Does Female Participation in Strategic Decision-Making Roles Matter for Corporate Social Responsibility Performance?

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Abstract

We examine the association between female participation in strategic decision-making roles and corporate social responsibility (CSR) performance using a sample of United States (US) firms from 2001 to 2018. Female participation in strategic decision-making roles is measured using: (i) the female presence in different positions on the board of directors, such as female board member, independent board member, chairperson and audit committee member; and (ii) the female presence in top management roles, such as Chief Executive Officer (CEO) and Chief Financial Officer (CFO). We find that female participation in strategic decision-making roles is positively associated with CSR performance. In investigating the 'tokenism' aspect of female participation on the board, our results contradict the 'tokenism' argument for appointing females to boards, instead supporting their real influence on CSR performance. These findings are important to regulators, policy makers, company management and other stakeholders with an interest in how increased female participation in strategic decision-making roles influences CSR performance.

Key words: Female, corporate social responsibility performance, Chairperson, Chief Executive Officer, Chief Financial Officer, board of directors, audit committee.

JEL: M14, M41, J16

Data availability: All data are publicly available from the sources mentioned in the paper.

1. Introduction

The demand for corporate social responsibility (CSR) has gained impetus over the last few decades, with CSR now widely used by investors in their investment decision making (Eccles and Klimenko, 2019). For example, when the United Nations (UN)-backed Principles for Responsible Investment (PRI) were introduced in 2006, only 63 investment companies, with a total of US$6.5 trillion in assets under management, signed a commitment to integrate environmental, social and governance (ESG) issues in their investment decisions. By 2018, the number of companies had grown 27 times with their investments totalling US$81.7 trillion (Eccles and Klimenko, 2019). Given the growing importance of integrating CSR into a firm's operation and the pressures from various stakeholders, understanding the drivers of CSR performance is an important area of study in the accounting literature (Radhakrishnan *et al.*, 2018). Consistent with this study area, a stream of previous studies, in recognising the existence of gender-based differences between women and men on ethical orientation, risk taking, and monitoring intention and ability, suggests that gender diversity on the board of directors drives companies to achieve and maintain better CSR performance (e.g., Atif *et al.*, 2020; Haque, 2017; Haque and Jones, 2020; Liu, 2018).

While the board of directors is responsible for devising CSR strategies and monitoring CSR performance (Endrikat *et al.*, 2020; Tapestry Networks and Ernst & Young, 2018; Unruh *et al.*, 2016) with board-level sub-committees assisting the board to more efficiently discharge these roles (Endrikat *et al.*, 2020), it is the top management of firms that actually implements CSR strategies (Bose *et al.*, 2021; Huang and Kisgen, 2013; McGuinness *et al.*, 2017). The crucial roles of multiple firm-level actors in a firm's CSR performance are also recognised by policy-making institutions and validated by recent survey evidence. For instance, a recent discussion of the European Audit Committee Leadership Network highlights that the board is ultimately responsible for approving designated CSR targets and goals (Tapestry Networks and

Ernst & Young, 2018), while the audit committee plays a key role in monitoring CSR-related risk and performance. Similarly, after surveying 1,223 companies from North America, Europe and the Asia Pacific, Vigeo (2013) finds that the board and audit committee members play vital roles in integrating CSR issues into the corporate governance system.[1] However, to the best of our knowledge, no existing study takes a comprehensive view to investigate the impact on firm-level CSR performance of a female presence on the board of directors and in critical top management positions. Our study aims to fill this gap in the literature.

The main research question investigated in this paper is whether female participation in strategic decision-making roles (i.e., the female presence in different positions on the board of directors and in critical top management positions) is associated with CSR performance. We rely on upper echelons and organisational theories to inform our hypotheses. These theories assert that the personal attributes and values of corporate strategic leaders have an important bearing on their cognitive frames and that these cognitive frames inevitably affect firms' strategic actions and outcomes (Hambrick, 2007; Hambrick and Mason, 1984; Neely *et al.*, 2020). The gender of strategic leaders is one such critical attribute that strongly affects their cognitive frames of mind. Owing to their different socialisation and upbringing, female strategic leaders emphasise harmony, inclusiveness and more careful reasoning which, in turn, makes them more ethically sensitive and risk averse than their male colleagues (Huang and Kisgen, 2013; Jeong and Harrison, 2017). When combined, the higher levels of ethical sensitivity and risk aversion of female leaders in strategic decision-making roles facilitate better CSR performance.

Using 15,874 firm-year observations from firms in the United States (US) from 2001–2018, we examine the association between female participation in strategic decision-making

[1] Vigeo Eiris is an international environmental, social and governance rating agency. The company named Vigeo was formed in 2002 and was rebranded as Vigeo Eiris in 2018.

roles and CSR performance. We measure female participation in these roles using: (a) the female presence in different positions on the board of directors (e.g., female board member, independent board member, chairperson and audit committee member); and (b) the female presence in top management positions (e.g., Chief Executive Officer [CEO] and Chief Financial Officer [CFO]). We measure CSR performance using ratings on the MSCI ESG KLD STATS (formerly KLD Research and Analytics Inc) database, following prior studies (e.g., Bose *et al.*, 2021; Du and Yu, 2020; Kim *et al.*, 2014). We also examine 'tokenism' and the non-linear relationship between female participation on the board and CSR performance, and use several robustness analyses to check the sensitivity of our findings.

We find evidence that firms with female participation in strategic decision-making roles exhibit a higher level of CSR performance. Having a female presence in different positions on the board of directors and audit committee and in top management roles is found to be significantly and positively associated with CSR performance. When firms' CSR performance is separated into strengths and concerns, we find that having a female presence at all levels of these decision-making roles is significantly and positively associated with CSR strengths, whereas a female presence in these roles is significantly and negatively associated with CSR concerns. These findings hold when we use the propensity score matching (PSM) technique and Heckman's (1979) two-stage analysis to address observable and unobservable selection bias, two-stage regression analysis to address endogeneity concerns, and alternative measures of CSR performance and female participation. Furthermore, we find that the presence of single female participation on the board of directors positively influences CSR performance, the results contradict the argument of 'tokenism' when appointing women to the board (Fan *et al.*, 2019; Liu, 2018), instead supporting their real positive influence on board dynamics (Chen *et al.*, 2016; Srinidhi *et al.*, 2011). Together, our results imply that appointing women to strategic

decision-making roles is a plausible way of improving a firm's CSR performance and that these appointments should be considered real rather than 'tokenism'.

Our study contributes to the extant literature in several ways. Firstly, it responds to a recent call by Radhakrishnan *et al.* (2018) for studies in the accounting literature on the drivers of CSR performance. Our study also responds to the calls for research on the effect of a CEO's gender on CSR performance by Marquis and Lee (2013); on the impact of board gender diversity on CSR by Rao and Tilt (2016); and on the impact of gender diversity at management levels other than board levels by Goldberg (2016). Secondly, our study extends prior studies (e.g., Coffey and Wang, 1998; Marquis and Lee, 2013; Wang and Coffey, 1992; Williams, 2003) that focus only on board-level gender diversity and corporate philanthropy. In addition to corporate philanthropy, CSR performance incorporates other dimensions including the firm's responsibility to the community, diversity, the environment, employee relations, human rights and products (Dhaliwal *et al.*, 2011; Kim *et al.*, 2012). In this paper, we focus on multidimensional CSR performance and gender diversity from the viewpoint of three levels: board of directors, audit committee and top management, with this not having been investigated in prior studies.

Thirdly, two studies, Rupley *et al.* (2012) and Boulouta (2013), examine board-level gender diversity with environmental disclosure quality and CSR performance, respectively. Boulouta (2013) covers a period from 1999–2003 before enactment of the *Sarbanes–Oxley Act of 2002* (SOX Act); however, Dalton and Dalton (2010) argue that the role of female leadership in the organisation has notably increased in the post-SOX period. The role of female directors in the organisation in the post-SOX period thus warrants further investigation. Furthermore, we contribute to the extant literature by demonstrating that female board members, female independent directors and female audit committee members do not reflect so-called 'tokenism'; the women in these roles are making a real difference in terms of firms' improved CSR

performance. Finally, our study's findings contribute to the ongoing debate on why firms should consider appointing women to strategic decision-making roles. The findings have important implications for regulators when formulating policies encouraging the appointment of women to strategic decision-making roles to enhance firms' CSR performance.

The remainder of the paper is organised as follows. Section 2 reviews the extant literature and develops the study's hypotheses. Section 3 presents the research methods, while Section 4 discusses the results. Section 5 discusses the robustness of the study's findings. The final section (Section 6) concludes the paper.

2. Literature review and development of hypotheses

2.1. Female participation on board of directors and a firm's CSR performance

Boards of directors have substantial responsibilities for formulating firms' CSR strategies and overseeing firms' CSR achievements (Unruh *et al.*, 2016). Based on upper echelons theory and organisational theory, most prior research argues that female board members discharge their strategic and monitoring roles regarding CSR issues better than their male counterparts for several reasons. Owing to women's different communal qualities, female directors have improved compassion towards diverse stakeholders (Mallin and Michelon, 2011; Nielsen and Huse, 2010). Adams and Funk (2012) find that female directors are more benevolent than male directors. Moreover, female directors are more likely to come from a non-business and community influencer background and, hence, have previous experience in engagement in philanthropic and charitable activities (Hillman *et al.*, 2002; Singh *et al.*, 2008). These characteristics of female directors exemplify the underlying CSR principles. In addition, female directors are generally more educated than their male counterparts (Hillman *et al.*, 2002; Singh *et al.*, 2008). Better levels of education encourage individuals to employ broader and multiple perspectives when they consider CSR and other issues (Elm *et al.*, 2001). Finally, female

directors play their monitoring role more effectively as they have a higher level of commitment and diligence than male directors (Adams and Ferreira, 2009). This more effective monitoring ability may curtail management's reluctance to invest in and boost CSR activities as CSR returns are long term rather than short term (Berrone and Gomez-Mejia, 2009). A significant percentage of prior research investigating the nexus between female participation on boards of directors and firms' CSR-related outcomes predicts a positive association between them (e.g., Atif *et al.*, 2020; Boulouta, 2013; Haque, 2017; Haque and Jones, 2020; Liu, 2018; Marquis and Lee, 2013; McGuinness *et al.*, 2017). With few exceptions (e.g., Boulouta, 2013; Haque, 2017), many of these prior studies find support for the view that board gender diversity positively influences CSR-related outcomes (e.g., Atif *et al.*, 2020; Haque and Jones, 2020; Marquis and Lee, 2013; McGuinness *et al.*, 2017). This evidence suggests a positive relationship between board gender diversity and CSR performance.

As women are still in the minority on boards of directors[2], several studies that draw on Kanter (1977) critical mass theory argue that the influence of female board members on various outcome variables is only realised when their numbers exceed a certain threshold (e.g., Atif *et al.*, 2020; Boulouta, 2013; Schwartz-Ziv, 2017). However, little agreement has been reached on the number or percentage of female members on boards of directors that constitutes this critical mass. For instance, several studies document that female directors can significantly affect strategic actions and outcomes when at least three female directors are on the board (Fan *et al.*, 2019; Liu, 2018). In contrast, some recent evidence suggests that even the presence of one woman on the board of directors positively influences boardroom dynamics (Chen *et al.*, 2016).

[2] Girardone *et al.* (2021), based on data insight from the Bloomberg's Gender-Equality Index2, report that women occupy only 27% and 19% of senior management and executive positions, respectively, and a mere 6% of CEO positions.

Beyond research on overall board gender diversity, the influence of a chairwoman on the board of directors, and of female independent directors and a female presence on important board committees attract limited attention in prior literature. The board chair is the most influential position on the board of directors as the chair plays a vital role in guiding the board's leadership attributes, and in advising and monitoring management (Banerjee *et al.*, 2020; Oliver *et al.*, 2018). The female chairperson can play a supportive role to enhance the feminine orientation of a board of directors (Eagly and Karau, 2002). Tuliao and Chen (2017) also find that chairwomen prioritise relationships with diverse stakeholders and concern about the company's reputation more than chairmen: their attitudes and behaviour are suggestive of a mental approach that promotes corporate social responsibility (CSR). In the context of China, McGuinness *et al.* (2017) find that the presence of a female chair or vice-chair is positively associated with CSR ratings. Hence, the female chairperson is likely to have a positive influence on firms' CSR-related strategies and outcomes.

