy issue in many countries, but in comparison to benchmarks set by the European Union, Taiwan's progress is still quite distant. Clearly, there is considerable room for improvement in this regard.

Board gender diversity and CSR performance

Upper Echelons Theory (Hambrick and Mason, 1984) suggested that the social and psychological attributes of top-level executives, such as those in the board of directors and senior management, are reflected in a firm's decision-making process and have a significant impact on its operational outcomes. Gender is one of the observable factors, and literature, such as Croson and Gneezy (2009), has confirmed differences between men and women in many personality and socio-psychological attributes, including self-confidence, risk tolerance, and information acquisition. Academic research has, consequently, begun to explore whether there are changes in a firm's operational decisions and outcomes when women hold high-level or leadership positions.

The influence of women in top corporate positions is primarily grounded in two theories: Agency Theory by Jensen and Meckling (1976) and Resource Dependence Theory by Pfeffer and Salancik (2003). The Agency Theory of Jensen and Meckling (1976) suggests that when ownership and control of a corporation are separated, information asymmetry arises, as management possesses more information about the corporation than shareholders. Under information asymmetry, management has more discretion and is more likely to pursue their own interests, potentially harming shareholders' interests and resulting in agency cost. The corporation's board of directors reduces these agency costs by monitoring the actions of the management, aligning their actions with shareholders' interests.

Cumming, Leung and Rui (2015) pointed out that women in the board of directors enhance board efficiency and independence through more rigorous monitoring activities. Female directors are less likely to engage in financial fraud and reduce agency costs through transparency. The increased efficiency in monitoring activities also improves the quality of the financial reporting system, thus reducing earnings management practices (Gul, Srinidhi and Ng, 2011; Srinidhi, Gul and Tsui, 2011; García Lara, García Osma, Mora and Scapin, 2017; Zalata, Ntim, Alsohagy and Malagila, 2022). Atif, Liu and Huang (2019) and Chen, Leung and Goergen (2017) each indicated that female directors lower managerial discretion in using corporation resources by supervising the excess level of cash holdings and dividend payments. In conclusion, female directors enhance the efficiency of board oversight over management, leading to a higher degree of alignment with shareholder interests in operating the corporation, thus creating more value for both the corporation and its shareholders.[3]

The Resource-Based Theory of Pfeffer and Salancik (2003) argues that business rely on external environmental resource, and a corporation's performance and survival depend on the board's ability to establish sufficient connections and exchange capabilities with the external environment. Directors of the corporation must establish connections with the outside and acquire adequate resource and information, providing management with

[3] However, existing studies pointed out that women are less trusting than men (Rau, 2012) while being more willing to cooperate with others (Sibley, Senn and Epanchin, 1968; Frank, 1993; Ortmann and Tichy, 1999). There is literature suggesting that female director exhibit a higher level of risk aversion (Huang, Hsu and Lee, 2021). For instance, Adams and Funk (2012) argue that women, in order to break the "Glass Ceiling" phenomenon in society, may align their decision-making and behavior more closely with that of men. Through a survey of directors and CEOs of listed Swedish companies, Adams and Funk (2012) found that female directors are more risk-seeking than their male counterparts. They note that the perception of women as relatively risk-averse is a stereotype. Nelson (2015) also presented the argument that women are not inherently more risk-averse than men. Therefore, female directors may be more inclined to collaborate or even collude with other directors, as well as collaborate or collude with existing management. This may undermine the effectiveness of monitoring, deteriorating corporate governance and CSR performance.

sufficient advice and counsel to enable the corporation to use these resources for improved operations and sustainability. The capabilities of women are particularly beneficial in connecting the corporation with the external environment (Chen, Leung and Goergen, 2017) and facilitating the acquisition of external resources and funding to meet the corporation's needs (Atif, Liu and Huang, 2019; Liu, Wei and Xie, 2014). Board gender diversity enhances the discussion of new issues, broadens expertise, strengthens board experience, and improves the quality of decisions, ultimately increasing the board's effectiveness (Gul, Srinidhi and Ng, 2011). Gender-diverse boards are more independent and effective because these directors provide diverse resources and experience for the corporation's strategic decisions (Nielsen and Huse, 2010; Ramon-Llorens, Garcia-Meca and Pucheta-Martínez, 2020). In summary, female directors contribute to increasing the value of the corporation through their networking and socialization skills, enhancing the board's advising and resource-providing function.

Faccio, Marchica and Mura (2016) found that when a corporation's CEO is female, the firm tends to have lower leverage and lower earnings volatility. Similarly, when there is a transition from a male CEO to a female CEO, the firm experiences a decrease in risk-taking, and vice versa. Perryman, Fernando and Tripathy (2016) discovered a relationship between increased gender diversity in the corporation's senior management and reduced risk-taking. Sila, Gonzalez and Hagendorff (2016), as well as Ciappei, Terzani, Bafundi and Liberatore (2023), also obtained similar findings. Additionally, some studies have explored how women in top corporate positions impact the financial reporting quality and earnings management behavior of firms. For example, Francis, Hasan, Park and Wu (2015) investigated how the gender of the Chief Financial Officer (CFO) affects financial reporting decision and accounting conservatism. They found that the transition from a male to a female CFO is associated with increased financial reporting conservatism. Firms with female CFOs tend to have lower equity-based compensation, lower corporate risk, higher level of tangible assets, and lower dividend payout ratio, supporting the notion that female CFOs may be more risk-averse than their male counterparts. Gul, Srinidhi and Ng (2011) argued that gender diversity in corporate boards enhances discussion of new issues, expands professional knowledge, strengthens board experience and decision quality, and improves board effectiveness. Gender diversity improves communication and information transparency for stakeholders. Srinidhi, Gul and Tsui (2011) pointed out that female directors better satisfy investors' needs for proper governance in financial reporting, increasing confidence in financial reports. Investors tend to have more confidence in financial reports with female directors, and in the case of fraud allegations, negative reactions from investors are likely to be reduced, as females are seen as more conservative and ethical than males (Cumming, Leung and Rui, 2015; Francis, Hasan, Park and Wu, 2015). García Lara, García Osma, Mora and Scapin (2017) found that firms with female independent director are less likely to engage in earnings management, which improves audit quality (Bose, Hossain, Sobhan and Handley, 2022) and enhances communication and information transparency toward stakeholders (Gul, Srinidhi and Ng, 2011).

In recent years, CSR, ESG (Environment, Social, Governance) and sustainability have become integral consideration in a corporation's strategic and decision-making process (Galbreath, 2011). Firms are increasingly required to respond to the demands of various stakeholders and prioritize the protection of their interests. These stakeholders encompass not only those with economic interests, such as shareholders and creditors, but also employees, communities, and upstream suppliers and downstream customers. To meet these diverse expectations, the composition of the board of directors has become a critical aspect of corporate sustainability governance. Michelon and Parbonetti (2012) have pointed out that the quality of board decision affects a corporation's willingness and effectiveness in engaging in CSR. Boards with good attributes tend to make high-quality decisions, thus better safeguarding the interests of all stakeholders (Huang, Hsiao and Lai, 2007; Shahzad, Rutherford and Sharfman, 2016). Cuadrado-Ballesteros, Martínez-Ferrero and García-Sánchez (2017), on the other hand, have highlighted the relevance of factors like board size, board independence, and board diversity to CSR performance.

Arayssi, Jizi and Tabaja (2020) pointed out the significant role that female directors play in enhancing CSR and a firm's positive image. Female directors strengthen CSR performance (Bear, Rahman and Post, 2010; McGuinness, Vieito and Wang, 2017), improve financial performance (Liu, Wei and Xie, 2014; Post and Byron, 2015), and exert more control over executive compensation (Lucas-Perez, Mínguez-Vera, Baixauli-Soler, Martín-Ugedo and Sanchez-Marín, 2015). Female managers enhance a firm's sustainability in terms of superior social performance, CSR engagement, and environmental disclosure (Atif, Hossain, Alam and Goergen, 2021; Erin, Adegboye and Bamigboye, 2021). Ramon-Llorens, Garcia-Meca and Pucheta-Martínez (2020) and Erin, Adegboye and Bamigboye (2021) indicated that women are more likely to engage in sustainable, social, and environmental activities. Qiu, Ren, Zuo and Cheng (2022) have found that the involvement of female directors contributes to increased

social trust in the corporation because female directors enhance the ESG information disclosure.

Bear, Rahman and Post (2010), as well as Byron and Post (2016), found that female directors enhance social performance because they are more attuned to the voices and interests of various stakeholders, which promotes the corporation's commitment to CSR and reputation management. Female directors tend to place greater emphasis on the community, and, through their participatory leadership style and involvement in social activities, they contribute to raising awareness and engagement, thereby bolstering CSR. McGuinness, Vieito and Wang (2017) and Ramon-Llorens, Garcia-Meca and Pucheta-Martínez (2020) support the finding that female directors increase CSR awareness within companies. Female directors are more focused on quality outcomes and exhibit greater social sensitivity compared to their male counterparts. Manita, Bruna, Dang and Houanti (2018) found that the presence of female directors increases the frequency of ESG information disclosure. Due to their heightened community focus, female directors willingly provide more environmental information and enhance the corporation's transparency (Liao, Luo and Tang, 2015). Furthermore, Ben-Amar, Chang and McIlkenny (2017) discovered that female directors, relative to male counterparts, more frequently discuss environmental issues in board meetings. Research by Liao, Luo and Tang (2015), Ben-Amar, Chang and McIlkenny (2017), and Hollindale, Kent, Routledge and Chapple (2019) found that female directors increase voluntary disclosure and enhance the transparency of environmental information. Atif, Hossain, Alam and Goergen (2021) found that independent female directors, when they reach a critical mass of at least two female directors, help to increase the consumption of renewable energy sources. Based on the above arguments, this study proposes the first hypothesis:

Hypothesis 1: *There is a positive relationship between the degree of board gender diversity and firm's CSR performance.*

Variables, econometric model, samples and data

Variables

Explained variables-CSR performance

According to Chang (2011), Taiwan's leading business magazine, the *Common Wealth*, conducted a corporate citizenship survey in 2007 for publicly traded firms in the Taiwanese financial market. The survey referenced international indicators and assessment methods, including the United Nations Global Compact, OECD Guidelines for Multinational Enterprises, and the Dow Jones Sustainability Index. It evaluated companies in four aspects: corporate governance, corporate commitment, social engagement, and environmental protection, in order to select the "Best Corporate Citizens" among the evaluated companies. The process of selecting the Best Corporate Citizens list first filtered companies from publicly traded companies that had been profitable for three consecutive years. Subsequently, more than 500 institutional analysts, accountants, and experts from the business, government, and academics, who have long been concerned with CSR, rated the performance of the companies in above four aspects. The scores were then weighted to obtain the total scores for each corporation, and the top 50 with the highest total scores were named the "Best Corporate Citizens TOP50".

Similarly, according to Chang (2011), another Taiwan's leading business magazine, the *Global Views Monthly* began conducting a comprehensive survey on CSR for publicly listed companies in 2005. They referenced the rating weight criteria from the German social responsibility research institution, OEKOM. The evaluation focused on three aspects: social performance, environmental performance, and financial information of the evaluated companies, with weighted scoring. They also examined other information related to the evaluated companies, including, (1) audit questionnaire content and negative news reports, (2) external evaluations from organizations such as the Ministry of Environment, Ministry of Labor, Consumer Protection Committee in Executive Yuan, and other non-governmental organizations, (3) eliminating of companies involved in significant labor disputes, environmental pollution cases, major consumer disputes, and businesses whose owners had travel restrictions due to legal issues in the past two years, (4) eliminating of companies with three consecutive years of operating losses. Companies that scored well in these evaluations were awarded the annual "CSR Award".

This study constructs three variables to measure a firm's CSR performance based on the list of winning firms of the *Common Wealth*'s "Corporate Citizen Awards" and the *Global Views Monthly*'s "CSR Awards" from 2007 to 2020. The first variable is current performance of CSR (*csrdummy*), which is a dummy variable that equals 1 if the firm has won either of the two awards in a specific year, and 0 otherwise. The second is cumulative performance of CSR (*csrcumu*),defined as the total number of years a firm has been win either or both of the awards (either award is sufficient). For example, if a firm has been win either or both of the awards for four years (missing one year) at the fifth year, the value of *csrcumu* at the fifth year is set to 4. The third variable is continuous performance of CSR (*csrcont*), which is also a dummy variable that equals 1 for a firm in every year of the data period (14 years) if it has won either of the two awards every year, but equals 0 if it fails to win either of the two

awards in any year. The fourth variable is overlap performance of CSR (*csrovlp*), which is a dummy variable that equals 1 if a firm has won both of the two awards in a specific year, and 0 otherwise.

In addition, this study refers to Huang and Chang (2021) to calculate the social contribution value of each firm-year sample as a measure of CSR performance. Social contribution value refers to the amount that a firm pays to its primary stakeholders, including shareholders, employees, government, and creditors each year. This includes the cash dividends paid to shareholders, salary expenses and benefits paid to employees, taxes paid to the government, and interest expenses paid to creditors. Adding up these four amounts gives the total value created by the firm for its primary stakeholders, and this social contribution value is used as a quantitative indicator of how much benefit the firm creates for society. This study takes the natural logarithm of the social contribution value (*scv*) as the second variable to measure CSR performance. At the same time, considering the firm's size, the social contribution value (not taken the natural logarithm) divided by the total assets of the firm to obtain the social returns of assets (*sroa*), which quantifies the benefits that each unit of assets brings to its primary stakeholders. In addition, the social contribution value divided by the number of outstanding shares in that year to obtain the social contribution value per share (*scvps*), which quantifies the benefits that each unit of common stock brings to its primary stakeholders.

Explanatory variables-board gender diversity

There are three common ways to measure gender diversity in corporate boards and top management (Ciappei, Liberatore and Manetti, 2023). The first method is based on the Critical Mass Theory (Kanter, 2008) and employs indicator (dummy) variable to quantify the gender diversity of the study subjects. If there is at least one female member in the board, the value of the dummy variable is set to 1, otherwise, it is 0. This approach is used by Carter, Franco and Gine (2017) to capture the presence of at least one woman in corporate board. Studies by Clacher, García Osma, Scarlat and Shields (2021) and Doan and Iskandar-Datta (2021) also employ dummy variable to measure whether the CEO or CFO of a firm is female.

The second method is based on the regulatory requirements of many countries regarding female's employment protection and gender quota laws. Liu, Wei and Xie (2014) and Liao, Luo and Tang (2015) use the ratio of the number of female director to the total number of director as a measure of gender diversity in corporate board. This type of measurement is also used to assess female participation in top management teams (Nadeem, 2020; García Lara, García Osma, Mora and Scapin, 2017; Schwartz-Ziv, 2017) and in environmental and audit committee (Liao, Luo and Tang, 2015).

The third method to measure gender diversity in corporate board applies the Blau Index (Ben-Amar, Chang and McIlkenny, 2017; Nadeem, 2020). It is primarily used to assess the level of diversity among a group of individuals, such as diversity in ethnicity or education, and is more suitable for measuring diversity that encompasses more than two categories. When applied to gender diversity, if there are only two categories (male and female), and the organization members are either all male or all female, the index's value is 0 (indicating no gender diversity). If there is an equal representation of males and females, the index's value is 0.5 (indicating the highest level of diversity).

Initially, this study measures board gender diversity by following four variables: (1) a dummy variable indicating whether the firm has female directors (*fdd*), with a value of 1 if the firm has at least one female director and 0 if it has none. (2) the number of female directors (*fdn*). (3) female director ratio (*fdr*), defined as the proportion of the number of female director to the number of director (4) a dummy variable indicating whether the firm has female independent director (*fidd*), with a value of 1 if the firm has at least one female independent director and 0 if it has none.[4]

Control variables

With reference to Shen and Chang (2009), El Ghoul, Guedhami, Kwok and Wang (2016), Boubakri, El Ghoul, Wang, Guedhami and Kwok (2016), Liang and Renneboog (2017), Dyck, Lins, Roth and Wagner (2019), Chen, Dong and Chen (2020), and Boubakri, El Ghoul, Guedhami and Wang (2021), this research considers controlling variables that may influence a firm's CSR performance. First, the

[4] This research has not directly conducted tests for the critical mass theory, such as Torchia, Calabrò, Huse and Brogi (2010) and Yang, Yang and Gao (2019). The examination of the critical mass theory for board gender diversity involves exploring the impact on a firm's financial and non-financial consequences or other corporate policies, within the board of directors, top management team, or other senior organizational structures (e.g., audit committees, compensation committees, or independent directors). Typically, in research designs, dummy variables such as the presence of at least one female director, the presence of at least two female directors, or the presence of at least three female directors are considered. By observing the signs and statistical significance of the coefficients for dummy variable, one can determine at what level of female representation a significant impact is likely to occur. For example, if the dummy variable indicating the presence of at least one female director is statistically significant, then the critical mass theory is not supported. However, if the dummy variable of the presence of at least one female and the dummy variable of the presence of at least two female are not significant, but the dummy variable of the presence of at least three female director is statistically significant, it suggests that the firm needs to have at least three or more female directors to generate a statistically significant impact, supporting the critical mass theory. Subsequent studies may consider conducting analysis on this aspect.

total assets (*asset*) is used as a measure of firm size, defined as the natural logarithm of total assets. Second, the debt ratio (*debtr*) is used as a measure of financial risk, defined as total liabilities divided by total assets. Third, firm's profitability, proxied by returns on assets (*roa*), defined as earnings before interest and tax and then divided by total asset. Fourth, institutional investors' shareholdings (*insthold*), defined as the number of shares hold by institutional investors and divided by the number of shares outstanding. Fifth, a dummy variable indicating family-controlled firm (*family*). Since most listed firms in Taiwan are family-controlled, this study defines firm controlled by a single family as family-controlled firm to control for CSR engagement. When a firm is controlled by a single family, it is defined as a family-control firm, with the value of *family* is 1; otherwise (jointly controlled by family and professional team, controlled by professional team, and controlled by government agencies), it is 0. The abbreviation and definition of the variables are summarized in Table 1.

Econometric model

This study employs multiple regression to estimate how the board gender diversity affects firm's CSR performance. The regression equation is:

$$\mathbf{CSR}_{i,t} = \beta_0+\beta_1\cdot\mathbf{BD}_{i,t}+\beta_2\cdot asset_{i,t}+\beta_3\cdot debt_{i,t}+\beta_4\cdot roa_{i,t}+\beta_5\cdot idr_{i,t}+\beta_6\cdot insthold_{i,t}+\varepsilon_{i,t} \quad (1)$$

where the subscripts i and t represent the firm i in year t, respectively. **CSR** is a vector of variables for CSR performance, including current performance of CSR (*csrdummy*), cumulative performance of CSR (*csrcumu*), continuous performance of CSR (*csrcont*), overlap performance of CSR (*csrovlp*), social contribution value (*scv*), social return on assets (*sroa*) and social contribution value per share (*scvps*). **BD** is the vector of the variables measuring the board gender diversity, including female director dummy (*fdd*), the number of female director (*fdn*), female director ratio (*fdr*) and female independent director dummy (*fidd*). Regression controls include firm size (*asset*), debt ratio(*debtr*), returns on assets(*roa*), institutional investors' shareholdings (*insthod*) and dummy of family-controlled firm (*family*). The regression is pooled-OLS estimated.

Sample and data

This study employs non-financial industry listed firms on the Taiwan Stock Exchange and the Taipei Exchange (excluding the firms of banking, insurance, billing, securities and financial holdings companies) as the research samples, with a total of 1,590 firms. The data is yearly ranged from 2007 to 2020. The data of board member's gender and characteristics, the data of firm's financial characteristics, governance variables is collected from the Taiwan Economic Journal (TEJ) database. The first four CSR performance variable is constructed by the annual name-lists of the *Common Wealth*'s "Top Corporate Citizen" (https://topic.cw.com.tw/csr/report.aspx) and the *Global Views Monthly*'s "CSR Awards"(https://csr.gvm.com.tw/2021/award.html). The data of quantitative variables used for subsequent analysis is 5% winsorized.

Empirical result

Summary statistics and correlation analysis

Table 2 reports the descriptive statistics, including the number of observations, mean, standard deviation, maximum, and minimum values of each variable. Panel A shows the results for the full sample, panel B for firms with female director (*fdd*=1), and panel C for firms without female director (*fdd*=0). Comparing the results between panel B and panel C reveals that, in firms with female director, the mean of *csrdummy* is 0.0358, while in firms without female directors, the average *csrdummy* is 0.0289. The mean difference *t*-test in the rightmost column indicates that the former (group of samples with *fdd*=1) is significantly greater than the latter (group of samples with *fdd*=0), means that the samples in the former group have greater probability of obtaining CSR award from the *Common Wealth* and the *Global Views Monthly*. This suggests that, on average, firms with female director have better CSR performance in terms of higher probability of obtaining CSR award. This finding is consistent with Hypothesis 1 of the study. Upon observing the *csrcumu*, *csrcont*, and *csrovlp*, it is evident that all means of three variables are lower compared to firms without female director (the mean differences are all positive), means that the samples with female director have more years of obtaining CSR award, have greater probability of continuously obtaining CSR award during sample period, and have greater probability of obtaining two CSR awards from the Common Wealth and the *Global Views Monthly*.

When examining the following three CSR performance variables, the differences in means of *scv* and *scvps* are positive and reach statistical significance, means that samples with female director have higher social contribution and higher social contribution per share than those firms without female director. Firms with female directors exhibit relatively superior performance in CSR performance. Through testing the mean differences in various CSR performance variables between the two sample groups, the large part of evidence shows that samples with female director perform better on CSR, supports the proposition that an increase in the board gender diversity

Table 1 The abbreviation and definition of variables

Variable	Abbreviation	Definition
Explained Variable-CSR performance		
Current performance of CSR	*csrdummy*	A dummy variable of the current performance of CSR (*csrdummy*), which measures the performance of a firm based on the list of firms that have won the *Common Wealth*'s "Corporate Citizenship" and the *Global Views Monthly*'s "CSR Award". If a firm wins either or both of the awards in a specific year, the value of *csrdummy* is equal to 1 in that year, otherwise, if the firm does not win either award, the value *csrdummy* is 0.
Cumulative performance of CSR	*csrcumu*	The total number of years a firm has been win either or both of the awards (either award is sufficient). For example, if a firm has been win either or both of the awards for four years (missing one year) at a given year, the value of *csrcumu* is set to 4.
Continuous performance of CSR	*csrcont*	Set to 1 if a firm wins either or both of the awards every year during the data period (14 years). If the firm fails to win either award in any given year during the data period, *csrcont* is set to 0.
Overlap performance of CSR	*csrovlp*	Set to 1 if a firm wins both awards in a specific year. If the firm wins only one award or none at all in a specific year, *csrovlp* is set to 0.
Social contribution value	*scv*	The sum of interest expense, tax , employee salary and after tax net income, and then take the natural logarithm
Social return on assets	*sroa*	(Social contribution value / total assets)*100%
Social contribution value per share	*scvps*	(Social contribution value / number of shares outstanding)
Main explanatory variable-Board Gender Diversity		
Female director dummy	*fdd*	A dummy variable indicating whether the firm has female directors, with a value of 1 if the firm has at least one female director and 0 if it has none
The number of female director	*fdn*	The number of female directors
Female director ratio	*fdr*	The proportion of female directors to the total number of board members
Female independent director dummy	*fidd*	A dummy variable indicating whether the firm has female independent directors, with a value of 1 if the firm has at least one female independent director and 0 if it has none
Blau Index of Board Gender Diversity	*fdblau*	One minus the sum of the squares of the female director ratio and the male director ratio
Control variable		
Firm size	*asset*	The total amount of assets and then takes the natural logarithm
Debt ratio (%)	*debtr*	(Total liabilities divided by total assets)×100%
Returns on assets (%)	*roa*	Earnings before interest and tax / total asset
Institutional investors' shareholdings (%)	*insthod*	(number of shares hold by institutional investors / number of shares outstanding) * 100%
Family control	*family*	If the type of control is single-family controlled, then it is 1, and 0 otherwise.

This table reports the abbreviations and definitions of the variables. The variable definitions are based on the Taiwan Economic Journal (TEJ) database and the author's own definitions. The first to the fourth CSR performance variables are constructed based on the annual name lists of the *Common Wealth*'s "Best Corporate Citizen" (https://topic.cw.com.tw/csr/report.aspx) and the *Global Views Monthly*'s "CSR Awards"(https://csr.gvm.com.tw/2021/award.html)

enhances monitoring by leveraging the meticulous and conservative traits associated with the female (Cumming, Leung and Rui, 2015; Gul, Srinidhi and Ng, 2011; Srinidhi, Gul and Tsui, 2011; García Lara, García Osma, Mora and Scapin, 2017; Zalata, Ntim, Alsohagy and Malagila, 2022; Atif, Liu and Huang, 2019; Chen, Leung and Goergen, 2017; Pucheta-Martínez, Bel-Oms and OlcinaSempere, 2019). Board gender diversity generates diverse perspectives and promotes advocacy for the well-being of diverse groups, contributing to the shaping of corporate policies and commitments towards CSR (Chen, Leung and Goergen, 2017; Atif, Liu and Huang, 2019; Liu, Wei and Xie, 2014; Gul, Srinidhi and Ng, 2011; Nielsen and Huse, 2010; Ramon-Llorens, Garcia-Meca and Pucheta-Martínez, 2020). These two channels collectively contribute to enhancing the firm's CSR performance, and the result of uni-variate *t*-test of means for CSR performance variables between two sample confirms the hypothesis 1.

Finally, when observing the differences in various control variables between the two sample groups, it can be noted that companies with female director tend to be greater in size (the mean difference in *asset* between the two groups is significantly positive). Additionally, firms with female director tend to higher debt ratio higher institutional investors' shareholdings, and larger proportion of family-controlled firm.

Table 2 Summary statistics

Variable	Panel A. Full samples					Panel B. Samples of firms with *fdd* =1					Samples of firms with *fdd* =0					Difference in mean
	Num. of obs.	Mean	Std. Dev.	Min	Max	Num. of obs.	Mean	Std. Dev.	Min	Max	Num. of obs.	Mean	Std. Dev.	Min	Max	
csrdummy	22,260	0.0295	0.1692	0.0000	1.0000	10,675	0.0358	0.1858	0.0000	1.0000	9,226	0.0289	0.1676	0.0000	1.0000	0.0068***
csrcumu	22,260	0.1921	1.0758	0.0000	14.000	10,675	0.2408	1.2376	0.0000	14.0000	9,226	0.1825	1.0023	0.0000	14.000	0.0583***
csrcont	22,260	0.0031	0.0560	0.0000	1.0000	10,675	0.0049	0.0696	0.0000	1.0000	9,226	0.0020	0.0441	0.0000	1.0000	0.0029***
csrovlp	22,260	0.0049	0.0698	0.0000	1.0000	10,675	0.0067	0.0813	0.0000	1.0000	9,226	0.0041	0.0640	0.0000	1.0000	0.0025**
scv	19,390	10.380	7.5487	-13.478	17.014	9,919	10.524	7.4699	-13.478	17.014	8,461	10.275	7.7319	-13.478	17.014	0.2486**
sroa	19,390	12.488	12.164	-25.943	49.269	9,919	12.026	11.604	-25.943	49.269	8,461	12.070	11.857	-25.943	49.269	-0.0436
scvps	17,131	4.4248	5.1469	-3.4267	27.536	9,218	4.5429	5.3374	-3.4267	27.536	7,887	4.2928	4.9150	-3.4267	27.536	0.2501***
fdd	19,901	0.5364	0.4987	0.0000	1.0000	10,675	1.0000	0.0000	1.0000	1.0000	9,226	0.0000	0.0000	0.0000	0.0000	1.0000
fdn	19,901	0.7911	0.9217	0.0000	6.0000	10,675	1.4748	0.7584	1.0000	6.0000	9,226	0.0000	0.0000	0.0000	0.0000	1.4748***
fdr	19,901	11.024	12.766	0.0000	55.556	10,675	20.552	10.393	5.0000	55.556	9,226	0.0000	0.0000	0.0000	0.0000	20.552***
fidd	19,901	0.1601	0.3667	0.0000	1.0000	10,675	0.2985	0.4576	0.0000	1.0000	9,226	0.0000	0.0000	0.0000	0.0000	0.2985***
asset	21,155	15.010	1.4058	11.996	19.479	10,674	15.141	1.3773	11.996	19.479	9,226	15.057	1.3595	11.996	19.479	0.0842***
debt	21,155	35.987	17.864	2.4870	83.883	10,674	35.952	17.686	2.4870	83.883	9,226	35.494	17.522	2.4870	83.883	0.4578*
roa	20,833	7.6079	10.303	-27.707	35.870	10,673	7.4062	9.7948	-27.707	35.870	9,225	7.3320	10.315	-27.707	35.870	0.0742
insthold	19,990	38.975	22.706	1.0089	92.171	10,661	39.949	22.779	1.0089	92.171	9,220	37.804	22.544	1.0089	92.171	2.1447***
family	20,008	0.6192	0.4856	0.0000	1.0000	10,675	0.6606	0.4735	0.0000	1.0000	9,222	0.5719	0.4948	0.0000	1.0000	0.0887***

This table reports the basic summarize statistics of each variable, including the number of non-missing observations, mean, standard deviation, minimum and maximum of full samples (Panel A), samples of firm with female director (*fdd*=1) and samples of firm without female director *fdd*=0. The rightmost column reports the differences in means (and *t*-statistics) of each variable. The data period is from 2007 to 2020. *, * * and * * * show that the differences in means reach 10%, 5% and 1% significant level, respectively

Table 3 reports the Pearson correlation coefficient. First, when examining the relationship between *csrdummy* and four board gender diversity variables, it is evident that firms with female director, a higher number of female director, and firms with female independent director tend to have higher value of *csrdummy* (three pairwise correlation coefficients are negative and significant). Similar result is obtained for the correlation between *csrcumu* and three of four board gender diversity variables. Some correlation coefficients between CSR performance variable and board gender diversity also show positive and significantly correlation. The empirical results partially support Hypothesis 1 that board gender diversity positively correlated with firm's CSR performance. Firm's with greater degree of board gender diversity tends to have better functioning of board, namely, one the hand, increasing monitoring by increasing female board member with more conservative, cautious, and risk-averse, and on the other hand, increasing advising by increasing female board member with more diverse, comprehensive, and shareholders-oriented decision making process. Therefore, the increased board gender diversity contributes to enhancing CSR performance.