Within a board of directors, independent directors comprise another critical sub-group and are argued to have greater concern about the firm's attitude towards CSR (de Villiers *et al.*, 2011; Ibrahim and Angelidis, 1995; Rupley *et al.*, 2012). Evidence suggests that independent directors are more likely to be sensitive to social demands (Ibrahim and Angelidis, 1995) and to promote socially responsible behaviour in their firms (O'Neill *et al.*, 1989). They may face higher incentives to pursue environmental innovations arising from their heightened consciousness of the improvement in a firm's standing, derived from its CSR approach, with constituencies such as investors, the government and lenders (Johnson and Greening, 1999). They also have increased motivation to maintain their personal reputations (de Villiers *et al.*, 2011). Several studies find that firms which have boards with more independent directors have a higher quality of CSR disclosure (Dah and Jizi, 2018; Rupley *et al.*, 2012). Female independent directors, who share their gender-based differences with female executive

directors, also have an independent orientation (Selby, 2000) which provides them with enhanced incentives to promote CSR strategies and outcomes. Consistent with this argument, Liu (2018) finds that the negative association between board gender diversity and environmental lawsuits is mainly driven by the presence of female independent directors rather than female executive directors. We predict that the combination of gender-based differences and independent director roles will lead firms with more female independent directors toward better CSR performance.

Finally, studies in the prior literature recognise that the audit committee assists a board of directors in performing its supervisory and overseeing roles on CSR issues (Al-Shaer and Zaman, 2018; Raimo *et al.*, 2021). These studies provide evidence supporting the view that characteristics of the audit committee (e.g., independence, expertise and meeting frequency) positively affect a firm's CSR disclosures (Al-Shaer and Zaman, 2018; Raimo *et al.*, 2021). Specific empirical evidence on the association between a female director presence on the audit committee and a firm's CSR performance is scarce. However, the limited empirical evidence shows that audit committee membership of female directors deters earnings manipulation (Gull *et al.*, 2018) and financial restatements (Oradi and Izadi, 2020). This empirical evidence suggests that board committees with a higher level of gender diversity have a superior ethical orientation, higher risk aversion and better monitoring ability. Hence, it could be expected that gender-diverse audit committees outperform their counterparts in formulating CSR-related strategies and monitoring their implementation.

To summarise, most prior research argues and finds evidence that the presence of women in board positions is more likely than that of their male counterparts to increase a firm's inclination to champion CSR-related policies. Recent meta-analytic reviews (e.g., Byron and Post, 2016) document a generally positive association between board gender diversity and CSR-related outcomes. We expect that the influence of board gender diversity on CSR-related

outcomes also extends to include the presence of female leaders in the board chair position, and their participation as independent directors and on audit committees. Hence, our study's hypothesis is stated as follows:

H1**:** *Female participation in different positions on the board of directors (female board member, independent board member, chairperson and audit committee member) is positively associated with a firm's CSR performance.*

2.2. Female participation in top management team and a firm's CSR performance

While the board of directors is responsible for setting a firm's strategies and monitoring its performance, top management is ultimately responsible for implementation of a firm's strategies and policies (McGuinness *et al.*, 2017). From upper echelons and organisational theories, it follows that top management attributes can affect a firm's strategic decisions and outcomes. Owing to women's gender-based differences, several studies predict that the presence of female top executives affects strategic decisions and outcomes. However, most of these studies focus on financial, rather than CSR-related, outcomes. These studies show that female CEOs adopt more conservative accounting policies (Ho *et al*., 2015) and take a lower level of risk in the case of bank lending (Faccio *et al.*, 2016), supporting the view that female CEOs are more ethical and risk averse than their male counterparts. The findings of the limited existing research focusing on female top executives and CSR-related outcomes are not conclusive (Hoobler *et al.*, 2018). For example, although Glass *et al.* (2016) report an insignificant influence of female CEOs on the promotion of corporate environmental policies, several studies document a positive association between female top executives and CSR-related outcomes. For instance, Liu (2018) finds that female CEOs are significantly associated with reduced environmental lawsuits, although only in firms with an overall lower level of female representation on boards. Liu (2021) also finds that female CEOs reduce the likelihood of labour lawsuits against their companies. Liu (2021) interprets this finding to mean that female

CEOs maintain better relationships with employees than their male counterparts. The findings of McGuinness *et al.* (2017) also document that the presence of a female CEO or vice-CEO in China increases a firm's environmental ratings.

Within top management, the Chief Financial Officer (CFO) has a critical role, being responsible for the firm's overall strategy and performance appraisal (Uhde *et al.*, 2017). Prior literature recognises that the CFO's role in corporate governance is multi-faceted, with this role having significantly increased under the *Sarbanes–Oxley Act of 2002* (Chava and Purnanandam, 2010). The CFO's influence on the firm's long-term strategies is inseparable from economic, social and environmental issues (Kuehn, 2010) as the CFO's activities are directly involved in the management, measurement and reporting of the firm's sustainability activities (Ernst & Young, 2016). The CFO, as an executive officer, supports the board of directors to make both financial and non-financial decisions and supports the CEO to communicate information to both investors and other stakeholders (International Federation of Accountants [IFAC], 2013). The CFO also has significant control over resource allocation to CSR-related causes. To the best of our knowledge, no study has investigated the association between female CFOs and CSR-related outcomes. However, prior studies establish that firms with female CFOs are more likely to recognise timelier loan loss provision (Janahi *et al.*, 2021); practise more conservative accounting policies (Francis *et al.*, 2014); and report higher quality earnings (Peni and Vahamaa, 2010) and are less likely to engage in earnings manipulation (Chava and Purnanandam, 2010); accounting fraud (Liao *et al.*, 2019); and financial misreporting (Gupta *et al.*, 2020). These findings support the view that female CFOs have a more risk-averse and better ethical orientation than their male counterparts. Hence, our hypothesis regarding the association between female top executives and a firm's CSR performance is stated as follows:

H2: *Female participation in top management positions (i.e., female CEO, female CFO) is positively associated with a firm's CSR performance.*

3. Research design

3.1. Sample and data

Our initial sample consists of all firms covered by the MSCI ESG KLD STATS (formerly KLD Research and Analytics Inc) database from 2001–2018. We merge firm-year observations with financial data in Standard & Poor (S&P)'s Compustat database, CSR performance data from the MSCI ESG KLD STATS database and corporate governance data from the BoardEx database. Our sampling period is restricted by the limitations of the BoardEx database which commenced data collection in 2000, while CSR performance data on the MSCI ESG KLD STATS database is available only until 2018. Table 1, Panel A provides the sample selection procedure for our analysis. We remove 8,593 firm-year observations due to insufficient firm-specific financial and corporate governance-related control variable data. Our final sample comprises 15,874 firm-year observations from 3,182 unique companies during 2001–2018.[3]

[INSERT TABLE 1 ABOUT HERE]

Table 1, Panel B summarises the industry classifications of firms in our sample based on industry classifications by Dhaliwal *et al.* (2011). We keep all industries in our sample, including utilities and financial companies, following prior studies on CSR (e.g., Dhaliwal *et al.*, 2011).[4] In our sample, the computer industry has the largest proportion of companies (15.26%), followed by services (8.67%) and financial industries (8.21%), while firms from 'other industries' (not covered by major industries) have the lowest proportion. Table 1, Panel

[3] Due to CFO-related variables in each model, the total number of observations drop significantly. The number of observations in each model was 26,593 firm-year observations before including CFO-related variables in each model. However, excluding CFO-related variables from each model does not change the findings.
[4] In the sensitivity analysis, we exclude firms from the financial and utilities industries in our samples. The results remain qualitatively similar.

C shows the year distribution of firms in our sample. The year 2017 has the largest proportion of firms (7.08%), followed by 2012 (6.52%) and 2016 (6.51%), while the year 2001 (1.64%) has the lowest proportion of firms.

3.2. Measurement of a firm's CSR performance

We measure a firm's CSR performance based on the MSCI ESG KLD STATS database. Prior studies on CSR performance have used this database extensively (e.g., Bose *et al.*, 2021; Deng *et al.*, 2013; Dhaliwal *et al.*, 2011; Kim *et al.*, 2014; Kim *et al.*, 2012).[5] Our CSR performance measure is based on the aggregate CSR score that captures firm-level CSR activities based on the following six dimensions used in CSR ratings by the MSCI ESG KLD STATS database: the community, diversity, employee relations, the environment, human rights and products. The number of indicators in the MSCI ESG KLD STATS database has changed over the years (Du and Yu, 2020). Consequently, it is not possible to directly compare CSR performance across years. However, this comparison is necessary for our study as we are interested in the time-series dimension as well as the cross-sectional dimension of CSR performance. Therefore, we first compute the total net CSR score by summing up the total CSR strengths and concerns. We then create a weighted measure for CSR performance that compares CSR performance across years and industries with the value ranging between 0 and 1, following prior studies (Bose *et al.*, 2021; Kim *et al.*, 2014).[6] More specifically, we generate

[5] The MSCI ESG KLD STATS database uses a variety of sources including surveys and interviews with company executives, firm disclosures, regulatory filings, government data, non-governmental organisation (NGO) data, global media news and academic journals (Deng *et al.*, 2013; Kim *et al.*, 2012) to assess CSR performance along seven qualitative dimensions and six exclusionary screens. The seven qualitative dimensions comprise the community, corporate governance, diversity, employee relations, the environment, human rights and products. Each of these dimensions is associated with positive and negative ratings (i.e., strengths and concerns) based on a predetermined set of criteria. The overall CSR rating for each dimension is the sum of strengths minus the sum of concerns, and a higher rating represents better CSR performance. However, this simple summing-up approach has a limitation (Deng *et al.*, 2013). The MSCI ESG ratings also involve six exclusionary screens that comprise alcohol, gambling, firearms, military, nuclear power and tobacco to which only negative ratings (i.e., concerns) are assigned.

[6] For an alternative proxy, we use the total net CSR score, which is the difference between the total CSR strengths and the total CSR concerns. We do not report the results here for reasons of brevity. However, the unreported results show that the tenor of our findings remains the same.

a transformation that maintains the relative distance between the net CSR score for firms within the same industry for each year using the following formula:

$$CSR\_PERF_{i,t} = \frac{(CSR \text{ for firm } i \text{ in year } t - \text{Minimum } CSR \text{ for firm } i\text{'s industry in year } t)}{(\text{Maximum } CSR \text{ for firm } i\text{'s industry in year } t - \text{Minimum } CSR \text{ for firm } i\text{'s industry in year } t)} \quad (1)$$

We exclude the corporate governance dimension from our CSR score, following prior studies (e.g., Kim *et al.*, 2014; Kim *et al.*, 2012), as it is considered to be a separate construct. We include the corporate governance dimension in our additional analysis. Furthermore, we do not include the exclusionary screens (i.e., alcohol, gambling, firearms, military, nuclear power and tobacco) in constructing our CSR performance measure as they do not pertain to firms' discretionary activities (Deng *et al.*, 2013; Kim *et al.*, 2014; Kim *et al.*, 2012). We use the positive ratings number as CSR strengths and the negative ratings number as CSR concerns, and the raw CSR score[7] as additional proxies for CSR performance.