Baseline regression result

Table 4 reports the regression estimates of the effects of board gender diversity on CSR performance (proxied by current CSR performance: *csrdummy*). The main explanatory variables in models (1)~(4) adopt different board gender diversity variables, including the dummy of whether a firm has female director (*fdd*), the number of female director (*fdn*), the female director ratio (*fdr*), and the dummy of whether a firm has female independent director (*fidd*). By observing the estimated coefficients of main explanatory variables across models, it is shown that all coefficients are positive and reach statistically significance. This indicates that firms with female director, with higher number of female director, with higher proportion of female directors, and with female independent director are more likely to obtain CSR awards from either the *Common Wealth* or the *Global Views Monthly*. Higher level of board gender diversity results in a higher level of CSR performance, supporting the hypothesis of the study.

This result is consistent with the following views. Increase in board gender diversity contributes to a more rigorous and careful monitoring of the management's execution of decisions that modern companies should prioritize in consideration of stakeholders' interests (Cumming, Leung and Rui, 2015; Gul, Srinidhi and Ng, 2011; Srinidhi, Gul and Tsui, 2011; García Lara, García Osma, Mora and Scapin, 2017; Zalata, Ntim, Alsohagy and Malagila, 2022; Atif, Liu and Huang, 2019; Chen, Leung and Goergen, 2017). Simultaneously, in the process of shaping management decisions, the diverse perspectives and concerns of different genders also aid the company in considering the interests of a more diverse and broader range of stakeholders (Chen, Leung and Goergen, 2017; Atif, Liu and Huang, 2019; Liu, Wei and Xie, 2014; Gul, Srinidhi and Ng, 2011; Nielsen and Huse, 2010; Ramon-Llorens, Garcia-Meca and Pucheta-Martínez, 2020). Consequently, the heightened board gender diversity contributes to enhancing monitoring and advising efficiency and intensity in CSR engagement. This facilitates the allocation of more resources to CSR, increasing the likelihood of the firm receiving CSR awards.

Estimated coefficients of control variables across models show that most of the coefficients for firm scale (*asset*) is positive and significant, the coefficients for debt ratio (*debtr*) are negative and significant, and the estimated coefficients for firm's profitability (*roa*) are positive and significant. Additionally, the coefficients for the institutional investor shareholdings (*insthold*) are significantly positive, while the coefficients for the dummy of family-controlled (*family*) is significantly negative. This implies that larger firms with lower debt ratios, better profitability as measured by return on assets, higher institutional investors' shareholdings, and non-family-controlled firms tend to exhibit better CSR performance. These findings are consistent with previous research results regarding factors influencing CSR performance (Shen and Chang, 2009; El Ghoul, Guedhami, Kwok and Wang, 2016; Boubakri, El Ghoul, Wang, Guedhami and Kwok, 2016; Liang and Renneboog, 2017; Dyck, Lins, Roth and Wagner, 2019; Chen, Dong and Chen, 2020; Boubakri, El Ghoul, Guedhami and Wang, 2021). Lastly, the determination coefficients across models are approximately 10%, and the *p*-value for the overall significance test of various regression specifications is very small, indicating that the regression models are appropriate specified.

Table 5 reports the regression estimates of the effects of board gender diversity on CSR performance, which is proxied by cumulative CSR performance (*csrcumu*) (Panel A), continuous CSR performance (*csrcont*) (Panel B), and overlap CSR performance (*csrovlp*) (Panel C). In each panel, the main explanatory variables in models (1)~(4) adopt different board gender diversoity variables, namely, the dummy of whether a firm has female director (*fdd*), the number of female director (*fdn*), the female director ratio (*fdr*), and the dummy of whether a firm has female independent director (*fidd*). In different panels, it can be observed that the coefficients of the main explanatory variables are mostly positive and significant, indicating that an increase in board gender diversity leads to more accumulated years of obtaining one of both CSR awards by the *Common Wealth* and the *Global Views*

Table 3 Correlation coefficients

variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) *fdd*	1.0000															
(2) *fdn*	0.7980*	1.0000														
(3) *fdr*	0.8028*	0.9365*	1.0000													
(4) *fidd*	0.4059*	0.5029*	0.4869*	1.0000												
(5) *csrdummy*	0.0192*	0.0293*	-0.0105	0.0209*	1.0000											
(6) *csrcumu*	0.0256*	0.0391*	-0.0110	0.0375*	0.7209*	1.0000										
(7) *csrcont*	0.0246*	0.0171*	0.0175*	0.0018	0.3221*	0.3815*	1.0000									
(8) *csrovlp*	0.0171*	0.0087	-0.0084	0.0103	0.4022*	0.4038*	0.3984*	1.0000								
(9) *scv*	0.0163*	0.0248*	-0.0061	0.0111	0.1056*	0.1068*	0.0384*	0.0478*	1.0000							
(10) *sroa*	-0.0019	-0.0044	-0.0125*	0.0578*	0.0543*	0.0385*	0.0440*	0.0304*	0.6264*	1.0000						
(11) *scvps*	0.0242*	0.0239*	0.0012	0.1024*	0.1458*	0.1431*	0.0534*	0.0454*	0.4637*	0.7443*	1.0000					
(12) *asset*	0.0307*	0.0480*	-0.0380*	-0.0178*	0.2923*	0.3313*	0.0789*	0.1639*	0.2758*	-0.0657*	0.2267*	1.0000				
(13) *debt*	0.0130*	0.0207*	0.0260*	0.0035	0.0070	0.0190*	0.0186*	0.0082	-0.0228*	-0.1491*	-0.0206*	0.1747*	1.0000			
(14) *roa*	0.0037	0.0064	-0.0131*	0.0340*	0.0860*	0.0776*	0.0503*	0.0595*	0.6453*	0.8663*	0.7065*	0.1569*	-0.1262*	1.0000		
(15) *insthold*	0.0471*	0.0617*	0.0084	0.0525*	0.1859*	0.2022*	0.0615*	0.1164*	0.1696*	0.1344*	0.2863*	0.3907*	0.0411*	0.2207*	1.0000	
(16) *family*	0.0911*	0.0692*	0.1069*	-0.0222*	-0.0685*	-0.0616*	0.0221*	-0.0147*	-0.0382*	-0.0751*	-0.0885*	0.0022	0.0207*	-0.0450*	-0.0148*	1.0000

This table reports the pairwise Pearson correlation coefficients among variables. The data period is from 2007 to 2020. The asterisk mark means that a correlation coefficient reaches a significance level of 5%. Please refer to Table 1 for the definitions of variables

Table 4 Regression Result of the Effects of Board Gender Diversity on CSR Performance (current CSR performance: *csrdummy*)

Explanatory Variable	Explained Variables (current CSR performance: *csrdummy*)			
	(1)	(2)	(3)	(4)
fdd	0.00496**			
	(2.06)			
fdn		0.00332**		
		(2.55)		
fdr			0.000110	
			(1.17)	
fidd				0.00974***
				(2.98)
asset	0.0355***	0.0355***	0.0356***	0.0356***
	(36.25)	(36.21)	(36.28)	(36.38)
debt	-0.000418***	-0.000419***	-0.000419***	-0.000420***
	(-5.93)	(-5.94)	(-5.95)	(-5.96)
roa	0.000274**	0.000274**	0.000273**	0.000262**
	(2.19)	(2.19)	(2.18)	(2.09)
insthold	0.000595***	0.000592***	0.000598***	0.000589***
	(10.25)	(10.20)	(10.30)	(10.14)
family	-0.0247***	-0.0247***	-0.0246***	-0.0241***
	(-10.01)	(-10.01)	(-9.93)	(-9.80)
constant	-0.501***	-0.500***	-0.501***	-0.502***
	(-36.23)	(-36.24)	(-36.09)	(-36.30)
Num. of obs.	19,875	19,875	19,875	19,875
Adj. *R*-square	0.101	0.102	0.101	0.102
Prob. of *F*-stat.	0.000	0.000	0.000	0.000

This table reports the regression estimates of the effects of corporate board gender diversity on CSR performance (current CSR performance: *csrdummy*). The main explanatory variables in models (1) to (4) adopt different board gender diversity variables, namely, the dummy of whether a firm has female director (*fdd*), the number of female director (*fdn*), the ratio of female director (*fdr*), and the dummy of whether a firm has female independent director (*fidd*). Control variables include firm size (*asset*), debt ratio (*debt*), returns on assets (*roa*), institutional investors shareholdings (*insthold*), and the dummy of whether a firm is a family-controlled firm (*family*). The data period is from 2007 to 2020. The *t*-values of the estimated coefficients are shown in parentheses, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Monthly, higher probability of obtaining one of both CSR awards each year during the data period, and higher probability of obtaining both CSR awards.

Similar to previous findings, the addition of members of different genders to the board increasing the gender diversity, contributing to enhanced monitoring and advising function. Previous literature has suggested that the women are more conservative, cautious, and risk-averse, this inclination makes companies more likely to execute decisions that maximize overall corporate interests rather than solely maximizing shareholder interests, and it also reduces the possibility of decisions that benefit the management at the expense of others. Additionally, the inclusion of female members in the board, as mentioned in the literature, aligns with the characteristics of women being more willing to listen to others' opinions and value others' interests. This orientation leads companies to make decisions that prioritize the interests of stakeholders in the execution and shaping of decisions. Therefore, the increased board gender diversity contributes to the allocation of more resources to CSR, increasing the likelihood of the company receiving relevant CSR awards and accumulating more award-winning years. This is directly correlated with better CSR performance. Consequently, the empirical result in Table 5 still supports the hypothesis of the study.

The representation of empirical result in Table 6 is similar to Table 5, with the only difference being the change in the variables used to measure CSR performance, namely, social contribution value (*scv*) (Panel A), social return on assets (*sroa*) (Panel B), and social contribution value per share (*scvps*) (Panel C). The empirical results in Table 6 similarly demonstrate that the impact coefficients of various board gender diversity on the CSR performance variables derived from social contribution value are mostly positive and significant. Moreover, there are no negative and significant coefficients, indicating that an increase in board gender diversity contributes to

Table 5 Regression result of the effects of board gender diversity on CSR performance (proxied by *csrcumu*, *csrcont*, *csrovlp*)

Panel A.				
Explanatory Variable	Explained Variables (cumulative CSR performance: *csrcumu*)			
	(1)	(2)	(3)	(4)
fdd	0.0426***			
	(2.81)			
fdn		0.0307***		
		(3.74)		
fdr			0.000734	
			(1.23)	
fidd				0.118***
				(5.72)
Controls	included	included	included	included
constant	included	included	included	included
Panel B.				
Explanatory Variable	Explained Variables (continuous CSR performance: *csrcont*)			
	(1)	(2)	(3)	(4)
fdd	0.00228***			
	(2.70)			
fdn		0.000681		
		(1.49)		
fdr			0.0000807**	
			(2.45)	
fidd				0.0000642
				(0.06)
Controls	included	included	included	included
constant	included	included	included	included
Panel C.				
Explanatory Variable	Explained Variables (overlap CSR performance: *csrovlp*)			
	(1)	(2)	(3)	(4)
fdd	0.00172*			
	(1.66)			
fdn		-0.0000260		
		(-0.05)		
fdr			-0.00000612	
			(-0.15)	
fidd				0.00184
				(1.30)
Controls	included	included	included	included
constant	included	included	included	included

This table reports the regression estimates of the effects of corporate board gender diversity on CSR performance, which is proxied by cumulative CSR performance (*csrcumu*) (Panel A), continuous CSR performance (*csrcont*) (Panel B), and overlap CSR performance (*csrovlp*) (Panel C). In each panel, the main explanatory variables in models (1) to (4) adopt different board gender diversity variables, namely, the dummy of whether a firm has female director (*fdd*), the number of female director (*fdn*), the ratio of female director (*fdr*), and the dummy of whether a firm has female independent director (*fidd*). Control variables include firm size (*asset*), debt ratio (*debt*), returns on assets (*roa*), institutional investors shareholdings (*insthold*), and the dummy of whether a firm is a family-controlled firm (*family*). The estimation result of control variables are omitted with notation of "included". The data period is from 2007 to 2020. The *t*-values of the estimated coefficients are shown in parentheses, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

enhancing a firm's CSR performance in terms of greater social contribution value, social returns on assets and social contribution value per share. Empirical result of Table 6 generally supports the proposition that an increase in the board gender diversity enhances monitoring by leveraging the meticulous and conservative traits associated with the female. Board gender diversity generates diverse perspectives and promotes advocacy for the well-being of diverse groups, contributing to the shaping of corporate policies and commitments towards CSR. These two channels collectively contribute to enhancing the firm's CSR performance.[5]

Additional tests

Various dimensions in social contribution value as CSR performance

Stakeholders of a firm are wide-ranging, including not only shareholders and creditors but also employees, consumers, government and non-governmental organizations, upstream suppliers, and other external third parties who are potentially related to the firm's operations. This study decomposes social contribution value (*scv*) into four components, including the total amount of after-tax net income potentially paid to shareholders,

[5] Whether viewed from the perspective of agency theory or resource dependence theory, overall support has been obtained from the baseline regression result. Specifically, the increase in board gender diversity, through more rigorous monitoring (from the agency theory perspective) and diverse advising roles (from the resource dependence theory perspective), enhances the firm's commitment and performance in CSR. However, the variable definitions in the study only consider the overall board gender diversity and whether one of independent directors is female. The study does not differentiate the gender diversity level of non-independent directors (i.e., general directors), thus making it unclear which of the two mentioned theories primarily explains the statistical relationships. According to Kim, Mauldin and Patro (2014), a prevailing viewpoint is that internal directors mostly provide the primary source of firm-specific information required for managerial advice, while external directors are better at providing monitoring as they are expected to be independent of the management. In subsequent research, if it is possible to distinguish between directors who also hold managerial positions (i.e., internal directors) and those who do not hold managerial positions (i.e., external directors, including independent directors), and if the gender diversity level among external directors has a greater impact on CSR performance than the gender diversity level among internal directors (including statistical and economic significance), then the positive influence of board gender diversity on CSR performance could be more strongly supported by agency theory. On the contrary, if the impact of gender diversity among internal directors on CSR performance is higher than the impact of gender diversity among external directors, then the positive influence of board gender diversity on CSR performance could be more strongly supported by resource dependence theory. In fact, some empirical data in the study indicate that the impact of having female independent directors on CSR performance is significantly higher than the impact of having female directors (not distinguishing between general directors and independent directors). From this, it can be inferred that the impact of female independent directors on CSR performance must be higher than the impact of female non-independent directors on CSR performance. Therefore, the primary empirical results obtained in the study can be explained predominantly by agency theory, emphasizing the enhancement of monitoring efficiency by female directors to improve firm's CSR performance.

Table 6 regression result of the effects of board gender diversity on CSR performance (proxied by *scv*, *sroa*, *scvps*)

Panel A.				
Explanatory Variable	Explained Variables (social contribution value: *scv*)			
	(1)	(2)	(3)	(4)
fdd	0.190**			
	(2.28)			
fdn		0.147***		
		(3.26)		
fdr			0.00702**	
			(2.14)	
fidd				-0.167
				(-1.49)
Controls	included	included	included	included
constant	included	included	included	included
Panel B.				
Explanatory Variable	Explained Variables (social returns on assets: *sroa*)			
	(1)	(2)	(3)	(4)
fdd	0.142*			
	(1.76)			
fdn		0.0673		
		(1.54)		
fdr			-0.000421	
			(-0.13)	
fidd				0.711***
				(6.57)
Controls	included	included	included	included
constant	included	included	included	included
Panel C.				
Explanatory Variable	Explained Variables (social contribution value per share: *scvps*)			
	(1)	(2)	(3)	(4)
fdd	0.261***			
	(4.77)			
fdn		0.107***		
		(3.65)		
fdr			0.00817***	
			(3.81)	
fidd				1.044***
				(14.19)
Controls	included	included	included	included
constant	included	included	included	included

This table reports the regression estimates of the effects of corporate board gender diversity on CSR performance, which is proxied by social contribution value (*scv*) (Panel A), social returns on assets (*sroa*) (Panel B), and social contribution value per share (*scvps*) (Panel C). In each panel, the main explanatory variables in models (1) to (4) adopt different board gender diversity variables, namely, the dummy of whether a firm has female director (*fdd*), the number of female director (*fdn*), the ratio of female director (*fdr*), and the dummy of whether a firm has female independent director (*fidd*). Control variables include firm size (*asset*), debt ratio (*debt*), returns on assets (*roa*), institutional investors' shareholdings (*insthold*), and the dummy of whether a firm is a family-controlled firm (*family*). The estimation result of control variables are omitted with notation of "included". The data period is from 2007 to 2020. The *t*-values of the estimated coefficients are shown in parentheses, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

the total amount of salaries/benefits paid to employees, the total amount of interest paid to creditors, and the total amount of taxes paid to the governments. Taking into account the firm's size effect, the above four items are divided by total assets and by the number of shares outstanding, respectively, to derive eight variables, including the total amount of employee salaries/benefits divided by total assets (*salaryta*), the total amount of taxes paid to governments divided by total assets (*taxta*), the total amount of interests paid to creditors divided by total assets (*interestta*), the total amount of after-tax net income divided by total assets (*profitta*), the total amount of employee salaries/benefits divided by the number of shares outstanding (*salaryq*), the total amount of taxes paid to governments divided by the number of shares outstanding (*taxq*), the total amount of interests paid to creditors divided by the number of shares outstanding (*interestq*), and the total amount of after-tax net income divided by the number of shares outstanding (*profitq*).

Table 7 reports the regression results of the effect of board gender diversity (proxied by *fdd*) on CSR performance in four dimensions, i.e., for SCV sub-variables. Observing the coefficients of the main explanatory variables in each model in panel A to panel C, it can be found that the dummy variable representing the presence of female director (*fdd*) is only significantly positive when the dependent variable is the proportion of employee salaries to total assets (*salaryta*) and the ratio of employee salaries to outstanding shares (*salaryq*), suggesting that firms with female director tend to have higher employee salaries, showing a greater emphasis on employee interests. However, when the dependent variable is interest expense, the ratio of interest expense to total assets (*interesta*), and the ratio of interest expense to outstanding shares (*salaryq*), all coefficients are negative and significant. Even though firms with female director tend to show lower levels of interest expenses, this does not necessarily imply a lack of consideration for the interests of creditors. It is more likely that firms with female director have lower levels of debt use, as mentioned earlier, because women tend to have a higher aversion to risk and, consequently, use less debt to reduce the financial risk (Faccio, Marchica and Mura, 2016; Perryman, Fernando and Tripathy, 2016; Sila, Gonzalez and Hagendorff, 2016; Ciappei, Terzani, Bafundi and Liberatore, 2023).

Table 8 reports the regression estimates on whether board gender diversity, measured by the dummy of whether a firm has female independent director (*fidd*), affects the results of four dimensions of a firm's CSR performance. Observing the estimated coefficients of the dummy variable representing the presence of

female independent directors, it is evident that when the dependent variables are dividends to shareholders, taxes paid to the government, and salaries and benefits provided to employees, whether in terms of the amounts or as a percentage of total assets or outstanding shares, the estimated coefficients are all positive and significant. This indicates that firms with female independent director tend to prioritize shareholder interests, contribute more taxes to the government, and place greater emphasis on employee welfare. Similar to the previous table, although firms with female independent director tend to provide lower levels of interest expenses, this does not imply a lack of consideration for the interests of creditors. Instead, it is more likely that firms with female independent director have lower levels of debt usage. Overall, the promotion of CSR performance by female independent director is highly evident, whether from a statistical significance perspective or an economic significance perspective.[6]

Moderating effects of the level of education, tenure and board meetings attendance

This research further examine how non-gender characteristics of female directors, including education level, tenure, and board meeting attendance rate, contribute to strengthen or weaken the effects of board gender diversity on a firm's CSR performance. These three factors involve essential qualities through which board members function within the board, beyond just gender differences. First, the Signaling Theory of Spence (1973) suggests that education level serves as an outward indicator of job quality, and directors with higher education or specialized knowledge are better equipped to apply their expertise to strategic decision-making, leading to improved performance. Directors with higher educational backgrounds are known to enhance board effectiveness (Fairchild and Li, 2005; Nicholson and Kiel, 2004). Directors with higher education levels can leverage their acquired professional knowledge to provide more advice and assistance. A director with a high level of education is more likely to possess more specialized knowledge and analytical skills, allowing them to focus on understanding and analyzing the firm's operational prospects, governance, and the input, strategies, and actions required or possessed in the face of current environmental changes. Therefore, this research proposes an additional hypothesis that female directors with higher education levels are capable of helping the board strengthen its oversight and advisory functions, thereby improving the firm's CSR performance.

Second, Vafeas (2003) indicated that directors with longer tenures have more opportunities to become familiar with crucial knowledge and the industry environment, which equips them with better experience, commitment, and competence. They also tend to have greater confidence in carrying out their responsibilities. Celikyurt, Sevilir and Shivdasani (2012) found that as board members accumulate management experience and networks, those with longer tenures are better able to fulfill their advisory roles. Consequently, directors with longer tenures possess more industry experience, understand the specialized knowledge and details required for sustainable operation, and are more aware that the firm needs to invest more resources and efforts in sustainability, particularly in the face of environmental changes. This, in turn, contributes to improving the firm's CSR performance. This research proposes a hypothesis that female directors with longer tenures strengthen the effects of board gender diversity on CSR performance.

Lastly, Beasley (1996) and Fama and Jensen (1983) argue that when outside directors hold multiple positions, driven by a concern for their own reputations, they are more inclined to effectively monitor the management to maintain their good standing. Directors holding multiple positions can expand their networks and increase opportunities for connecting with other companies, making it easier to help the firm acquire significant tangible and intangible resources. Board attendance is the most concrete and fundamental way a director can fulfill their supervisory and advisory functions. If a female director has low attendance rates at board meetings, it becomes challenging to gain a deep understanding of the execution of managerial decisions and determine whether various corporate policies are beneficial or detrimental to the corporation. Under this situation, gender trait in among the board still has little effects in enhancing board functioning, namely, monitoring and advising. Board attendance plays a crucial role in exerting effectiveness of board gender diversity. This research proposes an additional hypothesis that female directors with higher board meeting attendance rates strengthen the effects of board gender diversity on CSR performance.

Table 9 reports regression results about additional characteristics possessed by female director, including whether they hold a Ph.D., tenure, and board meetings attendance rate. It examines whether these characteristics strengthen or weaken the effects of board gender diversity on CSR performance. Firstly, when we observe

[6] The above result similarly indicates that women in the position of independent directors contribute relatively more to enhancing the firm's emphasis on stakeholder interests, leading to better CSR performance. Consistent with the statements mentioned in the footnote 5, independent directors play a more significant role in improving monitoring efficiency within the board. Therefore, the empirical result of female independent director enhancing CSR performance can be supported by the contribution of female director in reducing agency conflicts.

Table 7 The effects of corporate board gender diversity (*fdd*) on four dimensions (SCV Sub-variables) in CSR performance

	Panel A. Four SCV Sub-Variables				**Panel B. (Four SCV Sub-Variables / Total Assets)**				**Panel C. (Four SCV Sub-Variables / Shares Outstanding)**			
	salary	***divid***	***tax***	***interest***	***salaryta***	***dividta***	***taxta***	***interestta***	***salaryq***	***dividq***	***taxq***	***interestq***
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
fdd	-0.00673	0.0100	-0.00232	-0.260***	0.160***	0.0147	0.0177	-0.0109***	0.0658***	0.00459	0.00290	-0.00244**
	(-0.59)	(0.16)	(-0.04)	(-5.67)	(2.69)	(0.44)	(1.62)	(-3.37)	(3.28)	(0.31)	(0.60)	(-2.08)
asset	0.551***	1.220***	1.182***	1.120***	-1.343***	0.0274**	-0.0716***	0.0104***	-0.155***	0.0763***	0.00326	0.0115***
	(104.07)	(42.62)	(50.41)	(52.63)	(-54.07)	(2.03)	(-16.00)	(7.76)	(-18.18)	(12.26)	(1.58)	(22.51)
debt	0.00134***	-0.0315***	-0.00982***	0.0933***	0.0113***	-0.0246***	-0.00257***	0.00682***	0.0106***	-0.00145***	0.00141***	0.00258***
	(3.89)	(-17.03)	(-6.21)	(65.07)	(6.39)	(-25.53)	(-7.91)	(66.01)	(17.62)	(-3.38)	(9.73)	(67.84)
roa	0.0205***	0.324***	0.254***	0.000412	0.107***	0.207***	0.0680***	-0.000716***	0.0565***	0.0760***	0.0238***	0.000174**
	(33.74)	(98.81)	(86.09)	(0.14)	(33.51)	(111.21)	(108.07)	(-3.54)	(51.14)	(92.89)	(84.79)	(2.31)
insthold	-0.00136***	0.000699	-0.00560***	-0.0104***	0.00720***	0.00581***	-0.0000117	-0.000708***	0.00227***	0.00572***	0.00109***	-0.000176***
	(-4.90)	(0.46)	(-4.51)	(-9.37)	(4.98)	(7.21)	(-0.04)	(-8.98)	(4.50)	(15.60)	(9.02)	(-5.96)
family	-0.210***	-0.228***	-0.0146	0.459***	-1.033***	-0.159***	-0.0305***	0.0389***	-0.358***	-0.119***	-0.0301***	0.0105***
	(-17.91)	(-3.49)	(-0.27)	(9.75)	(-17.00)	(-4.65)	(-2.73)	(11.75)	(-17.35)	(-7.88)	(-6.04)	(8.70)
constant	3.792***	-11.39***	-10.73***	-12.48***	26.07***	1.803***	1.591***	-0.159***	3.531***	-0.717***	0.0177	-0.191***
	(50.14)	(-28.02)	(-32.09)	(-40.81)	(73.95)	(9.44)	(25.24)	(-8.32)	(29.51)	(-8.22)	(0.62)	(-26.25)
Num. of obs.	15,436	17,440	13,980	14,162	15,546	17,506	14,918	14,459	14,399	16,302	13,776	13,366
Adj. *R*-square	0.486	0.454	0.447	0.390	0.206	0.468	0.460	0.269	0.177	0.416	0.376	0.322
Prob. of *F*-stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimates of the effects of corporate board gender diversity (the dummy of whether a firm has female director: *fdd*) on four dimensions (SCV sub-variables) in CSR Performance. SCV sub-variables include the total amount of salaries/benefits paid to employees (taking the natural logarithm) (*salary*), the total amount of cash dividend paid to stockholders (*divid*), the total amount of taxes paid to governments (*tax*), the total amount of interests paid to creditors (*interest*), the total amount of salaries/benefits divided by assets (*salaryta*), the total amount of cash dividend divided by assets (*dividta*), the total amount of taxes divided by assets (*taxta*), the total amount of interests divided by assets (*interestta*), the total amount of salaries/benefits divided by shares outstanding (*salaryq*), the total amount of cash dividend divided by shares outstanding (*dividq*), the total amount of taxes paid to governments divided by shares outstanding (*taxq*), the total amount of interests divided by shares outstanding (*interestq*). Control variables include firm size (*asset*), debt ratio (*debt*), returns on assets (*roa*), institutional investors shareholdings (*insthold*), and the dummy of whether a firm is a family-controlled firm (*family*). The data period is from 2007 to 2020. The *t*-values of the estimated coefficients are shown in parentheses, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