3.3. Measurement of female participation in decision making

To measure female participation in decision-making roles, we employ two groups of measures: (a) female participation in different positions on the board of directors and audit committee; and (b) female participation in top management. Our study's measures for the first group comprise female board member *(FDIR)*; female independent board member *(FIND)*; female chairperson *(FCHAIR)*; and female audit committee member *(FAC)*. Our proxies for the second group comprise female CEO *(FCEO)* and female CFO *(FCFO)*. We measure *FDIR* as the proportion of female members on the board compared to the total number of board members, while *FIND* is measured as the proportion of female independent directors compared to the total number of independent directors on the board. Female chairperson *(FCHAIR)* is

[7] The raw CSR score is the sum of total strengths minus total concerns based on six dimensions of CSR: the community, diversity, employee relations, the environment, human rights and products.

measured as an indicator variable that takes a value of 1 if the chairperson of the board is female, and 0 otherwise. Female audit committee member *(FAC)* is measured as the proportion of female members compared to the total number of members on the audit committee. Female CEO *(FCEO)* is measured as an indicator variable that takes a value of 1 if the CEO of the firm is female, and 0 otherwise. Similarly, female CFO *(FCFO)* is measured as an indicator that takes a value of 1 if the CFO of the firm is female, and 0 otherwise.

3.4. Empirical model

We adopt a lead–lag approach in all our regression models to address potential endogeneity issues arising from reverse causality related to CSR performance *(CSR_PERF)* and female participation *(FP)* in decision-making roles. We estimate the following model to test our hypotheses:

$$\begin{aligned} CSR\_PERF_{i,t+1} = {} & \beta_0 + \beta_1 FP_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 FIN_{i,t} + \beta_5 TOBINQ_{i,t} + \beta_6 LEV_{i,t} \\ & + \beta_7 GLOBAL_{i,t} + \beta_8 LIQUIDITY_{i,t} + \beta_9 COMPETITION_{i,t} + \beta_{10} LITG_{i,t} \\ & + \beta_{11} ABS\_EM_{i,t} + \beta_{12} BSIZE_{i,t} + \beta_{13} BIND_{i,t} + \beta_{14} ACSIZE_{i,t} + \beta_{15} DUAL_{i,t} \\ & + \beta_{16} CEO\_AGE_{i,t} + \beta_{17} CEO\_TEN_{i,t} + \beta_{18} CFOAGE_{i,t} + \beta_{19} CFOTEN_{i,t} \\ & + \sum Industry_{i,t} + \sum Year_{i,t} + \varepsilon_{i,t} \qquad (2) \end{aligned}$$

where *CSR_PERF* is a measure of a firm's CSR performance and *FP* denotes female participation in strategic decision-making roles. The measurement of CSR performance (*CSR_PERF)* and female participation (*FP)* is previously discussed in Sections 3.2 and 3.3. Appendix A provides the definitions of all variables.

We include several control variables in Equation (2), based on prior CSR literature (e.g., Bose *et al.*, 2021; de Villiers *et al.*, 2011; Dhaliwal *et al.*, 2011). We control for firm size *(SIZE)* as size captures various factors (e.g., public pressure or financial resources) that motivate firms to maintain better CSR performance (Dhaliwal *et al.*, 2011). Firms with better financial performance are more likely to have more resources to accommodate a significant amount of social compliance costs, thus contributing to higher CSR performance (Clarkson *et al.*, 2011;

de Villiers *et al.*, 2011; Dhaliwal *et al.*, 2011). Therefore, we control for profitability (*ROA*). We also control for a firm's financing activities *(FIN)* as firms raising capital in the debt and equity markets are more likely to have better CSR performance (Cheng *et al.*, 2013; Clarkson *et al.*, 2008; El Ghoul *et al.*, 2011). Similarly, firms with higher growth opportunities *(TOBINQ)* and those with higher leverage (*LEV*) are more likely to engage in more CSR activities (Clarkson *et al.*, 2008; Clarkson *et al.*, 2011). Thus, we control for growth opportunities *(TOBINQ)* and leverage *(LEV).* Firms with global operations, especially those operating in emerging markets, face greater pressure to commit to social performance (Dhaliwal *et al.*, 2011). Therefore, we control for firms' global exposure (*GLOBAL*). Firms with better liquidity are more likely to allocate a larger sum of resources to CSR activities. Therefore, we control for a firm's liquidity *(LIQUIDITY).* Firms operating in more competitive industries are more likely to maintain a higher level of CSR performance to obtain a competitive advantage (Dhaliwal *et al.*, 2011). Thus, we control for industry competition (*COMPETITION*). We measure industry competition following Isidro and Marques (2021). Firms with a higher litigation risk maintain their CSR performance to preempt potential lawsuits (Skinner, 1997). Therefore, we control for a firm's litigation risk (*LITG*).[8] We also control for a firm's earnings management (*ABS_EM*) as socially responsible firms are less likely to engage in earnings management through discretionary accruals (Kim *et al.*, 2012).

Our study's next set of controls relates to the board of directors and audit committee. Firms with larger boards are more likely to have more experienced and expert members (Coles *et al.*, 2008) to provide technical advice on improving a firm's CSR performance. Similarly, firms with a higher concentration of independent members on the board are more likely to have better

[8] Standard Industrial Classification (SIC) codes for high-litigation industries are 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370. Although the litigation industry codes are based on the study by Francis *et al.* (1994), recent research by Kim and Skinner (2012) shows that these industries still face greater litigation risks than other industries.

CSR performance (Bose *et al.*, 2021). Therefore, we control for a firm's board size (*BSIZE*) and the level of board independence (*BIND*). We also control for the size of the audit committee (*AC_SIZE*). The reasons are that firms with larger audit committees are more likely to allocate more resources to overseeing the reporting process to ensure financial reporting transparency through effective monitoring (Anderson *et al.*, 2004) and that firms with financial reporting transparency are also socially responsible (Kim *et al.*, 2014; Kim *et al.*, 2012).

Our final set of control variables relates to CEO and CFO characteristics, in line with Yuan *et al.* (2019) and Bose *et al.* (2021). These are as follows: CEO duality (*DUAL*) as dual leadership roles allow a CEO to coordinate board actions and implement strategies more rapidly to gain a competitive advantage (Yang and Zhao, 2014); the ages of the CEO (*CEO_AGE*) and of the CFO *(CFO_AGE)* as older executives are more likely to be risk averse (David *et al.*, 1998), thus possibly preferring to reduce CSR-related risk by maintaining better CSR performance; and CEO tenure *(CEO_TEN)* and, similarly, CFO tenure (*CFO_TEN*) to control for higher power CEOs with a longer tenure in their current position that may help them to pursue their personal agendas (Ryan and Wiggins, 2001) through investment in proactive CSR strategies that may enhance their personal reputations.

We apply the ordinary least squares (OLS) regression technique to estimate all our regression models. Our study employs robust standard errors clustered by firm to control heteroscedasticity and serial correlation issues in these models. For all regression models, we include industry and year fixed effects. Additionally, we estimate variance inflation factor (VIF) values to diagnose any potential multicollinearity in the data. We winsorise all continuous variables at the 1st and 99th percentile to minimise the influence of potential outlier observations.

4. Empirical results

4.1. Descriptive statistics and correlation analysis

Table 2 reports the descriptive statistics. The mean of CSR performance (*CSR_PERF*) at 0.336 is lower than the mean of CSR performance of 0.404 reported by Kim *et al.* (2014), possibly due to the different sample period and size. About 68% of firms in the sample have at least one female director (*FDIR_DUM*) on their boards, with the mean of *FDIR* being 10.90%, which is similar to means reported in prior studies (e.g., Adams and Ferreira, 2009; Srinidhi *et al.*, 2011). Furthermore, about 61.20% of firms in our sample have at least one female independent director (*FIND_DUM*), while the average proportion of female independent directors to total independent directors *(FIND)* is 8.60%. About 1.90% of firms in our sample have a female chairperson (*FCHAIR*), while 3.20% have a female CEO (*FCEO*). These values are higher than those reported by Gul *et al.* (2011) of 1.7% of firms with a female chairperson and 1.3% of firms with a female CEO. These differences reflect the incremental growth in female participation in strategic decision-making positions in recent years. About 9.50% of firms in the sample have a female CFO *(FCFO)*. About 44.40% of firms in our sample have at least one female member on their audit committee *(FAC_DUM)*, which is higher than the 37.9% reported by Srinidhi *et al.* (2011). The mean proportion of female directors on audit committees *(FAC)* is 12.05%.

[INSERT TABLE 2 ABOUT HERE]

The average firm in our sample has a market capitalisation (*SIZE*) of US$7,875.73 million, indicating that our sample consists of relatively larger firms. In addition, firms in our sample have a return on assets (*ROA*) value of 2.60%; growth opportunities (*TOBINQ*) of 2.163; liquidity (*LIQUIDITY*) of 2.319; and leverage (*LEV*) of 0.231. About 30.20% of firms in our sample have a high-litigation risk (*LITG*) and about 45% of the firms have foreign operations (*GLOBAL*). On average, firms in our sample have positive financing (*FIN*), which indicates

that firms, on average, raise new finance in the public market. The average absolute value of abnormal accruals (*ABS_EM*) is 0.085. The average board size (*BSIZE*) is 10.684 members and, on average, 62.60% of board members are independent directors (*BIND*). The average size of the audit committee is (*AC_SIZE*) is 4.17 members. About 49.40% of firms in our sample have CEO–chair duality (*DUAL*). In terms of CEO characteristics, the average age (*CEO_AGE*) and tenure (*CEO_TEN*) of CEOs is 65.514 years and 5.364 years, respectively. In relation to CFO characteristics, the average age (*CFO_AGE*) and tenure (*CFO_TEN*) of CFOs is 61.130 years and 3.229 years, respectively.[9]

Table 2, Panel B presents the results of the mean and median tests of firms' CSR performance with a female director *(FDIR_DUM)*, female non-executive director *(FIND_DUM)*, female audit committee member *(FAC_DUM)*, female chair *(FCHAIR)*, female CEO *(FCEO)* and female CFO *(FCFO)*. These results suggest that firms with female participation have a higher level of CSR performance compared to their counterparts. The results from both mean and median tests suggest that these differences in CSR performance are statistically significant ($p<0.001$). These preliminary findings indicate that firms with female participation in strategic decision-making positions are more likely to have better CSR performance.

Table 3 provides the Pearson correlation matrix between the variables. This shows that all our study's proxies for female participation are significantly and positively associated with firms' CSR performance. This offers further support for the view that firms with female participation in strategic decision-making positions are more likely to have better CSR performance. The correlation matrix also shows that all coefficients between variables have values less than 0.80 except for *FDIR* and *FIND*; however, we do not include *FDIR* and *FIND*

[9] We convert *AC_SIZE, CEO_AGE, CEO_TEN, CFO_AGE* and *CFO_TEN* into natural logarithms when we include them in the regression models.

in the same model. Gujarati and Porter (2009) argue that a correlation coefficient value below 0.80 does not create a multicollinearity problem. In addition, we use variance inflation factor (VIF) values to assess the multicollinearity problem, with a VIF value of less than 10 showing that no multicollinearity problem exists between the variables (Gujarati and Porter, 2009). The average VIF value is 1.30, with the lowest VIF value being 1.01 and the highest VIF value being 2.28, indicating that multicollinearity problems are unlikely in our regression models.

[INSERT TABLE 3 ABOUT HERE]

4.2. Regression results

Table 4 reports the regression results for Equation (2). Models (1) to (4) report the regression results for female participation in different board positions using female director *(FDIR)*, female independent director *(FIND)*, female chairman *(FCHAIR)* and female audit committee member *(FAC)*, while Models (5) and (6) report the regression results for female participation in top management positions using female CEO *(FCEO)* and female CFO *(FCFO)*. The *R*-squared (R^2) values range between 30.70% and 34.20% across the six models presented in Table 4, suggesting that our independent variables explain the dependent variable well. The coefficients of *FP* are positive and statistically significant (β=0.476, p<0.01 in Model [1]; β=0.441, p<0.01 in Model [2]; β=0.073, p<0.01 in Model [3]; and β=0.151, p<0.01 in Model [4]) across all models from Models (1) to (4), suggesting that firms with female participation in different positions on the board and audit committee have a higher level of CSR performance. Thus, our first hypothesis (H1) is supported. Furthermore, the coefficients of *FP* are positive and statistically significant in Model (5) (β=0.063, p<0.01) and Model (6) (β=0.064, p<0.01), indicating that firms with female participation in top management have a higher level of CSR performance. These results provide support for our second hypothesis (H2).