Table 8 The effects of corporate board gender diversity (*fidd*) on four dimensions (SCV Sub-Variables) in CSR performance

	Panel A. Four SCV Sub-Variables				**Panel B. (Four SCV Sub-Variables / Total Assets)**				**Panel C. (Four SCV Sub-Variables / Shares Outstanding)**			
	salary	***divid***	***tax***	***interest***	***salaryta***	***dividta***	***taxta***	***interestta***	***salaryq***	***dividq***	***taxq***	***interestq***
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
fidd	0.0536***	0.385***	0.0622	-0.224***	0.318***	0.224***	0.0974***	-0.0271***	0.246***	0.147***	0.0521***	-0.00262*
	(3.52)	(4.52)	(0.90)	(-3.65)	(3.99)	(4.97)	(6.70)	(-6.28)	(9.00)	(7.34)	(7.93)	(-1.66)
asset	0.552***	1.226***	1.184***	1.118***	-1.340***	0.0301**	-0.0701***	0.0100***	-0.152***	0.0781***	0.00409**	0.0115***
	(104.17)	(42.80)	(50.38)	(52.47)	(-53.91)	(2.22)	(-15.68)	(7.46)	(-17.83)	(12.57)	(1.99)	(22.40)
debt	0.00132***	-0.0317***	-0.00985***	0.0932***	0.0113***	-0.0246***	-0.00260***	0.00683***	0.0106***	-0.00148***	0.00140***	0.00258***
	(3.83)	(-17.12)	(-6.23)	(64.97)	(6.36)	(-25.60)	(-8.03)	(66.19)	(17.65)	(-3.46)	(9.63)	(67.83)
roa	0.0205***	0.323***	0.254***	0.00124	0.107***	0.207***	0.0679***	-0.000654***	0.0564***	0.0759***	0.0237***	0.000183**
	(33.69)	(98.71)	(86.08)	(0.43)	(33.41)	(111.19)	(108.06)	(-3.24)	(51.20)	(93.02)	(84.99)	(2.42)
insthold	-0.00144***	0.000279	-0.00568***	-0.0104***	0.00702***	0.00558***	-0.000104	-0.000689***	0.00204***	0.00557***	0.00103***	-0.000175***
	(-5.17)	(0.18)	(-4.58)	(-9.39)	(4.86)	(6.92)	(-0.39)	(-8.73)	(4.06)	(15.20)	(8.58)	(-5.92)
family	-0.210***	-0.223***	-0.0148	0.434***	-1.012***	-0.154***	-0.0275**	0.0376***	-0.347***	-0.116***	-0.0293***	0.0102***
	(-17.97)	(-3.43)	(-0.28)	(9.26)	(-16.73)	(-4.52)	(-2.48)	(11.40)	(-16.9ind1)	(-7.73)	(-5.94)	(8.51)
constant	3.774***	-11.50***	-10.76***	-12.55***	26.05***	1.744***	1.566***	-0.156***	3.480***	-0.761***	0.000829	-0.191***
	(49.90)	(-28.30)	(-32.13)	(-41.03)	(73.92)	(9.13)	(24.88)	(-8.15)	(29.13)	(-8.72)	(0.03)	(-26.27)
Num. of obs.	15,436	17,440	13,980	14,162	15,546	17,506	14,918	14,459	14,399	16,302	13,776	13,366
Adj. *R*-square	0.487	0.455	0.447	0.389	0.206	0.469	0.461	0.270	0.181	0.418	0.379	0.322
Prob. of *F*-stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimates of the effects of corporate board gender diversity (the dummy of whether a firm has female independent director: *fidd*) on four dimensions (SCV sub-variables) in CSR Performance. SCV sub-variables include the total amount of salaries/benefits paid to employees (taking the natural logarithm) (*salary*), the total amount of cash dividend paid to stockholders (*divid*), the total amount of taxes paid to governments (*tax*), the total amount of interests paid to creditors (*interest*), the total amount of salaries/benefits divided by assets (*salaryta*), the total amount of cash dividend divided by assets (*dividta*), the total amount of taxes divided by assets (*taxta*), the total amount of interests divided by assets (*interestta*), the total amount of salaries/benefits divided by shares outstanding (*salaryq*), the total amount of cash dividend divided by shares outstanding (*dividq*), the total amount of taxes paid to governments divided by shares outstanding (*taxq*), the total amount of interests divided by shares outstanding (*interestq*). Control variables include firm size (*asset*), debt ratio (*debt*), returns on assets (*roa*), institutional investors shareholdings (*insthold*), and the dummy of whether a firm is a family-controlled firm (*family*). The data period is from 2007 to 2020. The *t*-values of the estimated coefficients are shown in parentheses, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

the coefficients of cross-product terms in model (1)~(3), it is found that two of three (*fdn*phd* and *fidd*phd*) are positive and significant, indicating that as the number of female director with Ph.D. increases and when firm has female independent director with Ph.D., firm has greater probability of obtaining CSR award, showing that higher education level further increases firm's CSR performance. Similarly, in model (4)~(6), it is found that two of three (*fdd*tenure* and *fdn*tenure*) are positive and significant, indicating that as firm has female director with greater level of tenure and as the number of female director with greater level of tenure increases, firm has greater probability of obtaining CSR award, showing that greater level of tenure further increases firm's CSR performance. In model (7)~(9), it is found that two of three (*fdn*attend* and *fidd*attend*) are positive and significant, indicating that as the number of female director with higher board meeting attendance rate and firm with female independent director with higher board meeting attendance rate, firm has greater probability of obtaining CSR award, showing that greater level of tenure further increases firm's CSR performance. Overall, empirical result in Table 9 supports the above three additional hypotheses that higher educational level, longer tenure, and higher board meeting attendance rate help to increase the effects of board gender diversity on CSR performance.

It is interesting that in models (3) and model (9), the coefficients of interaction term of female independent director and those with a doctoral degree (*fidd*phd*), as well as the interaction term of female independent director and the average board attendance rate of female independent director (*fidd*attend*), are found to be significantly positive and the numerical values of coefficients are larger (thus with greater economic significance). This indicates that female independent director with higher education level and female director with greater board meetings attendance rates, is helping to enhance the role of female independent director in the board (especially in improving monitoring efficiency), contributing to larger increase in the commitment to CSR and obtaining superior CSR performance. However, the effect of tenure of female independent director in improving CSR is not larger than that of non-independent directors. The explanation is that women who can serve as independent director are more likely to have substantial expertise and qualifications, on the other hand, the likelihood and the requirement of women with substantial expertise and qualifications in serving as non-independent director may be relatively lower. While greater tenure helps to improving expertise and obtaining qualifications, tenure plays a more important role in enhancing female non-independent in helping board to monitoring and advising in forming decision of improving firm's CSR performance.

Blau index as alternative measure of board gender diversity

The Blau Index, also known as the Simpson Index, is used to measure the level of gender diversity within a firm's board of directors, its functional committees, senior management, or the entire management hierarchy (Campbell and Mínguez-Vera, 2008). This index takes into account the number of gender categories, typically two, and the evenness of the distribution of board members within these categories. Assuming a firm's board consists of only men and women, and the male and female ratios are easily calculate. To obtain the Blau Index, subtract the sum of the squares of these two ratios from one. When the number of men and women is equal, with each gender representing 50% of the board, the Blau Index is 0.5. When the board is entirely composed of either men or women, the Blau Index is 0. Therefore, the Blau Index for gender diversity ranges from 0 to a maximum of 0.5, with values closer to 0.5 indicating a higher level of diversity.

Panel A of Table 10 presents the regression estimates of how Blau Index (*fdblau*) as an alternative measure of board gender diversity affects various CSR performance. Observing the estimated coefficients, most are positive, and three of them are statistically significant as explained variable is *csrcont*, *scv* and *scvps*, indicating that firms with greater level of board gender diversity tends to be firms with greater probability of continuous obtaining CSR award, higher social contribution value and higher social contribution value per share. The empirical result generally supports the hypothesis of the study.

Industry adjustment of female director ratio

This study considers that firms within the same industry face similar industry and market environments, which lead to close operational and litigation risks. The boards of directors of these firms may exhibit specific industry patterns in terms of their demand for managerial monitoring and advising. Therefore, the degree of gender diversity in boards may show similar levels within the same industry. This study defines a new variable by subtracting the average female director ratio in its industry from female director ratio in an individual firm, resulting in an industry-adjusted female director ratio (*fdrindjust*). This variable is used to predict a firm's CSR performance.

Panel B of Table 10 presents the regression estimates of how industry-adjusted female director ratio (*fdrindjust*) affects various CSR performance. Observing the estimated coefficients, most are positive, and three of them are statistically significant. These are corporate social responsibility continuous performance (*csrcont*), social contribution value (*scv*), and per-share social contribution value (*scvps*), indicating that firms with female directors above the industry average are more likely

Table 9 The effects of female directors with greater level of education, tenure and board meeting attendance on CSR performance

Explanatory Variable	Explained Variables (current CSR performance: *csrdummy*)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
*fdd*phd*	0.00549								
	(1.57)								
*fdn*phd*		0.00470***							
		(3.47)							
*fidd*phd*			0.0123**						
			(2.47)						
*fdd*tenure*				0.000583**					
				(2.07)					
*fdn*tenure*					0.000281**				
					(2.00)				
*fidd*tenure*						0.000288			
						(0.81)			
*fdd*attend*							0.000118		
							(0.99)		
*fdn*attend*								0.0000744**	
								(2.38)	
*fidd*attend*									0.000109**
									(1.96)
BD vars	included	included	included	included	included	included	included	included	included
CONTROLs	included	included	included	included	included	included	included	included	included
Constant	included	included	included	included	included	included	included	included	included
Num. of obs.	19,875	19,875	19,875	5,368	5,368	5,368	7,048	7,048	7,048
Adj. *R*-square	0.101	0.102	0.102	0.111	0.111	0.111	0.112	0.113	0.113
Prob. of *F*-stat.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table reports the regression estimates of the effects of female directors with greater level of education, tenure and board meeting attendance on CSR Performance (current CSR performance: *csrdummy*). The main explanatory variables in models (1) to (9) are, the intersection of the dummy of whether a firm has female director and whether firm's female director has Ph.D. degree (*fdd*phd*), the intersection of the number of female director and whether firm's female director has Ph.D. degree (*fdn*phd*), the intersection of the whether a firm has female independent director and whether firm's female director has Ph.D. degree (*fidd*phd*), the intersection of the dummy of whether a firm has female director and female directors' average tenure (*fdd*tenure*), the intersection of the number of female director and female directors' average tenure (*fdn*tenure*), the intersection of the whether a firm has female independent director and female directors' average tenure (*fidd*tenure*), the intersection of the dummy of whether a firm has female director and female directors' average board meeting attendance rate (*fdd*attend*), the intersection of the number of female director and female directors' average board meeting attendance rate (*fdn*attend*), the intersection of the whether a firm has female independent director and female directors' average board meeting attendance rate (*fidd*attend*), respectively. Control variables include firm size (*asset*), debt ratio (*debt*), returns on assets (*roa*), institutional investors shareholdings (*insthold*), and the dummy of whether a firm is a family-controlled firm (*family*). The data period is from 2007 to 2020. The *t*-values of the estimated coefficients are shown in parentheses, and *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

to consistently obtain corporate social responsibility awards, along with higher social contribution value and social contribution value per share. With one exception (the coefficient for social return on assets, *sroa*, is negative and significant), the empirical results still tend to support the hypothesis of the study.

Two-stage least square instrumental variable estimation

Due to the potential endogeneity issue between board gender diversity and CSR performance, meaning that firms with higher levels of board gender diversity also tend to have better CSR performance, especially when the assessment of CSR performance includes criteria related to board diversity, this study employs a two-stage least square instrumental variable estimation to mitigate endogeneity in examining the effects of board gender diversity on CSR performance. Following Lin and Lai (2012), the choice of instrumental variables should satisfy relevance, meaning that the selected instrumental variables should have a significant relationship with the endogenous variable. They should also satisfy exogeneity, meaning that the selected instrumental variables should be unrelated to the error term in the original regression equation (Levitt, 1997). Regarding the latter property, Angrist and Krueger (1991, 1992, 2001) point out that it is generally difficult to test using statistical tools but can be argued through a detailed theoretical and institutional analysis.

Table 10 Additional tests for the estimation of the relationship between board gender diversity and CSR performance

	csrdummy (1)	*csrcumu* (2)	*csrcont* (3)	*csrovlp* (4)	*scv* (5)	*sroa* (6)	*scvps* (7)
Panel A. Blau Index as Alternative Measure of Board Gender Diversity							
fdblau	0.00794	0.0654	0.00698***	0.00108	0.561**	0.138	0.796***
	(1.11)	(1.44)	(2.78)	(0.35)	(2.25)	(0.58)	(4.88)
Panel B. Industry Adjustment of Female Director Ratio							
fdrindjust	0.0000147	0.000272	0.0000852***	-0.0000131	0.00709**	-0.00556*	0.00422**
	(0.17)	(0.49)	(2.66)	(-0.45)	(2.14)	(-1.73)	(2.05)
Panel C. Two-stage Least Square Instrumental Variable Estimation (IV: Last-period Female Director Ratio)							
fdr_{HAT1}	0.0000742	0.000349	0.0000740**	-0.0000196	0.00519	-0.00255	0.00748***
	(0.73)	(0.55)	(2.21)	(-0.57)	(1.37)	(-0.69)	(3.19)
Panel D. Two-stage Least Square Instrumental Variable Estimation (IV: Industry Average Female Director Ratio)							
fdr_{HAT2}	0.00309***	0.0151***	-0.0000630	0.000212	0.00470	0.162***	0.132***
	(5.70)	(5.44)	(-1.02)	(1.07)	(0.25)	(6.29)	(7.20)
Panel E. Nonlinear (Quadratic) Effects of Board Gender Diversity on CSR Performance							
fdr	0.0000877	0.00206	0.000202***	0.000174*	0.0121	0.0194***	0.0307***
	(0.39)	(1.57)	(2.72)	(1.84)	(1.54)	(2.58)	(5.98)
fdrsq	0.000000619	-0.0000363	-0.00000332*	-0.00000494**	-0.000140	-0.000545***	-0.000617***
	(0.11)	(-1.08)	(-1.67)	(-2.16)	(-0.72)	(-3.00)	(-5.05)
Panel F. Heckman Two-stage Estimation							
fdd	0.251***	2.511***	0.0847***	0.0752***	-2.777**	5.138***	17.94***
	(6.16)	(7.91)	(6.02)	(4.72)	(-2.48)	(4.49)	(9.64)

This table reports several additional tests of the effects of board gender diversity on firm's CSR performance. Panel A shows the regression result of how the Blau Index (*fdblau*), recalculated for board gender diversity, affects CSR performance (only reporting the estimates of the main explanatory variable). Panel B reports the regression estimates of how the industry-adjusted female director ratio (*fdrindjust*) affects CSR performance (also reporting estimates of the main explanatory variable only). Panel C reports the result of two-stage least square instrumental variable estimation of whether board gender diversity influences CSR performance. In the first stage (not reported), the last-period female director ratio and control variables in regression equation (1) are used to predict the current female director ratio, resulting in the fitted value for the female director ratio (fdr_{HAT1}), which becomes the main explanatory variable for predicting CSR performance in the second stage. Control variables in the second stage estimation are the same as in regression equation (1) (estimates of control variables not reported). Panel D reports the results of two-stage instrumental variable estimation of whether board gender diversity affects CSR performance. In the first stage (not reported), the average female director ratio for the same industry and control variables in regression equation (1) are used to predict the current female director ratio, resulting in the fitted value for the female board member ratio (fdr_{HAT2}), which becomes the main explanatory variable for predicting CSR performance in the second stage. Control variables in the second stage estimation are the same as in regression equation (1) (estimates of control variables not reported). Panel E reports the results of a quadratic regression estimation of whether board gender diversity affects CSR performance, with the main explanatory variables including the female director ratio (*fdr*) and the square of the female director ratio (*fdrsq*). Panel F reports the results of a Heckman two-stage estimation of whether board gender diversity affects CSR performance. In the first stage, a probit model determines whether a firm has female board members, with explanatory variables including firm size, return on asset, independent director ratio, institutional investors' shareholdings, and a dummy variable of whether a firm is family-controlled. After estimation, an bias-correction term (*lambda*) for self-selection bias is obtained and becomes an additional explanatory variable for the second stage. In the second stage estimation, explanatory variables include female director dummy variable (*fdd*), the additional selection bias correction term (*lambda*), and control variables that are the same as in regression equation (1). The Heckman two-stage estimation adopts maximum likelihood estimation (MLE)

Following Adams, Lin and Zou (2011), Lin, Officer and Zou (2011), Hertzel and Officer (2012), this study considers two variables as instrumental variables in the two-stage least square instrumental variable estimation. The first instrumental variable is the lagged one-period board gender diversity variable (lagged female director ratio). The second instrumental variable is the industry-average board gender diversity variable from firms in the same industry (industry-average female director ratio). In this study, exact identification is used in the two-stage least squares instrumental variable estimation. For potentially endogenous variables, such as the board gender diversity variable, one instrumental variable is employed at a time.

Panel C of Table 10 reports the two-stage least squares instrumental variable estimation results of whether board gender diversity affects CSR performance when the instrumental variable is the lagged one-period female director ratio. In the unreported table content, the first-stage estimation results indicate that the selected instrumental variables have a positive and significant impact on the potential endogenous variable, and the first-stage estimation's F-statistics is very high, demonstrating that the choice of instrumental variables aligns with the previously mentioned relevance criteria. The second-stage estimation results are similar to the results of the baseline regression estimates conducted previously. The fitted female director ratio (fdr_{HAT1}) from the first-stage estimation shows a positive

and significant influence on certain coefficients related to CSR performance variables. As the fitted female director ratio increases, the CSR performance improves, partially supporting the hypothesis of this study. Panel D of Table 10 reports the two-stage least squares instrumental variable estimation results of whether board gender diversity affects CSR performance when the instrumental variable is the industry-average female director ratio. Similar to the results in panel C, the fitted female director ratio (fdr_{HAT2}) from the first-stage estimation shows a positive and significant influence on certain CSR performance variables. As the fitted female director ratio increases, CSR performance improves.

Nonlinear effects of board gender diversity on CSR performance

Considering the possibility of a non-linear relationship between board gender diversity and CSR performance, meaning that there may be a U-shaped pattern where firms benefit more from increased female board members when board gender diversity is low. In such cases, incorporating more female directors can leverage their unique attributes, experiences, and perspectives to enhance the efficiency of board operations, including improved managerial monitoring, managerial advising and providing valuable insights and resources, thereby contributing to improved CSR performance. However, as board gender diversity increases, the added costs of social identification, communication, and coordination, along with the potential for stereotyping of female board members, can diminish the positive influence of board gender diversity on CSR performance.[7] It may even lead to costs greater than the benefits, resulting in an inverted U-shaped relationship between board gender diversity and CSR performance. To examine this, this study introduces the squared term of the female director ratio into the regression equation and then re-estimates.

The empirical results of the non-linear estimation are reported in panel E of Table 10. As observing the coefficients of the female director ratio (*fdr*) and its squared term (*fdrsq*), it is evident that a combination of positive and negative coefficients with statistical significance is present. This indicates that while an increase in the female director ratio contributes to the enhancement of CSR performance, the magnitude of its positive impact diminishes as it increases. Interestingly, by utilizing the statistically significant coefficients of the linear and squared terms, it can be inferred that the optimal female director ratio for a firm to achieve the highest level of CSR performance lies approximately between 17% to 30%. Beyond a female director ratio of 30%, firm's CSR performance begins to decline. This result aligns with many current regulatory practices in which government guidelines recommend a female director ratio of around 30%.

Heckman two-stage estimation

Existing research indicates that the level of board gender diversity is determined by various firm characteristics and corporate governance variables (Saeed, Belghitar and Yousaf, 2016; Oliveira and Zhang, 2022; Ángeles López-Cabarcos, Vizcaíno-González and López-Pérez, 2023). These underlying factors that influence board gender diversity may also influence a firm's CSR performance. To enhance the causal inference of the effects of board gender diversity on CSR performance, it is essential to consider controlling for the underlying factors determining board gender diversity.

To address the problem of self-selection of samples, this study employs the Heckman (1979) two-stage estimation to examine the effects of board gender diversity (proxied by the dummy of the presence of female director, *fdd*) on CSR performance. In the first stage, a probit model is used to estimate the likelihood of a firm hiring female director based on firm size, profitability, board independence, institutional investors' shareholdings, and whether a firm is family-controlled. The estimation result of the first stage obtains the selection bias correction term (inverse Mill's ratio), which is introduced as an additional explanatory variable in the second-stage estimation. Panel F in Table 10 reports the results of the second stage, where the dummy variable representing the presence of female director (*fdd*) is mostly positive and significant. This indicates that, after controlling for the pre-determined factors of board gender diversity, the large part of the evidence suggests that a higher level

[7] A diverse board may lead to decreased board efficiency, longer decision-making process, or reduced decision quality, exacerbating agency problems (Earley and Mosakowski, 2000; Williams and O' Reilly, 1998; Lau and Murnighan, 1998). Jehn, Northcraft and Neale (1999) have proposed that diversity among team members results in poorer overall performance in decision-making, organizational commitment, and performance. Jianakoplos and Bernasek (1998) suggested that female director may make erroneous decisions due to their gender-specific risk-averse tendency, resulting in reduced company performance. Adams and Ferreira (2009) argued that a higher proportion of female director in a corporation might lead to "over-monitoring" by the board, potentially decreasing firm performance. Cox and Blake (1991) posited that increasing the ratio of female executives could raise firm costs due to increased turnover of senior management, negatively impacting firm performance. Richard, Barnett, Dwyer and Chadwick (2004) found that increasing the proportion of female director could heighten dissent caused by gender differences, thereby increasing board controversies during the decision-making process. Additionally, some studies provide evidence that female director is more likely to be seen as symbolic member of the board (Zelechowski and Bilimoria, 2004) and are appointed in large numbers to match the demographics of employees, meet societal expectations, or comply with legal mandates (Farrell and Hersch, 2005). The direct consequence of this symbolism is that female director may only play a superficial institutional role, while having little actual benefits to the board (Zelechowski and Bilimoria, 2004). Kanter (2003) also mentioned that board gender diversity might decrease firm performance or have no effect on firm performance because the appointment of female director may be driven solely by the symbolic image of board diversity that the firm wishes to portray.

of board gender diversity positively influences firm's CSR performance. The empirical results continue to support the hypothesis of the study, the addition of members of different genders to the board has increased the gender diversity of the board, contributing to the enhancement of monitoring and advising efficiency (Nielsen and Huse, 2010; Gul, Srinidhi and Ng, 2011; Srinidhi, Gul and Tsui, 2011; Liu, Wei and Xie, 2014; Cumming, Leung and Rui, 2015; García Osma, Mora and Scapin, 2017; Chen, Leung and Goergen, 2017; Atif, Liu and Huang, 2019; Pucheta-Martínez, Bel-Oms and OlcinaSempere, 2019; Ramon-Llorens, Garcia-Meca and Pucheta-Martínez, 2020; Zalata, Ntim, Alsohagy and Malagila, 2022). This improvement aids the firms in allocating more resources to CSR activities.

Conclusion and suggestion

This study examines the relationship between board gender diversity and CSR performance using data from 1,590 non-financial industry listed firms on the Taiwan Stock Exchange and Taipei Exchange from 2007 to 2020. Existing research has highlighted that increased board gender diversity contributes to improved exchange of diverse perspectives, traits, experience, and background, providing tangible and intangible resource to board. It enhances the monitoring and advising efficiency of board over management, thereby mitigating the problem of agency conflict. Moreover, women directors are often noted to exhibit a stronger commitment to stakeholder interests and environmental concern than their male counterparts. In this context, the appointment of female director increases the board gender diversity, which, in turn, fosters a proactive and contributory stance of corporation towards issues of social responsibility, ESG, and sustainability, which are highly valued in current management practices and academic discourse.

However, some studies have discussed potential challenges related to social identity issue, increased communication and coordination cost between genders, and the risk of introducing tokenism, which might increase the operational cost of board. It may lead to reduced efficiency in board functioning, making it difficult to reach consensus or make decisions regarding CSR or ESG strategies and policies, potentially resulting in a negative relationship between board gender diversity and CSR performance. In the Taiwanese financial market, as female participation in corporate board increases and regulatory frameworks such as Corporate Governance Blueprint 3.0 and Sustainability Development Blueprint set disclosure and proportion requirements for board gender diversity policies of publicly traded firms, it becomes imperative to examine the subsequent impact of board gender diversity on CSR performance in Taiwanese financial market. The need to align practical norms with regulatory requirements and understand the relationship between board gender diversity and CSR performance in the Taiwanese financial market is a central motivation behind the study.

In the study, gender data of each board member was collected annually for each firm over the data period, in order to calculate variables such as the presence of female director, the number of female director, female director ratio, and the number of female independent directors. These variables were used to quantify the degree of board gender diversity. CSR performance variables were constructed using historical name-list of CSR awards from local famous business magazines such as the *Common Wealth* and the *Global Views Monthly*. The concept of social contribution value, as an inclusion criterion for the Shanghai Stock Exchange's Social Responsibility Index constituents, was also employed to quantify CSR performance. Through univariate *t*-tests in means, Pearson correlation analysis, and baseline regression estimation, it was found that an increase in board gender diversity corresponds to better CSR performance. Furthermore, extensive additional tests revealed that board gender diversity notably enhances firm's commitment to shareholder rights, increased tax payments to the government, and more resource allocated to employees. Female director with higher educational level, longer tenure, and higher board meetings attendance rate further enhance CSR performance. Another additional analyses, including the calculation of the Blau Index to proxy for the degree of board gender diversity, industry-adjusted gender diversity variables, two-stage least square instrumental variable estimation to address endogeneity, and Heckman two-stage estimation to address sample self-selection issues, consistently showed a positive effect of board gender diversity on CSR performance, consistently support the principal outcome of the study. Lastly, a quadratic non-linear estimation revealed that the degree to which board gender diversity maximizes CSR performance might reach an optimum when the female director ratio is around 30%, beyond which it could potentially result in adverse effects on CSR performance. Overall, the principal outcome of the study consists with the view that board gender diversity has positive impact on CSR performance (Pucheta-Martínez, Bel-Oms, and Nekhili, 2019; Fernández-Gago, Cabeza-García and Nieto, 2018; Harjoto and Rossi, 2019; Gulzar, Cherian, Hwang, Jiang and Sial, 2019; Furlotti, Mazza, Tibiletti, and Triani, 2019; Cruz, Justo, Larraza-Kintana, and GarcésGaldeano, 2019; Campopiano, Rinaldi, Sciascia, and De Massis, 2019).

The implications of the empirical result include the following: For management, appointing female director is

beneficial in strengthening firm's sustainability, improving performance on management of stakeholder interests, and may enhance and accumulate social reputation. Regarding the appointment of director, the organization and its decision-making process should also consider additional qualities of female director candidates, such as their educational background, previous board meeting attendance rates, and tenure. For government regulatory agencies, ongoing regulations promoting board gender diversity have positive effects on social harmony, stability, and a firm's sustainability. However, there is a need to consider specific details, including the potential consequences of having too many female directors, such as whether there should be a limit on the female director ratio exceeding 30% and similar issues. For investors, board gender diversity not only enhances a firm's CSR performance but also leads to better performance in other aspects, as evidenced in existing research. Therefore, board gender diversity can indeed be considered as one of the factors for investors when selecting investment targets

Regarding recommendations for future research, firstly, the current focus of gender diversity measurement is primarily on the board level. Subsequent research can explore and investigate the gender diversity within subsidiary organizations of the board, such as audit committee, compensation committee, corporate governance committee, and nomination committee. This expansion of the analysis will enable a more comprehensive assessment of the broader impact of gender diversity within the senior organizational structure of a firm. Second, continuing from the previous point, in the future, the level of gender diversity in top-tier organization of a firm can also be used to predict more specific actions related to ESG, such as corporate misconduct, information disclosure, dividend policies, executive compensation, tax avoidance, related-party transactions.