[INSERT TABLE 4 ABOUT HERE]

Regarding the control variables for Models (1) to (6), the coefficients of *SIZE*, *TOBINQ*, *COMPETITION* and *LITG* are positive and statistically significant, suggesting that firms which are larger in size, have higher growth opportunities, are highly competitive, and are subject to higher litigation risks have a better level of CSR performance. On the other hand, the coefficients of *LEV* and *LIQUIDITY* are negative and statistically significant, suggesting that firms with higher leverage and higher liquidity have a lower level of CSR performance. Regarding board characteristics, we find that the coefficients of *BSIZE* are positive and statistically significant across all models. However, the coefficients of *DUAL* are positive and statistically significant across all models except for the *FDIR* and *FCHAIR* models. While the coefficients of most control variables are consistent with our expectations, the negative coefficient of *CEOAGE* is opposite to the prediction. A possible explanation may be that firms with younger CEOs are more proactive about CSR issues and that this contributes to these firms' higher level of CSR performance.

4.3. Endogeneity analyses

Endogeneity occurs when the variable of interest correlates with the error term to yield incorrect inferences. Although we use a lead–lag approach in our baseline regression models that partially addresses the problem of reverse causality, it does not fully resolve the endogeneity problem (Gul *et al.*, 2011). Therefore, we address the possibility that firms with a higher level of CSR performance may opt to have more female participation in corporate governance in the ways described in the following subsections.

4.3.1. Propensity score matching (PSM) technique

The association between female participation and a firm's CSR performance may be affected by observable heterogeneity bias and functional misspecification bias (Shipman *et al.*,

2017) which provide an additional source of endogeneity that may affect our findings. Therefore, we use the propensity score matching (PSM) technique to address endogeneity arising from observable self-selection bias (Lennox *et al.*, 2012) and functional form misspecification bias (Shipman *et al*., 2017). The PSM technique is a special procedure that uses propensity scores and matching algorithms to determine the causal effect: it serves to adjust covariate distribution between treatment and control groups (Li, 2013). The technique involves a logistic regression with a dummy dependent variable in the first stage. We run the logistic regression models for *FDIR_DUM, FIND_DUM, FCHAIR, FAC_DUM, FCEO* and *FCFO* with the same set of control variables as in Equation (1). Based on the predicted propensity score from this first-stage model, we match, without replacement, a firm-year observation with female participation *(FP)* which is assigned a value of 1, while the treatment observation, against another firm-year observation with female participation *(FP)* is assigned a value of 0 (a control observation). The same control variables are used in the PSM technique in the first- and second-stage regressions to ensure balance between the treatment and control groups in the matched sample (Shipman *et al*., 2017). Therefore, we employ the same set of control variables in both stages. We use the caliper matching method with a caliper of 1%. The pooled test samples vary from 602 observations with 301 corresponding matched pairs for the *FCHAIR* model to 9,672 observations with 4,836 matched pairs for the *FAC* model for PSM's second-stage model, in which we run an ordinary least squares (OLS) regression with the matched observations.

Table 5, Panel A reports the PSM results for the first-stage logistic regression. Appendix B shows the matching of firms with female participation and those with non-female participation based on firm characteristics used in the first-stage regression. Table 5, Panel B presents the second-stage regression results using the PSM samples. The coefficients of *FP* retain the same sign and significance level across all models from Models (1) to (6). These

results suggest that our findings are not affected by the observable heterogeneity bias and functional misspecification bias, thus corroborating our main findings.

[INSERT TABLE 5 HERE]

4.3.2. Heckman's (1979) two-stage analysis

Although we address the observable differences between the treatment and control firms using the PSM technique, some unobservable factors could differ across firms with female participation and those without female participation. Thus, the self-selection bias problem associated with female participation may not be completely solved. Following Gul *et al.* (2011) and Hillman *et al.* (2007), we use Heckman's (1979) two-stage model to address unobservable selection bias and develop the following first-stage model:

$$FP_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 ROA_{i,t} + \beta_3 TOBINQ_{i,t} + \beta_4 RET_{i,t} + \beta_5 VWRETD_{i,t} + \beta_6 FAGE_{i,t} + \beta_7 TOTRISK_{i,t} + \beta_8 GROWTH_{i,t} + \beta_9 DIVERSIFICATION_{i,t} + \beta_{10} DIR\_MULTIPLE_{i,t} + \beta_{11} IND\_FPCT_{i,t} + \sum INDUSTRY_{i,t} + \sum YEAR_{i,t} + \varepsilon_{i,t} \quad (3)$$

In Equation (3), we control for several variables, following Adams and Ferreira (2009) and Srinidhi *et al.* (2011). We include firm size *(SIZE)* as larger and more visible firms face greater pressure to conform to societal expectations (DiMaggio and Powell, 1983; Hillman *et al.*, 2007). Adams and Ferreira (2009) find that firm performance is associated with female participation. Therefore, we control for accounting-based performance *(ROA)* and market-based performance (*TOBINQ)*, as well as for a firm's stock returns *(RET)* and value-weighted market returns *(VWRETD)*. Firm age *(FAGE)* is also included to control for potential alternative explanations for female representation, such as inertia (Hillman *et al.*, 2007). We also control for a firm's total risk *(TOTRISK)*, sales growth *(GROWTH)* and total diversification *(DIVERSIFICATION)* as firms with more monitoring requirements are likely to increase female participation (Gul *et al.*, 2011; Hillman *et al.*, 2007; Srinidhi *et al.*, 2011).

Furthermore, we include the number of external directorships *(DIR_MULTIPLE)* held by independent directors to proxy for the demand for additional networking (Gul *et al.*, 2011; Srinidhi *et al.*, 2011). Finally, we include the percentage of female employees *(IND_FPCT)* in the three-digit North American Industry Classification System (NAICS) category to control for industries dependent on female employees (Hillman *et al.*, 2007; Srinidhi *et al.*, 2011), which is also served as an exclusion restriction in our first-stage model as stated in Equation (3).[10] The rationale for choosing this variable as an exclusion restriction is that firms operating in industries dependent on female employees influence the likelihood of female participation in strategic decision-making positions in that industry (Hillman *et al.*, 2007; Srinidhi *et al.*, 2011). However, they do not influence the CSR performance of a firm as this is a strategic issue influenced by the board of directors and top management, consistent with upper echelons theory (Marquis and Lee, 2013). Therefore, *IND_FPCT* serves as an appropriate exclusion restriction for performing Heckman's (1979) two-stage analysis.

Table 6, Panel A presents the first-stage regression results. The coefficient values range from 0.340–0.987 with *p*-values ranging from 0.001–0.10. The partial R^2 value (untabulated) for *IND_FPCT* varies from 0.1% to 1% over the six models, which is significantly greater than 0, suggesting that *IND_FPCT* is a reasonable exclusion restriction for our first-stage model.

[INSERT TABLE 6 ABOUT HERE]

Table 6, Panel B reports Heckman's (1979) second-stage regression results for CSR performance, controlling for potential self-selection bias. The coefficients of the inverse Mills ratio (*IMR)* are positive and significant in Models (1) to (4), suggesting that self-selection bias is a potential issue when examining the association of female directors, female independent

[10] We collect the percentage of female employees in the three-digit North American Industry Classification System (NAICS) category from the US Bureau of Labor Statistics. Available at: https://www.bls.gov/ (accessed on 10 November 2021).

directors, a female chairman and female audit committee members with a firm's CSR performance. However, after controlling for self-selection bias, we find that the coefficients of the *FP* variable retain the same sign and significance level, thus corroborating our main findings reported in Table 4.

4.3.3. Unexplained female participation and a firm's CSR performance

We address the question of whether female participation in strategic decision-making roles results in a firm's better CSR performance by: (i) building a prediction model for female participation in strategic decision-making roles; and (ii) examining the association between unexplained female participation in strategic decision-making roles and a firm's CSR performance, following Srinidhi *et al.* (2011). The underlying reason is that predicted female participation in strategic decision-making roles is a linear combination of firm characteristics. If most of the variations in firms' CSR performance are also explained by the firm characteristics used to predict female participation in strategic decision-making roles, then female participation simply works as an aggregate proxy for these firm characteristics (Gul *et al.*, 2011). In contrast, if most of the variations in firms' CSR performance are explained by the unexplained part of female participation in strategic decision-making roles, firms' CSR performance is more likely to be causally linked to female participation (Bose *et al.*, 2021; Gul *et al.*, 2011).

For the female participation prediction model, we use the model from Heckman (1979) first-stage estimation except for the measurement of dependent variables. In the case of *FCHAIR*, *FCEO* and *FCFO*, we use dummy variables and run logistic regressions. In the case of *FAC*, *FDIR* and *FIND* models, we use continuous variables instead of dummy variables and run OLS regressions. Table 7 presents the results of the female participation prediction model. The residual, ε, which is the unexplained component of female participation (*FP_RESID*), is used in the second-stage regression model (Table 7, Panel B). The results are consistent with

our prediction; that is, the coefficients of *FP_RESID* are positively significant in all models from Models (1) to (6). In summary, the results are consistent with our main findings reported in Table 4, indicating that our results are robust.

[INSERT TABLE 7 ABOUT HERE]

5. Additional analysis and robustness checks

5.1. 'Tokenism' and a non-linear relationship between female directors and a firm's CSR performance

Prior studies argue that female directors are selected by firms as mere tokens in response to social pressure or to give the perception of inclusion (e.g., Bourez, 2005; Branson, 2007; Gul *et al.*, 2011; Srinidhi *et al.*, 2011). In our sample, 68% of firms have one female director (*FDIR*), while 34.93% have two or more female directors (*FDIR*). Therefore, 'tokenism' can be viewed as potentially introducing a non-linear relationship between female directors (*FDIR*) and a firm's CSR performance (Gul *et al.*, 2011; Srinidhi *et al.*, 2011). To address this issue, we run four separate regression models with *FDIR* defined as an indicator variable for one, two, three or four female directors on the board, following Srinidhi *et al.* (2011). Table 8, Models (1) to (4) present the regression results. As shown in Table 8, *FDIR1* equals 1 if the board has one or more female directors, and 0 otherwise. Similarly, *FDIR2* equals 1 if the board has two or more female directors, and 0 otherwise. *FDIR3* equals 1 if the board has three or more female directors, and 0 otherwise, while *FDIR4* equals 1 if the board has three or more female directors, and 0 otherwise. The coefficients of *FDIR1, FDIR2*, *FDIR3* and *FDIR4* are positively significant at the 1% level, supporting the argument that the association between a firm's CSR performance and female directors continues to hold as the number of female directors increases beyond one (Srinidhi *et al.*, 2011).

[INSERT TABLE 8 ABOUT HERE]

The tokenism concept can also be applied to female independent directors (*FIND*) in a similar treatment to that for female directors (*FDIR*) as described above. In our sample, 61.22% of firms have one female independent director (*FIND1*), while 26.64% have two or more female independent directors. We formulate *FIND1, FIND2*, *FIND3* and *FIND4* dummy variables in the same way as we formulated *FDIR1, FDIR2*, *FDIR3* and *FDIR4* dummy variables. The regression results are presented in Table 8, Models (5) to (8). The coefficients of all *FIND* variables are positive and statistically significant at the 1% level, implying that the relationship between *FIND* and a firm's CSR performance holds as the number of female independent directors increases beyond one.

Similarly, we test the application of the tokenism concept for female audit committee members. In our sample, 44.37% of firms have at least one female audit committee member *(FAC1)*, while 9.74% have two or more female members on the audit committee. Female participation on the audit committee (*FAC1*) is measured by taking a value of 1 if an audit committee has one or more female members, and 0 otherwise. Similarly, *FAC2* equals 1 if the audit committee has two or more female members, and 0 otherwise. Table 8, Models (7) and (8) report the regression results. The coefficient of *FAC1* and *FAC2* is positive and statistically significant at the 1% level. This suggests that tokenism is not a valid concern for female participation in these firms. Thus, our findings suggest that females are influential and actively involved in decision making rather than being tokens (ineffective) in their leadership roles in relation to firms' CSR performance.