Third, existing research has found that the probability of women occupying top positions in a firm significantly increases when the firm is facing financial distress or a crisis. This is because women, who have to break through the so-called "glass ceiling," face more criticism and scrutiny than men. Therefore, when a firm is in distress, the probability of men taking on such positions decreases, while the likelihood of women assuming top positions increases (Elsaid and Ursel, 2018). This phenomenon is referred to as the "glass cliff" and it occurs when women are only allowed to take on leadership roles when the firm is in an unstable or high-risk situation. However, this phenomenon also suggests that when a firm has women in power positions, the firm is more likely to be in an unstable state (Haslam, 2010; Mulcahy and Linehan, 2014). Therefore, subsequent research can examine whether this glass cliff phenomenon truly exists in Taiwanese listed firms. Lastly, the discussion examination on board gender diversity can investigate whether there is a spillover effect. A higher degree of board gender diversity may lead to greater gender diversity in the firm's management, or is it the other way around (Cook and Glass, 2014; Dezsö and Ross, 2012; Chang and Liu, 2024). The former can be explained using Social Identity Theory by Kanter (1977) and Tajfel and Turner (2004), while the latter can be explained using the Queen Bee Syndrome (Staines, Tavris and Jayaratne, 1974; Moore, 1999; Chang and Liu, 2024).

Abbreviations

AMD	Advanced Micro Devices
CEO	Chief Executives Officer
CFO	Chief Financial Officer
COO	Chief Operation Officer
CSR	Corporate Social Responsibility
ESG	Environment, Social and Governance
FSC	Financial Supervisory Commission
IV	Instrumental Variable
LGBTQ	Lesbian, Gay, Bisexual, Transgender, Queer
M&A	Merger and Acquisition
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
OTC	Over the Counter
SOX Act	Sarbanes-Oxley Act
TEJ	Taiwan Economic Journal

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Authors' contributions
Yuan Chang is responsible for the implementation of econometric analysis and representation of statistical tables, and the writing the empirical and conclusion part. Kun-Tsung Wu, Shu-Hui Lin and Chia-Jung Lin are responsible for the writing of the introduction, literature review, the formulation of the research design and research hypotheses.

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Declarations

Competing interests
The authors declare that they have no conflict of interest.

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References

Adams, R. B., & Ferreira, D. (2007). A theory of friendly boards. *Journal of Finance, 62*, 217–250.
Adams, R., & Ferreria, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics, 94*(2), 291–309.
Adams, R. B., & Funk, P. (2012). Beyond the glass ceiling: does gender matter? *Management Science, 58*, 219–235.
Adams, M., Lin, C., & Zou, H. (2011). Chief executive officer incentives, monitoring, and corporate risk management: evidence from insurance use. *Journal of Risk and Insurance, 78*(3), 551–582.
Adams, R. B, Gray, S., and Nowland, J. (2010) *Is there a business case for female directors? evidence from the market reaction to all new director appointments. Working paper*.
Ahern, K. R., & Dittmar, A. K. (2012). The changing of the boards: the impact on firm valuation of mandated female board representation. *Quarterly Journal of Economics, 127*(1), 137–197. https://www.jstor.org/stable/41337208.
Ángeles López-Cabarcos, M., Vizcaíno-González, M., & López-Pérez, L. (2023). Gender diversity on boards: determinants that underlie the proposals for female directors. *Technological Forecasting and Social Change, 190*, 122417.
Angrist, J., & Krueger, A. B. (1991). Does compulsory school attendance affect schooling and earnings? *Quarterly Journal of Economics, 106*(4), 979–1014.
Angrist, J., & Krueger, A. B. (1992). The effect of age at school entry on educational attainment: an application of instrumental variables with moments from two samples. *Journal of the American Statistical Association, 87*(No.418), 328–336.
Angrist, J., & Krueger, A. B. (2001). Instrumental variables and the search for identification: from supply and demand to natural experiments. *Journal of Economic Perspectives, 15*(4), 69–85.
Arayssi, M., Jizi, M., & Tabaja, H. H. (2020). The Impact of board composition on the level of ESG disclosures in GCC countries. *Sustainability Accounting, Management and Policy Journal, 11*(1), 137–161.
Atif, M., Liu, B., & Huang, A. (2019). Does board gender diversity affect corporate cash holdings? *Journal of Business Finance and Accounting, 46*(7/8), 1003–1029.
Atif, M., Hossain, M., Alam, M. S., & Goergen, M. (2021). Does board gender diversity affect renewable energy consumption? *Journal of Corporate Finance, 66*, 101665.
Bart, C., & McQueen, G. (2013). Why women make better decisions. *International Journal of Business Governance and Ethics, 8*, 93–99.
Bear, S., Rahman, N., & Post, C. (2010). The impact of board diversity and gender composition on corporate social responsibility and firm reputation. *Journal Business Ethics, 97*, 207–221.
Beasley, M. S. (1996). An empirical analysis of the relation between the board of director composition and financial statement fraud. *Accounting Review, 71*, 443–465.
Becker-Blease, J. R. (2011). Governance and innovation. *Journal of Corporate Finance, 17*, 947–958.
Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board gender diversity and corporate response to sustainability initiatives: evidence from the carbon disclosure project. *Journal of Business Ethics, 142*(2), 369–383.
Bigelow, L. and Parks, J. M. (2006). *Gender stereotypes hold back investors. Working paper*.
Bøhren, Ø., & Strøm, R. Ø. (2010). Governance and politics: regulating independence and diversity in the boardroom. *Journal of Business Finance and Accounting, 37*, 1281–1308.
Bose, S., Hossain, S., Sobhan, A., & Handley, K. (2022). Does female participation in strategic decision-making roles matter for corporate social responsibility performance? *Accounting and Finance, 62*(3), 4109–4156.
Boubakri, N., El Ghoul, S., Guedhami, O., & Wang, H. (2021). Corporate social responsibility in emerging market economies: Determinants, consequences, and future research directions. *Emerging Markets Review, 46,* 100758. https://www.sciencedirect.com/science/article/abs/pii/S1566014120303307.
Boubakri, N., El Ghoul, S., Wang, H., Guedhami, O., & Kwok, C. Y. (2016). Cross-listing and corporate social responsibility. *Journal of Corporate Finance, 41*(3), 123–138.
Branco, M. C., & Rodrigues, L. L. (2008). Factors influencing social responsibility disclosure by portuguese companies. *Journal of Business Ethics, 83*, 685–701.
Byoun, S., Chang, K., and Kim, Y. S. (2011). *Does corporate board diversity affect corporate payout policy? Working paper.*
Byron, K., & Post, C. (2016). Women on boards of directors and corporate social performance: a meta-analysis. *Corporate Governance: An International Review, 24*(4), 428–442.
Campbell, K., & Mínguez-Vera, A. (2008). Gender diversity in the boardroom and firm financial performance. *Journal of Business Ethics, 83*, 435–451.
Campopiano, G., Rinaldi, F. R., Sciascia, S., & De Massis, A. (2019). Family and non-family women on the board of directors: effects on corporate citizenship behavior in family-controlled fashion firms. *Journal of Cleaner Production, 214*, 41–51.
Carter, D. A., Simkins, B. J., & Simpson, W. G. (2003). Corporate governance, board diversity, and firm value. *Financial Review, 38*, 33–53.
Carter, D. A., D'Souza, F., Simkins, B. J., & Simpson, W. G. (2010). The gender and ethnic diversity of U.S. boards and board committees and firm financial performance. *Corporate Governance: An International Review, 18*, 396–414.
Carter, M. E., Franco, F., & Gine, M. (2017). Executive gender pay gaps: the roles of female risk aversion and board representation. *Contemporary Accounting Research, 34*(2), 1232–1264.
Celikyurt, U., Sevilir, M., & Shivdasani, A. (2012). Venture capitalist on boards of mature public firms. *Review of Financial Studies, 27*(1), 56–101.
Chang, Y. (2011). Do companies with corporate social responsibility perform better in stock returns? *Fu Jen Management Review, 18*(1), 79–118.
Chang, Y., and Liu, Z. Y (2024). *Homosocial Reproduction v.s Queen Bee Syndrome? The Spillover Effect of Board Gender Diversity over Managerial Gender Diversity, Academia Economic Papers*.
Chen, J., Leung, W. S., & Goergen, M. (2017). The impact of board gender composition on dividend payouts. *Journal of Corporate Finance, 43*, 86–105.
Chen, T., Dong, H., & Lin, C. (2020). Institutional shareholders and corporate social responsibility. *Journal of Financial Economics, 135*(2), 483–504.
Chen, M. H. (2016). *The Effects of Gender Diversity on Operating Performance/Risks of Bank, master thesis*. Department of Finance, National Changhua University of Education.
Ciappei, C., Liberatore, G., & Manetti, G. (2023). A systematic literature review of studies on women at the top of firm hierarchies: critique, gap analysis and future research directions. *Sustainability Accounting, Management and Policy Journal, 14*(7), 202–231.
Clacher, I., García Osma, B., Scarlat, E., & Shields, K. (2021). Do Commonalities facilitate private information channels? Evidence from common gender and Insider trading. *Journal of Corporate Finance, 70*, 102062.
Claessens, S., Djankov, S., & Lang, H. P. (2000). The separation of ownership and control in east Asian corporations. *Journal of Financial Economics, 58*(1-2), 81–112.

Cook, A., & Glass, C. (2014). Above the glass ceiling: when are women and racial/ethnic minorities promoted to CEO? *Strategic Management Journal, 35*(7), 1080–1089.

Cox, T. H., & Blake, S. (1991). Managing cultural diversity: implications for organizational competitiveness. *The Executive, 5*, 45–56.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature, 47*(2), 448–474.

Cruz, C., Justo, R., Larraza-Kintana, M., & Garcés-Galdeano, L. (2019). When do women make a better table? Examining the influence of women directors on family firm's corporate social performance. *Entrepreneurship Theory and Practice, 43*(2), 282–301.

Cuadrado-Ballesteros, B., Martínez-Ferrero, J., & García-Sánchez, I. M. (2017). Board structure to enhance social responsibility development: a qualitative comparative analysis of US companies. *Corporate Social Responsibility and Environmental Management, 24*(6), 524–542.

Cumming, D., Leung, T. Y., & Rui, O. (2015). Gender Diversity and Securities Fraud. *Academy of Management Journal, 58*(5), 1572–1593. https://www.jstor.org/stable/24758234.

Dargnies, M. P. (2012). Men too sometimes shy away from competition: the case of team competition. *Management Science, 58*, 1982–2000.

Darmadi, S. (2011). Board diversity and firm performance: the INDONESIAN evidence. *Corporate Ownership and Control, 8*(2–4), 450–466.

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal, 33*(9), 1072–1089.

Doan, T., & Iskandar-Datta, M. (2021). Does gender in the C-suite really MATTER? *Journal of Accounting, Auditing and Finance, 36*(1), 81–107.

Dobbin, F., & Jung, J. (2011). Corporate board gender diversity and stock performance. the competence gap or institutional investor bias? *North Carolina Law Review, 89*(3), 809–838.

Dyck, A., Lins, K. V., Roth, L., & Wagner, H. F. (2019). Do Institutional investors drive corporate social responsibility? international evidence. *Journal of Financial Economics, 131*, 693–714.

Earley, P. C., & Mosakowski, E. M. (2000). Creating hybrid team cultures: an empirical test of transnational team functioning. *Academy of Management Journal, 43*(1), 26–49.

El Ghoul, S., Guedhami, O., Wang, H., & Kwok, C. C. (2016). Family control and corporate social responsibility. *Journal of Banking and Finance, 73*, 131–146.

Elsaid, E., & Ursel, N. D. (2018). Re-examining the glass cliff hypothesis using survival analysis: The case of female CEO tenure. *British Journal of Management, 29*, 156–170. https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-8551.12241.

Erin, O., Adegboye, A., & Bamigboye, O. A. (2021). Corporate governance and sustainability reporting quality: evidence from Nigeria. *Sustainability Accounting, Management and Policy Journal, 13*(3), 680–707.

Faccio, M., Marchica, M. T., & Mura, R. (2016). CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance, 39*, 193–209. https://www.sciencedirect.com/science/article/abs/pii/S0929119916300244.

Bilimoria, D., and Wheeler, V. (2000). *"Women Corporate Directors: Current Research and Future Directions"*. In RJ Burke and M Mattis (Eds.), Women in Management: Current Research Issues, 2, pp. 138-163.

Fairchild, L. M., & Li, J. W. (2005). Director quality and firm performance. *Financial Review, 40*(2), 257–279.

Faleye, O., Hoitash, R., & Hoitash, U. (2011). "The costs of intense board monitoring. *Journal of Financial Economics, 101*, 160–181.

Fama, E. F., & Jensen, M. C. (1983). Agency problems and residual claims. *Journal of Law and Economics, 26*(2), 327–349.

Farrell, A. K., & Hersch, P. L. (2005). Additions to corporate boards: the effect of gender. *Journal of Corporate Finance, 11*(1–2), 85–106.

Fernández-Gago, R., Cabeza-García, L., & Nieto, M. (2018). Independent directors' background and CSR disclosure. *Corporate Social Responsibility and Environmental Management, 25*(5), 991–1001.

Fondas, N. (2000). Women on Boards of Directors: Gender Bias or Power Threat? In R. J. Burke & M. C. Mattis (Eds.), *Women on Corporate Boards of Directors: International Challenges and Opportunities* (pp. 171–178). Dordrecht: Kluwer Academic.

Francis, B., Hasan, I., Park, J. C., & Wu, Q. (2015). Gender differences in financial reporting decision making: evidence from accounting conservatism. *Contemporary Accounting Research, 32*(3), 1285–1318.

Frank, R. H., Gilovich, T., & Regan, D. T. (1993). Does studying economics inhibit cooperation? *Journal of Economic Perspectives, 7*(2), 159–171.

Furlotti, K., Mazza, T., Tibiletti, V., & Triani, S. (2019). Women in top positions on boards of directors: gender policies disclosed in Italian sustainability reporting. *Corporate Social Responsibility and Environmental Management, 26*(1), 57–70.