5.2. Firm-level regressions

To test for sensitivity, we run a cross-sectional regression analysis at the firm level using our baseline regression models. The two potential reasons for this type of analysis are, firstly, that female participation may be relatively stable over time. Secondly, our data may be affected by potential serial dependence as CSR performance and female participation could remain

fairly stable over time. Following Hoi *et al.* (2013), we use the average of each variable over the sampling period to compute firm-level measures for all the variables in our baseline regression models. We use the firm-level average variables to run our baseline regression models.[11] We do not present the results here for reasons of brevity. However, the unreported results suggest that our main findings remain the same as reported in Table 4, thus corroborating our findings.

5.3. Alternative proxies for a firm's CSR performance

We employ several alternative proxies for a firm's CSR performance to assess the robustness of our findings. As mentioned in Section 3.2, the MSCI ESG KLD STATS database reports firm-level CSR performance data in the form of CSR strengths and CSR concerns which may capture different dimensions of a firm's CSR performance (Kim *et al.*, 2014) and may be influenced by female participation in decision-making roles. Therefore, we separately analyse CSR strengths and concerns as two separate measures of CSR performance. Table 9, Panel A reports the regression results between female participation in decision-making roles and firms' performance in CSR strengths. The coefficients of *FP* are positive and statistically significant across all models from Models (1) to (6), suggesting that firms with female participation in decision-making roles have a higher level of performance in CSR strengths. Furthermore, we present the regression results between female participation in decision-making roles and firms' performance in CSR concerns and strengths in Table 9, Panel B. The coefficients of *FP* are negative and statistically significant in Table 9, Panel B across all models from Models (1) to (6), suggesting that firms with female participation in decision-making roles have lower performance in CSR concerns. Moreover, the MSCI ESG KLD STATS database reports the separate dimension of a company's corporate governance performance.

[11] For dummy variables, we followed Hoi *et al.* (2013) to construct the firm-level measure. For example, for *FCEO*, we constructed the firm-level measure as a dummy variable that equals 1 if *FCEO* equals 1 in at least half of the years during 2003–2012; otherwise, it equals 0.

As an alternative proxy for CSR performance, corporate governance is included in our study in computing the CSR performance variable. We do not report these regression results here for reasons of brevity. However, the unreported results show that the tenor of the findings remains qualitatively similar to those reported in Table 4.

[INSERT TABLE 9 ABOUT HERE]

Furthermore, we examine the association between female participation in decision-making roles and a firm's CSR performance using the following individual components of CSR performance: the environment, employee relations, the community, human rights, diversity and products. We report the regression results in Table 9, Panels C to H. The coefficients of *FP* for female directors (*FDIR)* are positive and statistically significant in Model (1) across all panels from Panels C to H. This suggests that firms with female board members have a higher level of CSR performance in all dimensions. In relation to female independent board directors *(FIND)*, we find similar results, except for the employee relations and product dimensions of CSR performance. In relation to the female chairperson, we find that firms with a female chairperson have a higher level of CSR performance only in diversity and product dimensions. The results suggest that firms with female audit committee members have a higher level of CSR performance in all dimensions of CSR performance except for products. For a female CEO, the results suggest that firms with a female CEO have a higher level of CSR performance only in the environment and diversity dimensions. In relation to a female CFO, we find that firms with a female CFO have a higher level of CSR performance only in the employee relations and diversity dimensions.

5.4. Using alternative measures for female participation

We test the robustness of our findings using dummy variables to measure *FDIR*, *FIND* and *FAC* instead of using continuous measures. Appendix A provides the definition of female

dummy variables. We report the regression results in Model (1), (5) and (9) of Table 8. The results show that the coefficients of *FDIR*, *FIND* and *FAC* are positively significant at the 1% level, implying that firms with female participation in corporate governance are more likely to have a higher level of CSR performance. These results provide evidence to support the role of female participation in corporate governance.

5.5. Using different sampling methods

Firms in our sample operate in a variety of industries. However, firms operating in the financial and utilities industries have different asset and liability structures to firms in other industries which could potentially influence our results. To mitigate these concerns, we re-run our baseline regression models excluding firms in the financial and utilities industries. We do not report the regression results here for reasons of brevity. However, the unreported results show that the coefficients of *FP* retain the same sign and significance level as stated in Table 4, suggesting that the exclusion of firms operating in the financial and utilities industries do not affect our results, thus corroborating our main findings.

In addition, our sample period covers 2001–2018, a period which includes the Global Financial Crisis (GFC) that devastated much of the world's economy in 2008 and 2009. Consequently, the GFC may affect our results. Therefore, we re-estimate the models for the pre-GFC period (2001–2007) and the post-GFC period (2010–2018) to examine the potential effect of the GFC on our findings. For both sub-samples, the results (un-tabulated) are qualitatively similar to the baseline regression results reported in Table 4, suggesting that the GFC has not affected our findings.

6. Conclusion

In this study, we examine the association between female participation in strategic decision-making roles and firms' CSR performance. We measure female participation in

strategic decision- making roles using: (a) the female presence in different positions on the board of directors (e.g., female board member, independent board member, chairperson and audit committee member); and (b) the female presence in top management roles (i.e., Chief Executive Officer [CEO] and Chief Financial Officer [CFO]). We find that female participation in strategic decision-making roles is positively associated with firms' CSR performance. We also find that female participation at all levels of strategic decision-making roles is significantly and positively associated with CSR strengths, whereas it is significantly and negatively associated with CSR concerns. We employ the propensity score matching (PSM) technique to address observable selection bias and functional misspecification bias and Heckman's (1979) two-stage model to address unobservable selection bias. We find that our results are robust in addressing both observable and unobservable selection bias. We use a two-stage regression model to address endogeneity concerns, with this also suggesting that our results are robust. We find evidence that appointing women to decision-making roles is a plausible way of improving a firm's CSR performance and increasing investors' confidence and should be considered a real influence, rather than being viewed as tokenism.

Our study's findings contribute to the extant literature by identifying the importance of female participation in strategic decision-making roles and its impact on firms' CSR performance. More specifically, our results contribute to the CSR and corporate governance literature, showing that female participation at all levels of strategic decision making supports better CSR performance in firms. Our findings justify the claim that women bring not only different abilities to the board and management but also make the firm more responsible to society and its stakeholders, with a positive influence on the quality of a company's CSR activities (Marquis and Lee, 2013; Soares *et al.*, 2011). Finally, evidence from this study can help regulators to better understand the importance of gender diversity in corporate governance

as an option for improving business practices, particularly those relating to corporate social responsibility (CSR).

The study's findings should be considered amid some limitations. Firstly, the focus of our study is only on United States (US) firms, and the findings could be different in other countries. Future research could investigate this issue using international settings. Secondly, we do not examine the gender diversity of firms' sustainability committees. Future research could explore the impact of the sustainability committee's gender diversity on firms' CSR performance. Despite these limitations, the study's findings add to the growing body of literature on CSR that explores the drivers of CSR performance by providing theoretical and empirical support for the beneficial role of female participation in strategic decision making in improving firms' CSR performance.

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Table 1
Sample selection and distribution

Panel A: Sample selection	**Observations**
MSCI ESG KLD STAT database coverage from 2001–2018	42,130
Less: Firms dropped due to not being merged between databases	(6,644)
Less: Firms dropped due to insufficient observations for firm-specific financial and corporate governance control variables	(8,593)
Firm-year observations available for each model	26,593
Less: Firms dropped due to insufficient observations for CFO-related variables	(10,719)
Final Test Sample from 2001–2018	**15,874**

Panel B: Industry-wise distribution of firms in sample		
Name of Industry	**Observations**	**% of Sample**
Mining/Construction	424	2.67
Food	417	2.63
Textiles/Printing/Publishing	660	4.16
Chemicals	466	2.94
Pharmaceuticals	909	5.73
Extractive	658	4.15
Manufacturing: Rubber/glass/etc.	266	1.68
Manufacturing: Metal	466	2.94
Manufacturing: Machinery	608	3.83
Manufacturing: Electrical Equipment	446	2.81
Manufacturing: Transport Equipment	533	3.36
Manufacturing: Instruments	815	5.13
Manufacturing: Miscellaneous	125	0.79
Computers	2,422	15.26
Transportation	955	6.02
Utilities	808	5.09
Retail: Wholesale	510	3.21
Retail: Miscellaneous	978	6.16
Retail: Restaurant	224	1.41
Financial	1,303	8.21
Insurance/Real Estate	416	2.62
Services	1,377	8.67
Others	89	0.56
Total Sample	**15,874**	**100**

Panel C: Year-wise distribution of firms in sample		
Year	**Observations**	**% of Sample**
2001	260	1.64
2002	347	2.19
2003	602	3.79
2004	798	5.03
2005	831	5.23

2006	885	5.58
2007	917	5.78
2008	981	6.18
2009	1,017	6.41
2010	996	6.27
2011	975	6.14
2012	1,035	6.52
2013	986	6.21
2014	1,009	6.36
2015	979	6.17
2016	1,034	6.51
2017	1,124	7.08
2018	1,098	6.92
Total Sample	**15,874**	**100**

Table 2
Descriptive statistics

Panel A: Full sample descriptive statistics

	Observations	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
CSR_PERF	15,874	0.336	0.214	0.182	0.300	0.455
FDIR_DUM	15,874	0.680	0.466	0.000	1.000	1.000
FDIR	15,874	0.109	0.099	0.000	0.100	0.167
FIND_DUM	15,874	0.612	0.487	0.000	1.000	1.000
FIND	15,874	0.086	0.086	0.000	0.083	0.143
FCHAIR	15,874	0.019	0.136	0.000	0.000	0.000
FAC_DUM	15,874	0.444	0.497	0.000	0.000	1.000
FAC	15,874	0.125	0.159	0.000	0.000	0.250
FCEO	15,874	0.032	0.176	0.000	0.000	0.000
FCFO	15,874	0.095	0.293	0.000	0.000	0.000
SIZE	15,874	7.392	1.639	6.211	7.204	8.424
ROA	15,874	0.026	0.130	0.009	0.043	0.083
FIN	15,874	0.047	0.228	-0.039	0.000	0.040
TOBINQ	15,874	2.163	1.514	1.221	1.645	2.478
LEV	15,874	0.231	0.210	0.033	0.204	0.355
GLOBAL	15,874	0.450	0.497	0.000	0.000	1.000
LIQUIDITY	15,874	2.319	1.769	1.162	1.843	2.895
COMPETITION	15,874	0.547	2.846	-0.596	0.886	2.316
LITG	15,874	0.302	0.459	0.000	0.000	1.000
ABS_EM	15,874	0.085	0.094	0.025	0.057	0.108
BSIZE	15,874	10.684	3.393	8.000	10.000	13.000
BIND	15,874	0.626	0.149	0.533	0.625	0.750
AC_SIZE	15,874	4.170	1.165	3.000	4.000	5.000
DUAL	15,874	0.494	0.500	0.000	0.000	1.000
CEO_AGE	15,874	65.514	8.120	60.000	65.000	71.000
CEO_TEN	15,874	5.364	5.441	1.600	3.600	7.400
CFO_AGE	15,874	61.130	7.629	56.000	61.000	66.000
CFO_TEN	15,874	3.229	3.451	1.000	2.000	5.000

Panel B: Mean and median tests

		Observations	CSR Performance (*CSR_PERF*)		Mean Difference (*t*-statistic)	Median Difference (*z*-statistic)
			Mean	Median		
FDIR	With	10,795	0.371	0.333	30.939^{***}	31.325^{***}
	Without	5,079	0.262	0.222		
FIND	With	9,718	0.372	0.333	27.071^{***}	27.021^{***}
	Without	6,156	0.279	0.235		
FCHAIR	With	301	0.402	0.375	5.394^{***}	5.562^{***}
	Without	15,573	0.335	0.300		
FAC	With	7,043	0.379	0.333	22.873^{***}	21.890^{***}
	Without	8,831	0.302	0.263		
FCEO	With	507	0.395	0.375	6.297^{***}	6.688^{***}
	Without	15,367	0.334	0.294		
FCFO	With	1,508	0.383	0.333	9.011^{***}	7.812^{***}
	Without	14,366	0.331	0.286		