Galasso, A., & Simcoe, T. S. (2011). CEO overconfidence and innovation. *Management Science, 57*, 1469–1484.

Galbreath, J. (2011). Are there gender-related influences on corporate sustainability? A study of women on boards of directors. *Journal of Management and Organization, 17*(1), 17–38.

Galbreath, J. (2018). Is board gender diversity linked to financial performance? The mediating mechanism of CSR. *Business and Society, 57*(5), 863–889.

García Lara, J., García Osma, B., Mora, A., & Scapin, M. (2017). The monitoring role of female directors over accounting quality. *Journal of Corporate Finance, 45*, 651–668.

Gul, F. A., Srinidhi, B., & Ng, A. C. (2011). Does board gender diversity improve the informativeness of stock prices? *Journal of Accounting and Economics, 51*(3), 314–338.

Gulzar, M. A., Cherian, J., Hwang, J., Jiang, Y., & Sial, M. S. (2019). The impact of board gender diversity and foreign institutional investors on the Corporate Social Responsibility (CSR) engagement of Chinese listed companies. *Sustainability, 2019*(11), 307.

Hafsi, T., & Turgut, G. (2013). Boardroom diversity and its effect on social performance: conceptualization and empirical evidence. *Journal of Business Ethics, 112*(3), 463–479.

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: the organization as a reflection of its top managers. *Academy of Management Review, 9*(2), 193–206.

Harjoto, M. A., & Rossi, F. (2019). Religiosity, female directors, and corporate social responsibility for italian listed companies. *Journal of Business Research, 95*, 338–346.

Haslam, A. S., Ryan, M. K., Kulich, C., Trojanowski, G., & Atkins, A. (2010). Investing with prejudice: the relationship between women's presence on company boards and group cultural differences on cooperative and competitive behavior on a group task. *Academy of Management Journal, 34*(4), 827–847.

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica, 47*, 153–162.

Hertzel, M. G., & Officer, M. S. (2012). Industry contagion in loan spreads. *Journal of Financial Economics, 103*(3), 493–506.

Hirshleifer, D., Low, A., & Teoh, S. H. (2012). Are overconfident CEOs better innovators? *Journal of Finance, 67*, 1457–1498.

Hollindale, J., Kent, P., Routledge, J., & Chapple, L. (2019). Women on boards and greenhouse gas emission disclosures. *Accounting and Finance, 59*(1), 277–308.

Holmström, B. (2005). Pay without performance and the managerial power hypothesis: a comment. *Journal Corporate Law, 30*, 703–713.

Huang, S. T., & Chang, Y. (2021). The linkage between bank revenue diversification and performance: the moderating effect of social responsibility performance. *Taiwan Academy of Management Journal, 21*(1), 23–50.

Huang, J., & Kisgen, D. J. (2013). Gender and corporate finance: are male executives overconfident relative to female executives. *Journal of Financial Economics, 108*(3), 822–839.

Huang, L. Y., Hsiao, T. Y., & Lai, G. C. (2007). Does corporate governance and ownership structure influence performance? Evidence from Taiwan life insurance companies. *Journal of Insurance Issues, 30*(2), 123–151.

Huang, P. K., Hsu, Y. L., & Lee, Y. H. (2021). Are Women risk-averse? A perspective from female board members' hedging decisions. *Review of Securities and Futures Markets, 33*(4), 31–75.

Isidro, H., & Sobral, M. (2015). The effects of women on corporate boards on firm value, financial performance, and ethical and social compliance. *Journal of Business Ethics, 132*, 1–19.

Jehn, K. A., Northcraft, G. B., & Neale, M. A. (1999). Why Differences make a difference: a field study of diversity, conflict and performance in workgroups. *Administrative Science Quarterly, 44*(4), 741–763.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360.

Jianakoplos, N., & Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry, 36*, 620–630.

Kante, R. M. (2003). Leadership and the Psychology of Turnarounds. *Harvard Business Review, 81*(6), 58–67, 136.
Kanter, R. M. (1977). Men and women of the corporation. Basic Books, New York. https://www.scirp.org/reference/referencespapers?referenceid=1773374.
Kanter, R. M. (2008). *Men and Women of the Corporation*. New York: Basic Books.
Kim, K. E., Mauldin, E., & Patro, S. (2014). Outside directors and board advising and monitoring performance. *Journal of Accounting and Economics, 57*, 110–131.
Kramer, V. W., Konrad, A.M., Erkut, S., and Hooper, M. J. (2006). *Critical Mass on Corporate Boards: Why Three or More Women Enhance Governance. Working paper.* Wellesley Centers for Women.
Lau, D., & Murnighan, J. K. (1998). Demographic diversity and faultlines: the compositional dynamics of organizational groups. *Academy of Management Review, 23*, 325–340.
Levi, M., Li, K., & Zhang, F. (2014). Director gender and mergers and acquisitions. *Journal of Corporate Finance, 28*, 185–200.
Levitt, S. D. (1997). Using electoral cycles in police hiring to estimate the effect of police on crime. *American Economic Review, 87*(3), 270–290.
Liang, H., & Renneboog, L. (2017). On the foundations of corporate social responsibility. *Journal of Finance, 72*, 853–910.
Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review, 47*(4), 409–424.
Lin, M. J., & Lai, J. (2012). The effect of clean water on long term health and education outcome: evidence from Japanese Colonial Taiwan 1909–1933. *Taiwan Economic Review, 40*(1), 1–35. https://www.airitilibrary.com/Article/Detail/10183833-201203-201205010001-201205010001-3-37.
Lin, C., Officer, M. S., & Zou, H. (2011). Directors' and officers' liability insurance and acquisition outcomes. *Journal of Financial Economics, 102*(3), 507–525.
Liu, Y., Wei, Z., & Xie, F. (2014). Do women directors improve firm performance in China? *Journal of Corporate Finance, 28*, 169–184.
Lucas-Perez, M. E., Mínguez-Vera, A., Baixauli-Soler, J. S., Martín-Ugedo, J. F., & Sanchez-Marín, G. (2015). Women on the board and managers' pay: evidence from spain. *Journal of Business Ethics, 129*(2), 265–280.
Manita, R., Bruna, M. G., Dang, R., & Houanti, L. H. (2018). Board gender diversity and ESG Disclosure: evidence from the USA. *Journal of Applied Accounting Research, 19*(2), 206–224.
Matsa, D. A., & Miller, A. R. (2013). A female style in corporate leadership? Evidence from quotas. *American Economic Journal: Applied Economics, 5*(3), 136–169.
McGuinness, P. B., Vieito, J. P., & Wang, M. (2017). The role of board gender and foreign ownership in the CSR performance of Chinese listed firms. *Journal of Corporate Finance, 42*, 75–99.
Michelon, G., & Parbonetti, A. (2012). The effect of corporate governance on sustainability ddisclosure. *Journal of Management and Governance, 16*(3), 477–509.
Miller, T., & Triana, M. D. C. (2009). Demographic diversity in the boardroom: mediators of the board-diversity-firm performance relationship. *Journal of Management Studies, 46*, 755–786.
Minguez-Vera, A., & Martin, A. (2011). Gender and management on Spanish SMEs: an EMPIRICAL analysis. *International Journal of Human Resource Management, 22*, 2852–2873.
Moore, S. (1999). Understanding and managing diversity among groups at work: ley issues for organizational training and development. *Journal of European Industrial Training, 23*(4/5), 208–218.
Mulcahy, M., & Linehan, C. (2014). Females and precarious board positions: further evidence of the glass cliff. *British Journal of Management, 25*(3), 425–438. https://onlinelibrary.wiley.com/doi/abs/10.1111/1467-8551.12046.
Nadeem, M. (2020). Does board gender diversity influence voluntary disclosure of intellectual capital in initial public offering prospectuses? Evidence from China. *Corporate Governance: An International Review, 28*(2), 100–118.
Nelson, J. A. (2015). Are women really more risk-averse than men? A re-analysis of the literature using expanded methods. *Journal of Economic Surveys, 29*(3), 566–585.
Nicholson, G. J., & Kiel, G. C. (2004). Breakthrough board performance: how to harness your board's intellectual capital. *Corporate Governance, 4*(1), 5–23.
Nielsen, S., & Huse, M. (2010). The contribution of women on boards of directors: going beyond the surface. *Corporate Governance: An International Review, 18*(2), 136–148.
Oliveira, M., & Zhang, S. (2022). The trends and determinants of board gender and age diversities. *Finance Research Letters, 46*, 102798.
Ortmann, A., & Tichy, L. K. (1999). Gender differences in the laboratory: evidence from prisoner's dilemma games. *Journal of Economic Behavior and Organization, 39*(3), 327–339.
Perrault, E. (2015). Why does board gender diversity matter and how do we get there? The role of shareholder activism in deinstitutionalizing old boys' networks. *Journal of Business Ethics, 128*, 149–165.
Perryman, A. A., Fernando, G. D., & Tripathy, A. (2016). Do gender differences persist? An examination of gender diversity on firm performance, risk, and executive compensation. *Journal of Business Research, 69*(2), 579–586.
Pfeffer, J., and Salancik G. R. (2003). *The external control of organizations: a resource dependence perspective*. Stanford University Press.
Post, C., & Byron, K. (2015). Women on boards and firm financial performance: a meta-analysis. *Academy of Management Journal, 58*(5), 1546–1571.
Prihatiningtias Y. (2012). *Gender Diversity in the Board Room and Firm Performance: Evidence from Indonesian Publicly Listed Financial Firms*. Thesis, University of Canberra, Australia.
Pucheta-Martínez, M. C., Bel-Oms, I., & Olcina-Sempere, G. (2019). Commitment of Independent and Institutional Women Directors to Corporate Social Responsibility Reporting. *Business Ethics: A European Review, 28*(3), 290–304.
Qiu, B., Ren, H., Zuo, J., & Cheng, B. (2022). Social trust and female board representation: evidence from China. *Journal of Business Ethics, 136*(2), 1–18.
Ramon-Llorens, M. C., Garcia-Meca, E., & Pucheta-Martínez, M. C. (2020). Female directors on boards. the impact of faultiness on CSR reporting. *Sustainability Accounting, Management and Policy Journal, 12*(1), 156–183.
Rau H. A. (2012). *Trust and Trustworthiness-A Survey of Gender Differences*. In SP. McGeown (Ed.), Psychology of Gender Differences (pp. 205-224). Nova Science Publishers.
Richard, O. C., Barnett, T., Dwyer, S., & Chadwick, K. (2004). Cultural diversity in management, firm performance, and the moderating role of entrepreneurial orientation dimensions. *Academy of Management Journal, 47*(2), 255–266. https://www.jstor.org/stable/20159576.
Rose, C. (2007). Does female board representation influence firm performance? The Danish evidence. *Corporate Governance: An International Review, 15*, 404–413.
Saeed, A., Belghitar, Y., & Yousaf, A. (2016). Firm-level determinants of gender diversity in the boardrooms: evidence from some emerging markets. *International Business Review, 25*(5), 1076–1088.
Schwartz-Ziv, M. (2017). Gender and board activeness: the role of a critical mass. *Journal of Financial and Quantitative Analysis, 52*(2), 751–780.
Shahzad, A. M., Rutherford, M. A., & Sharfman, M. P. (2016). Stakeholder-centric governance and corporate social performance: a cross-national study. *Corporate Social Responsibility and Environmental Management, 23*(2), 100–112.
Shen, C. H., & Chang, Y. (2009). Ambition versus conscience, does corporate social responsibility pay off?-The application of matching methods. *Journal of Business Ethics, 88*, 133–153.
Shrader, C., Blackburn, V., & Iles, P. (1997). Women in management and firm financial performance: an exploratory study. *Journal of Managerial Issues, 9*, 355–372.
Sibley, S. A., Senn, S. K., & Epanchin, A. (1968). Race and sex of adolescents and cooperation in a mixed-motive game. *Psychonomic Science, 13*(2), 123–124.
Sila, V., Gonzalez, A., & Hagendorff, J. (2016). Women on board: does boardroom gender diversity affect firm risk? *Journal of Corporate Finance, 36*, 26–53.
Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics, 87*(3), 355–374.
Srinidhi, B. I. N., Gul, F. A., & Tsui, J. (2011). Female directors and earnings quality. *Contemporary Accounting Research, 28*(5), 1610–1644.
Staines, G., Tavris, C., & Jayaratne, T. E. (1974). The queen bee syndrome. *Psychology Today, 7*, 63–66.
Tajfel. H., and Turner J. C. (2004). *"The Social Identity Theory of Intergroup Behavior". Key readings in social psychology*. In Jost JT. and Sidanius J, (Eds.), political psychology: Key readings, Key readings in social psychology (pp. 276-293). New York: Psychology Press.

Torchia, M., Calabrò, M., Huse, M., & Brogi, M. (2010). Critical mass theory and women directors' contribution to board strategic tasks. *Corporate Board: Role, Duties and Composition, 6*(3), 42–51.
Vafeas, N. (2003). Length of board tenure and outside director independence. *Journal of Business Finance and Accounting, 30*(7–8), 1043–1064.
Wang, Y., & Clift, B. (2009). Is there a "business case" for board diversity? *Pacific Accounting Review, 21*, 88–103.
Westphal, J. D. (1999). Collaboration in the boardroom: behavioral and performance consequences of CEO-board social ties. *Academy of Management Journal, 42*, 7–24.
Williams, R. J. (2003). Women on corporate boards of directors and their influence on corporate philanthropy. *Journal of Business Ethics, 41*(1), 1–10.
Williams, K., and O' Reilly, C. A. (1998). *Demography and Diversity in Organizations*, in Barry M. Staw. and Robert M. Sutton (ed.), Research in Organizational Behavior. pp. 77-140. JAI Press.
Yang, W. L., Yang, J. L., & Gao, Z. T. (2019). Do female board directors promote corporate social responsibility? An empirical study based on the critical mass theory. *Emerging Markets Finance and Trade, 55*(15), 3452–3471. https://www.tandfonline.com/doi/full/10.1080/1540496X.2019.1657402.
Zalata, A. M., Ntim, C. G., Alsohagy, M. H., & Malagila, J. (2022). Gender diversity and earnings management: the case of female directors with financial background. *Review of Quantitative Finance and Accounting, 58*(1), 101–136.
Zelechowski, D. D., & Bilimoria, D. (2004). Characteristics of women and men corporate inside directors in the US. *Corporate Governance: An International Review, 12*(3), 337–342.

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