Notes: Superscript ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively. Variable definitions are provided in Appendix A. Std. Dev.=standard deviation

Table 3
Correlation matrix

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]]	[20]	[21]	[22]	[23]	[24]
CSR_PERF	[1]	1.000																							
FDIR	[2]	**0.231**	1.000																						
FIND	[3]	**0.160**	**0.873**	1.000																					
FCHAIR	[4]	**0.043**	**0.178**	**0.032**	1.000																				
FAC	[5]	**0.158**	**0.627**	**0.664**	**0.027**	**1.000**																			
FCEO	[6]	**0.050**	**0.247**	**0.056**	**0.466**	**0.045**	1.000																		
FCFO	[7]	**0.071**	**0.163**	**0.060**	-0.012	**0.044**	**0.038**	1.000																	
SIZE	[8]	**0.313**	**0.293**	**0.273**	**0.023**	**0.243**	0.012	0.007	1.000																
ROA	[9]	**0.115**	**0.066**	**0.053**	**0.022**	**0.031**	0.005	-0.010	**0.256**	1.000															
FIN	[10]	**-0.076**	**-0.089**	**-0.070**	**-0.017**	**-0.051**	**-0.017**	-0.007	**-0.170**	**-0.370**	1.000														
TOBINQ	[11]	**-0.040**	**0.014**	0.006	0.000	-0.001	**0.022**	0.007	**0.039**	-0.006	**0.182**	**1.000**													
LEV	[12]	**0.071**	**0.052**	**0.064**	**-0.026**	**0.061**	**-0.014**	**-0.028**	**0.134**	**-0.068**	**0.073**	**-0.186**	**1.000**												
GLOBAL	[13]	**0.031**	**0.079**	**0.100**	0.006	**0.086**	**-0.026**	**-0.017**	**0.264**	**0.189**	**-0.130**	0.004	**-0.028**	1.000											
LIQUIDITY	[14]	**-0.035**	-0.004	-0.002	**-0.017**	-0.000	0.003	0.001	**0.058**	**-0.057**	**0.087**	**0.088**	0.007	**-0.017**	**1.000**										
COMPETITION	[15]	**0.072**	**0.109**	**0.103**	0.005	**0.096**	0.007	**-0.015**	**0.101**	**0.119**	**-0.086**	**-0.136**	**0.155**	**-0.082**	**-0.143**	**1.000**									
LITG	[16]	**-0.144**	**-0.016**	**-0.040**	**0.014**	**-0.021**	**0.039**	**0.039**	**-0.058**	**-0.132**	**0.082**	**0.255**	**-0.202**	0.006	**0.173**	**-0.380**	1.000								
ABS_EM	[17]	**-0.073**	**-0.090**	**-0.082**	**-0.013**	**-0.055**	**-0.015**	-0.012	**-0.183**	**-0.192**	**0.222**	**0.153**	-0.010	**-0.087**	**0.109**	**-0.130**	**0.025**	1.000							
BSIZE	[18]	**0.373**	**0.247**	**0.182**	0.008	**0.200**	0.008	-0.002	**0.622**	**0.139**	**-0.168**	**-0.137**	**0.132**	**0.168**	**-0.016**	**0.105**	**-0.130**	**-0.134**	1.000						
BIND	[19]	**-0.155**	**0.145**	**0.314**	0.009	**0.079**	0.011	**0.034**	**-0.070**	**-0.044**	**0.045**	-0.001	0.012	**0.023**	**0.031**	**0.038**	**-0.047**	**-0.015**	**-0.292**	1.000					
AC_SIZE	[20]	**0.183**	**0.215**	**0.231**	0.007	**0.173**	0.013	0.007	**0.329**	**0.078**	**-0.102**	**-0.128**	**0.110**	**0.085**	**-0.040**	**0.098**	**-0.178**	**-0.083**	**0.407**	**0.123**	1.000				
DUAL	[21]	**0.099**	0.002	**0.016**	**0.030**	-0.002	**-0.050**	**-0.021**	**0.082**	**0.071**	**-0.042**	**-0.036**	**0.030**	**0.016**	-0.008	0.003	**-0.056**	**-0.029**	**0.052**	**0.137**	**0.052**	1.000			
CEO_AGE	[22]	**0.160**	**-0.117**	**-0.142**	**-0.025**	**-0.073**	**-0.053**	**-0.039**	0.005	**0.088**	**-0.069**	**-0.118**	0.009	**-0.023**	**-0.105**	0.001	**-0.089**	**-0.037**	**0.162**	**-0.192**	**0.054**	**0.320**	1.000		
CEO_TEN	[23]	**-0.052**	**-0.057**	**-0.047**	-0.002	**-0.051**	**-0.042**	**-0.019**	**-0.037**	**0.077**	**-0.031**	**0.019**	**-0.021**	**0.018**	**-0.034**	0.005	**-0.031**	**-0.037**	**-0.112**	**0.045**	**-0.099**	**0.195**	**0.228**	1.000	
CFO_AGE	[24]	**0.149**	**-0.086**	**-0.106**	0.000	**-0.043**	**-0.022**	**-0.107**	**0.019**	**0.041**	**-0.046**	**-0.039**	**-0.057**	**0.016**	**-0.047**	**-0.016**	**-0.044**	**-0.030**	**0.173**	**-0.201**	**0.052**	**0.125**	**0.352**	**0.039**	1.000
CFO_TEN	[25]	**-0.019**	-0.010	**0.019**	**-0.022**	**-0.001**	**-0.040**	**-0.033**	**0.024**	**0.114**	**-0.068**	**-0.003**	**-0.042**	**0.023**	**-0.062**	**0.022**	**-0.047**	**-0.064**	**-0.033**	**0.042**	**-0.016**	**0.058**	**0.070**	**0.246**	**0.218**

Notes: A correlation coefficient in bold indicates that the correlation is statistically significant at least at the 10% level. Variable definitions are provided in Appendix A.

Table 4
Regression results of association between female participation and firms' CSR performance

	Dependent Variable=*CSR_PERF*					
	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.476***	0.441***	0.073***	0.151***	0.063***	0.064***
	(18.439)	(14.441)	(3.862)	(9.695)	(4.142)	(7.355)
SIZE	0.028***	0.029***	0.031***	0.030***	0.031***	0.031***
	(9.388)	(9.391)	(9.881)	(9.455)	(9.894)	(9.886)
ROA	0.016	0.016	0.010	0.017	0.011	0.013
	(1.131)	(1.147)	(0.675)	(1.217)	(0.787)	(0.938)
FIN	0.010	0.007	0.003	0.005	0.004	0.004
	(1.590)	(1.095)	(0.485)	(0.700)	(0.564)	(0.554)
TOBINQ	0.005***	0.006***	0.006***	0.006***	0.006***	0.006***
	(3.708)	(3.823)	(4.113)	(4.005)	(3.927)	(4.151)
LEV	-0.015	-0.020*	-0.021	-0.023*	-0.021*	-0.019
	(-1.258)	(-1.646)	(-1.639)	(-1.804)	(-1.681)	(-1.498)
GLOBAL	0.009*	0.008	0.011*	0.009	0.011*	0.011**
	(1.663)	(1.440)	(1.848)	(1.544)	(1.908)	(1.995)
LIQUIDITY	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	(-3.718)	(-3.613)	(-3.359)	(-3.542)	(-3.395)	(-3.415)
COMPETITION	0.007***	0.007***	0.007***	0.007***	0.008***	0.007***
	(3.406)	(3.422)	(3.529)	(3.127)	(3.560)	(3.547)
LITG	0.034**	0.036**	0.040**	0.035**	0.039**	0.038**
	(2.188)	(2.254)	(2.406)	(2.175)	(2.334)	(2.224)
ABS_EM	-0.020	-0.025	-0.028*	-0.029*	-0.027	-0.027*
	(-1.247)	(-1.540)	(-1.673)	(-1.739)	(-1.621)	(-1.647)
BSIZE	0.070***	0.080***	0.102***	0.093***	0.102***	0.101***
	(6.063)	(6.786)	(8.429)	(7.787)	(8.415)	(8.367)
BIND	-0.021	-0.058***	0.021	0.008	0.019	0.016
	(-1.112)	(-3.010)	(1.060)	(0.425)	(0.984)	(0.854)
ACSIZE	0.007	0.009	0.021*	0.014	0.021*	0.021*
	(0.530)	(0.752)	(1.696)	(1.142)	(1.666)	(1.649)
DUAL	0.009	0.010*	0.009	0.009*	0.010*	0.010*
	(1.629)	(1.890)	(1.580)	(1.745)	(1.891)	(1.827)
CEO_AGE	-0.018	-0.024	-0.032	-0.029	-0.032	-0.037*
	(-0.848)	(-1.119)	(-1.465)	(-1.360)	(-1.455)	(-1.694)
CEO_TEN	-0.002	-0.002	-0.003	-0.002	-0.003	-0.003
	(-0.714)	(-0.724)	(-1.170)	(-0.900)	(-1.070)	(-1.065)
CFO_AGE	0.007	0.006	0.008	0.007	0.009	0.025
	(0.368)	(0.323)	(0.377)	(0.363)	(0.426)	(1.216)
CFO_TEN	-0.001	-0.003	-0.002	-0.002	-0.002	-0.002
	(-0.412)	(-0.912)	(-0.732)	(-0.841)	(-0.698)	(-0.789)
Intercept	0.176	0.203*	0.122	0.148	0.119	0.074
	(1.489)	(1.687)	(0.979)	(1.210)	(0.951)	(0.597)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.342	0.327	0.307	0.316	0.307	0.312
F-statistic	50.238***	45.515***	37.925***	39.521***	38.210***	39.498***

Notes: Superscript ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.
Coefficient values (robust *t*-statistics) are shown with standard errors clustered at the firm level.
Variable definitions are provided in Appendix A.

Table 5
Propensity score matching (PSM) analysis

Panel A: PSM first-stage logistic regression results

	Dependent Variable=*FP_DUM*					
	FDIR_DUM	***FIND_DUM***	***FCHAIR***	***FAC_DUM***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
SIZE	0.264	0.278	0.023	0.191	0.018	0.028
	(12.730)	13.900	(0.420)	(11.130)	(0.410)	(1.060)
ROA	-0.352	-0.520	1.715	-0.561	0.280	-0.291
	(-2.040)	-2.980	(2.710)	(-3.400)	(0.690)	(-1.180)
FIN	-0.315	-0.206	-0.218	-0.108	-0.489	-0.151
	(-3.2800	-2.120	(-0.620)	(-1.170)	(-1.890)	(-1.070)
TOBINQ	-0.001	0.009	-0.125	-0.003	0.040	-0.023
	(-0.0500	0.590	(-2.420)	(-0.220)	(1.210)	(-1.110)
LEV	-0.228	-0.137	-1.607	-0.053	-0.769	-0.756
	(-2.140)	-1.300	(-4.390)	(-0.560)	(-3.090)	(-4.940)
GLOBAL	0.076	0.163	0.051	0.165	-0.174	-0.142
	(1.5700	3.410	(0.360)	(3.880)	(-1.530)	(-2.150)
LIQUIDITY	-0.013	-0.014	-0.085	0.012	-0.033	-0.008
	(-1.050)	-1.120	(-2.030)	(1.060)	(-1.140)	(-0.480)
COMPETITION	0.055	0.058	-0.072	0.080	-0.085	-0.010
	(3.140)	3.290	(-1.130)	(4.990)	(-1.590)	(-0.420)
LITG	0.060	0.522	-0.971	0.403	-0.211	0.135
	(0.3200	2.700	(-2.160)	(2.230)	(-0.480)	(0.510)
ABS_EM	-0.114	-0.005	-0.834	0.113	-0.968	-0.243
	(-0.510)	-0.020	(-1.120)	(0.540)	(-1.710)	(-0.740)
BSIZE	3.768	3.649	0.102	0.972	0.174	0.303
	(33.300)	32.630	(0.320)	(10.120)	(0.710)	(2.040)
BIND	2.463	5.085	-1.013	1.208	0.035	0.490
	(14.330)	28.710	(-2.070)	(7.830)	(0.090)	(2.050)
ACSIZE	1.009	1.011	-0.114	2.614	0.172	0.126
	(8.490)	8.860	(-0.340)	(25.950)	(0.680)	(0.830)
DUAL	-0.029	-0.103	0.720	-0.014	-0.406	-0.054
	(-0.630)	-2.270	(5.370)	(-0.340)	(-3.830)	(-0.870)
CEO_AGE	-1.262	-1.146	-2.162	-0.457	-1.647	0.356
	(-6.230)	-5.710	(-3.660)	(-2.500)	(-3.500)	(1.280)
CEO_TEN	-0.017	-0.052	0.033	-0.068	-0.151	-0.058
	(-0.610)	-1.880	(0.410)	(-2.740)	(-2.580)	(-1.510)
CFO_AGE	-0.046	0.317	1.870	0.229	0.765	-2.674
	(-0.240)	1.680	(3.160)	(1.340)	(1.700)	(-10.340)
CFO_TEN	-0.031	-0.026	-0.363	-0.011	-0.298	-0.057
	(-1.100)	-0.960	(-4.530)	(-0.470)	(-4.680)	(-1.500)
Intercept	-7.874	-11.757	-3.172	-8.022	-1.841	5.718
	(-7.080)	-10.680	(-0.920)	(-8.050)	(-0.700)	(3.760)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,361	15,874	15,025	15,874
Pseudo-R^2	0.274	0.293	0.095	0.156	0.093	0.040
Log likelihood	-7222.90	-7497.82	-1340.41	-9201.40	-2010.64	-4783.26

Panel B: PSM second-stage regression results

	Dependent Variable=*CSR_PERF*					
	FDIR_DUM	***FIND_DUM***	***FCHAIR***	***FAC_DUM***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.071***	0.063***	0.077***	0.039***	0.055***	0.062***
	(14.491)	(11.863)	(3.933)	(7.141)	(3.453)	(6.656)
SIZE	0.013***	0.017***	0.040***	0.030***	0.043***	0.031***
	(4.156)	(5.665)	(4.236)	(9.209)	(5.793)	(6.410)
ROA	0.004	0.014	0.018	0.009	-0.032	0.038
	(0.251)	(0.919)	(0.231)	(0.552)	(-0.697)	(1.402)

FIN	0.007	-0.009	0.025	-0.008	-0.007	-0.002
	(0.882)	(-1.028)	(0.566)	(-0.977)	(-0.243)	(-0.182)
TOBINQ	0.005***	0.006***	0.007	0.005***	-0.001	0.007**
	(3.086)	(3.506)	(1.000)	(2.657)	(-0.189)	(2.286)
LEV	-0.029**	-0.025*	-0.084	-0.036**	-0.031	-0.054**
	(-2.556)	(-1.949)	(-1.325)	(-2.523)	(-0.703)	(-2.460)
GLOBAL	0.014**	0.014**	0.003	0.012*	0.026	0.010
	(2.513)	(2.378)	(0.119)	(1.950)	(1.331)	(0.984)
LIQUIDITY	-0.002	-0.001	-0.008	-0.001	-0.001	-0.002
	(-1.212)	(-0.572)	(-1.426)	(-0.929)	(-0.340)	(-0.671)
COMPETITION	0.010***	0.009***	0.011	0.007***	0.012	0.008*
	(4.296)	(3.604)	(1.387)	(2.638)	(1.241)	(1.740)
LITG	0.030*	0.039**	0.075**	0.036*	0.076	0.043
	(1.776)	(2.122)	(2.290)	(1.761)	(1.618)	(1.297)
ABS_EM	-0.011	-0.015	-0.243**	-0.025	-0.174*	-0.041
	(-0.575)	(-0.782)	(-2.055)	(-1.103)	(-1.942)	(-1.084)
BSIZE	0.004	0.033**	0.107**	0.105***	0.090**	0.120***
	(0.286)	(2.453)	(2.103)	(7.365)	(2.311)	(5.160)
BIND	0.009	-0.027	0.012	0.027	0.085	-0.042
	(0.461)	(-1.157)	(0.158)	(1.205)	(1.483)	(-1.137)
ACSIZE	0.005	0.020	-0.017	-0.016	0.017	0.023
	(0.348)	(1.379)	(-0.344)	(-1.119)	(0.466)	(0.984)
DUAL	-0.000	0.007	0.005	0.006	0.013	0.009
	(-0.087)	(1.130)	(0.270)	(1.040)	(0.733)	(0.859)
CEO_AGE	-0.018	-0.041*	-0.017	-0.025	-0.005	-0.059
	(-0.877)	(-1.756)	(-0.195)	(-1.001)	(-0.064)	(-1.508)
CEO_TEN	-0.002	-0.001	-0.010	-0.003	0.007	0.001
	(-0.661)	(-0.236)	(-0.802)	(-0.906)	(0.665)	(0.210)
CFO_AGE	0.029	0.015	0.047	0.015	0.045	0.063*
	(1.401)	(0.673)	(0.466)	(0.657)	(0.646)	(1.650)
CFO_TEN	0.001	-0.002	-0.004	-0.003	-0.005	0.002
	(0.202)	(-0.538)	(-0.289)	(-0.877)	(-0.478)	(0.347)
Intercept	0.355***	0.396***	-0.178	0.086	-0.149	0.046
	(2.787)	(2.924)	(-0.290)	(0.593)	(-0.312)	(0.195)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,130	7,340	602	9,646	1,014	3,002
R-squared	0.392	0.358	0.368	0.305	0.319	0.366
F-statistic	40.820***	35.302***	11.795***	29.588***	6.388***	16.216***

Notes: Superscript ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.
Coefficient values (robust *t*-statistics) are shown with standard errors clustered at the firm level.
Variable definitions are provided in Appendix A.

Table 6
Heckman's (1979) two-stage analysis

Panel A: Heckman's (1979) first-stage probit regression results

	Dependent Variable=*CSR_PERF*					
	FDIR_DUM	***FIND_DUM***	***FCHAIR***	***FAC_DUM***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
SIZE	0.342***	0.321***	0.010	0.203***	-0.006	-0.021
	(15.682)	(15.714)	(0.255)	(10.884)	(-0.178)	(-0.941)
ROA	-0.907***	-0.965***	0.769**	-0.776***	0.118	-0.087
	(-5.528)	(-5.840)	(2.284)	(-4.853)	(0.428)	(-0.421)
TOBINQ	-0.009	-0.008	0.026	-0.008	0.050**	0.009
	(-0.567)	(-0.478)	(0.964)	(-0.487)	(2.010)	(0.488)
RET	0.163***	0.174***	-0.074	0.132***	-0.047	0.016
	(4.487)	(4.946)	(-1.094)	(3.846)	(-0.786)	(0.342)
VWRETD	-0.207*	-0.202*	0.035	-0.116	-0.071	0.075
	(-1.920)	(-1.908)	(0.152)	(-1.105)	(-0.399)	(0.506)
FAGE	0.272***	0.292***	0.140	0.204***	0.039	-0.045
	(7.471)	(8.023)	(1.611)	(5.814)	(0.557)	(-0.990)
TOTRISK	-2.867	-3.916*	9.486**	-2.688	1.137	-3.467
	(-1.377)	(-1.898)	(2.506)	(-1.318)	(0.325)	(-1.309)
GROWTH	-0.248***	-0.234***	-0.231	-0.182***	-0.105	-0.051
	(-4.813)	(-4.476)	(-1.279)	(-3.316)	(-1.015)	(-0.777)
DIVERSIFICATION	-0.618***	-0.686***	-0.368	-0.539***	0.054	-0.431*
	(-3.080)	(-3.422)	(-0.883)	(-2.870)	(0.141)	(-1.900)
DIR_MULTIPLE	0.053	0.115*	0.021	0.079	0.166	0.173**
	(0.764)	(1.674)	(0.159)	(1.179)	(1.404)	(2.104)
IND_PFCT	0.987***	0.893***	0.840***	0.460***	0.751***	0.340*
	(5.864)	(5.439)	(2.707)	(2.964)	(2.675)	(1.853)
Intercept	-2.314***	-2.457***	-2.839***	-1.903***	-2.536***	-1.122***
	(-8.727)	(-9.474)	(-5.676)	(-7.771)	(-5.453)	(-3.465)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,258	13,258	13,005	13,258	13,075	13,258
Pseudo-R^2	0.168	0.172	0.035	0.090	0.022	0.013
Wald chi^2	824.43	896.75	69.83	515.83	54.81	49.51
Log pseudolikelihood	-7004.41	-7353.44	-1181.30	-8264.05	-1830.46	-4126.16
Partial R^2–*IND_PFCT*	0.002	0.010	0.003	0.002	0.022	0.001

Panel B: Heckman's (1979) second-stage regression results

	Dependent Variable=*CSR_PERF*					
	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.470***	0.434***	0.074***	0.151***	0.064***	0.060***
	(18.093)	(14.751)	(3.917)	(10.024)	(4.341)	(7.003)
IMR	0.096***	0.080***	-0.028**	0.035*	-0.039	0.026
	(5.017)	(4.787)	(-2.181)	(1.717)	(-1.373)	(0.757)
Intercept	-0.121	-0.111	0.220	0.001	0.219	0.012
	(-0.912)	(-0.821)	(1.602)	(0.008)	(1.499)	(0.083)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,258	13,258	12,291	13,258	13,075	13,258
R-squared	0.362	0.347	0.330	0.333	0.326	0.328
F-statistic	49.294***	45.022***	38.092***	39.732***	39.031***	39.806***

Notes: Superscript ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.
Coefficient values (robust *t*-statistics) are shown with standard errors clustered at the firm level.
Variable definitions are provided in Appendix A.

Table 7
Female participation and firms' CSR performance: Two-stage analysis

Panel A: Female participation prediction						
	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
SIZE	0.013***	0.010***	0.031	0.019***	-0.008	-0.037
	(10.938)	(8.877)	(0.302)	(18.383)	(-0.111)	(-0.834)
ROA	-0.035***	-0.036***	1.749**	-0.074***	0.307	-0.147
	(-2.999)	(-3.506)	(2.130)	(-5.889)	(0.485)	(-0.362)
TOBINQ	0.002**	0.002	0.059	0.001	0.108**	0.018
	(2.008)	(1.500)	(0.910)	(1.130)	(1.991)	(0.499)
RET	0.003	0.003	-0.169	0.013***	-0.104	0.040
	(1.468)	(1.482)	(-1.043)	(3.413)	(-0.754)	(0.430)
VWRETD	-0.002	-0.003	-0.057	-0.013	-0.229	0.140
	(-0.212)	(-0.492)	(-0.098)	(-0.854)	(-0.537)	(0.472)
FAGE	0.014***	0.012***	0.353	0.017***	0.087	-0.090
	(5.598)	(5.595)	(1.546)	(8.306)	(0.509)	(-0.997)
TOTRISK	-0.280**	-0.383***	22.321**	-0.106	3.076	-6.541
	(-2.004)	(-3.249)	(2.433)	(-0.683)	(0.371)	(-1.227)
GROWTH	-0.019***	-0.013***	-0.554	-0.017***	-0.234	-0.103
	(-5.585)	(-4.425)	(-1.115)	(-4.097)	(-0.906)	(-0.742)
DIVERSIFICATION	-0.035***	-0.033***	-0.956	-0.062***	0.138	-0.838*
	(-2.631)	(-2.896)	(-0.897)	(-5.800)	(0.145)	(-1.943)
DIR_MULTIPLE	0.001	0.002	0.054	0.011***	0.360	0.335**
	(0.211)	(0.555)	(0.164)	(3.013)	(1.325)	(2.062)
IND_FPCT	0.084***	0.056***	1.972***	0.072***	1.667***	0.651*
	(7.483)	(5.910)	(2.711)	(7.790)	(2.584)	(1.810)
Intercept	-0.062***	-0.049***	-7.777***	-0.107***	-4.957***	-2.597***
	(-3.505)	(-3.070)	(-4.742)	(-6.098)	(-4.427)	(-3.492)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,258	13,258	11,946	13,258	12,509	13,237
R-squared	0.162	0.172	0.034	0.090	0.022	0.022
F-statistic	37.960	46.505	182.77	50.122	53.33	48.99

Panel B: Regression results of association between unexpected female participation and firms' CSR performance						
	Dependent Variable=*CSR_PERF*					
	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP_RESID	0.457***	0.418***	0.011***	0.146***	0.013***	0.018***
	(17.527)	(14.232)	(4.468)	(9.676)	(4.997)	(6.993)
Intercept	0.078	0.108	-0.032	0.085	0.074	0.062
	(0.657)	(0.897)	(-0.245)	(0.689)	(0.586)	(0.503)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,258	13,258	11,946	13,258	12,509	13,237
R-squared	0.357	0.344	0.333	0.332	0.331	0.330
F-statistic	50.011***	45.646***	39.425***	40.421***	40.498***	41.032***

Notes: Superscript ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.
Coefficient values (robust *t*-statistics) are shown with standard errors clustered at the firm level.
Variable definitions are provided in Appendix A.

Table 8
Test of non-linearity between female participation and firms' CSR performance

	Dependent Variable=*CSR_PERF*									
	FDIR1	***FDIR2***	***FDIR3***	***FDIR4***	***FIND1***	***FIND2***	***FIND3***	***FIND4***	***FAC1***	***FAC2***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**	**Model (7)**	**Model (8)**	**Model (9)**	**Model (10)**
FP	0.065***	0.080***	0.120***	0.152***	0.056***	0.077***	0.122***	0.157***	0.043***	0.061***
	(13.003)	(14.138)	(13.453)	(10.971)	(10.739)	(11.566)	(9.636)	(6.601)	(8.325)	(6.600)
Intercept	0.168	0.251**	0.242**	0.214*	0.206*	0.266**	0.225*	0.169	0.174	0.155
	(1.376)	(2.082)	(2.011)	(1.751)	(1.679)	(2.185)	(1.843)	(1.363)	(1.418)	(1.249)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.319	0.326	0.334	0.327	0.316	0.322	0.323	0.315	0.313	0.311
F-statistic	42.706***	42.356***	43.984***	43.140***	41.270***	41.816***	40.775***	39.775***	38.206***	39.361***

Notes: Superscript ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.
Coefficient values (robust *t*-statistics) are shown with standard errors clustered at the firm level.
Variable definitions are provided in Appendix A.

Table 9
Additional analyses

Panel A: Regression results between female participation and firms' CSR performance: Alternative proxy for CSR performance using CSR strengths

	Dependent Variable=*CSR_PERF*					
	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.350***	0.283***	0.066***	0.111***	0.066***	0.062***
	(13.020)	(9.018)	(3.809)	(6.624)	(4.774)	(6.477)
Intercept	-0.568***	-0.556***	-0.609***	-0.589***	-0.612***	-0.656***
	(-4.569)	(-4.430)	(-4.786)	(-4.673)	(-4.811)	(-5.221)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.417	0.407	0.400	0.404	0.401	0.405
F-statistic	32.930***	31.097***	30.563***	30.842***	30.910***	31.208***

Panel B: Regression results between female participation and firms' CSR performance: Alternative proxy for CSR performance using CSR concerns

	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	-0.434***	-0.499***	-0.020*	-0.154***	-0.020**	-0.024***
	(-26.450)	(-25.418)	(-1.733)	(-15.623)	(-2.049)	(-4.515)
Intercept	-0.280***	-0.322***	-0.230***	-0.255***	-0.229***	-0.212**
	(-3.423)	(-3.910)	(-2.680)	(-3.074)	(-2.734)	(-2.522)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.243	0.241	0.213	0.224	0.213	0.214
F-statistic	-0.434***	-0.499***	-0.020*	-0.154***	-0.020**	-0.024***

Panel C: Regression results between female participation and firms' CSR performance: Environmental performance

	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.107***	0.108***	0.005	0.032*	0.021**	-0.004
	(3.899)	(3.456)	(0.207)	(1.953)	(2.214)	(-0.226)
Intercept	0.488***	0.496***	0.476***	0.481***	0.460***	0.476***
	(3.770)	(3.826)	(3.676)	(3.722)	(3.573)	(3.676)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.423	0.423	0.422	0.422	0.422	0.423
F-statistic	79.264***	79.060***	78.891***	78.555***	78.724***	78.915***

Panel D: Regression results between female participation and firms' CSR performance: Employee relations

	FDIR	***FIND***	***FCHAIR***	***FAC***	***FCEO***	***FCFO***
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.079***	0.052	0.026	0.043***	0.016	0.022**
	(2.886)	(1.631)	(1.298)	(2.590)	(1.159)	(2.539)
Intercept	0.113	0.114	0.103	0.111	0.103	0.087
	(0.933)	(0.936)	(0.853)	(0.917)	(0.847)	(0.718)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.285	0.285	0.285	0.285	0.285	0.285
F-statistic	46.665***	46.158***	46.061***	46.252***	46.255***	46.297***

Panel E: Regression results between female participation and firms' CSR performance: Community

	FDIR	*FIND*	*FCHAIR*	*FAC*	*FCEO*	*FCFO*
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.104***	0.098***	-0.010	0.032*	-0.003	0.006
	(3.536)	(2.827)	(-0.554)	(1.884)	(-0.243)	(0.694)
Intercept	0.434***	0.440***	0.423***	0.428***	0.423***	0.418***
	(3.517)	(3.546)	(3.409)	(3.456)	(3.408)	(3.369)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.284	0.283	0.283	0.283	0.283	0.283
F-statistic	93.728***	93.381***	93.497***	93.764***	93.566***	93.324***
Panel F: Regression results between female participation and firms' CSR performance: Human rights						
	FDIR	*FIND*	*FCHAIR*	*FAC*	*FCEO*	*FCFO*
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.063*	0.072*	0.004	0.043*	0.004	0.005
	(1.749)	(1.684)	(0.211)	(1.936)	(0.250)	(0.439)
Intercept	-1.158***	-1.152***	-1.165***	-1.158***	-1.165***	-1.168***
	(-6.348)	(-6.296)	(-6.407)	(-6.357)	(-6.408)	(-6.442)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.465	0.465	0.465	0.465	0.465	0.465
F-statistic	256.796***	256.709***	257.007***	255.740***	257.084***	257.345***
Panel G: Regression results between female participation and firms' CSR performance: Diversity						
	FDIR	*FIND*	*FCHAIR*	*FAC*	*FCEO*	*FCFO*
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.981***	1.000***	0.144***	0.311***	0.153***	0.088***
	(37.486)	(30.763)	(6.987)	(18.055)	(10.495)	(9.903)
Intercept	-0.011	0.059	-0.126	-0.073	-0.134	-0.192
	(-0.094)	(0.498)	(-0.922)	(-0.563)	(-0.988)	(-1.407)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.443	0.417	0.349	0.373	0.353	0.353
F-statistic	136.742***	118.191***	83.781***	92.144***	87.697***	87.277***
Panel H: Regression results between female participation and firms' CSR performance: Products						
	FDIR	*FIND*	*FCHAIR*	*FAC*	*FCEO*	*FCFO*
	Model (1)	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**
FP	0.049*	0.047	0.027*	0.002	-0.006	0.006
	(1.959)	(1.524)	(1.747)	(0.102)	(-0.442)	(0.709)
Intercept	0.736***	0.739***	0.730***	0.731***	0.731***	0.726***
	(5.899)	(5.914)	(5.853)	(5.862)	(5.861)	(5.827)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,874	15,874	15,874	15,874	15,874	15,874
R-squared	0.129	0.129	0.129	0.128	0.128	0.128
F-statistic	29.602***	29.453***	29.509***	29.465***	29.502***	29.484***

Appendix A

Descriptions of variables

Variables		Definitions
(A) CSR performance variables		
CSR_PERF	CSR performance	A weighted measure for CSR performance that compares CSR performance across years and industries with the value ranging between 0 and 1. The net score of CSR ratings based on the MSCI ESG KLD STATS data, measured as total CSR strengths minus total CSR concerns based on the dimensions of: the community, diversity, employee relations, the environment, human rights and products, standardised based on year and industry.
(B) Female participation variables		
FP	Female participation	*FDIR or FIND or FCHAIR or FAC or FCEO or FCFO.*
FDIR	Female director	The percentage of female directors relative to the total number of directors on the board.
FDIR_DUM	Presence of female director on the board	An indicator variable that equals 1 if the board has a female director, otherwise 0.
FIND	Independent female director	The percentage of female independent directors relative to the total number of independent directors on the board.
FIND_DUM	Presence of independent female director on the board	An indicator variable that equals 1 if the board has a female independent director, otherwise 0.
FAC	Female director on the audit committee	The percentage of female audit committee members relative to the total number of audit committee members.
FAC_DUM	Presence of female director on the audit committee	An indicator variable that equals 1 if the audit committee has a female member, otherwise 0.
FCHAIR	Female chair	An indicator variable of 1 if the chair of the board is female, and 0 otherwise.
FCEO	Female CEO	An indicator variable that equals 1 if a CEO is female, otherwise 0.
FCFO	Female CFO	An indicator variable that equals 1 if a CFO is female, otherwise 0.
(C) Control variables		
SIZE	Firm size	The natural logarithm of the market value of equity (*CSHO*×*PRCC_F*) at the beginning of each fiscal year.
ROA	Return on assets	Return on assets measured as the ratio of income before extraordinary items (*IB*) scaled by total assets *(AT)* as the beginning of each year.
FIN	Financing	The amount of debt or equity capital raised by the firm. This is measured as the issuance of common stock and preferred shares minus the purchase of common stock and preferred shares (*SSTK-PRSTKC*) plus the long-term debt issuance minus the long-term debt reduction (*DLTIS-DLTR*), scaled by total assets at the beginning of the year.
TOBINQ	Tobin's Q	The market value of common equity plus the book value of preferred stock (*PSTKL*), the book value of long-term debt (*DLTT*) and current liability (*LCT*), scaled by the book value of total assets.
LEV	Leverage	The ratio of total debt (*DLTT*+*DLC*) divided by total assets *(AT)*.
GLOBAL	Foreign operations	An indicator variable that equals 1 if the firm reports non-zero foreign income (*PIFO*), and 0 otherwise.
LIQUIDITY	Liquidity	The ratio of the number of shares traded (*CSHTRD_F*) to the total shares outstanding (*CSHO*) at the end of the year.
COMPETITION	Industry competition	Industry competition is measured as the principal component of: (i) the Herfindahl–Hirschman Index of industry concentration, calculated as the sum of the squared market shares (in sales) of all firms in the industry; (ii) the four-firm concentration ratio, calculated as the proportion of the market share of sales of the four largest firms in an industry; and (iii) market size,

		calculated as the number of firms in the industry following Isidro and Marques (2021). A higher value indicates higher industry competition.
LITG	Litigation	An indicator variable that equals 1 if the firm operates in a high-litigation industry (SIC codes of 2833–2836, 3570–3577, 3600–3674, 5200–5961 and 7370), and 0 otherwise.
ABS_EM	Earnings management	Absolute value of discretionary accruals where discretionary accruals are computed using the performance-adjusted modified Jones model.
BSIZE	Board size	The natural logarithm of the size of the board.
BIND	Board independence	The percentage of independent directors on the board.
ACSIZE	Audit committee size	The natural logarithm of the size of the audit committee.
DUAL	CEO duality	An indicator variable that equals 1 if the CEO and chair of the board are the same person, 0 otherwise.
CEOAGE	CEO age	The natural logarithm of the CEO's age.
CEOTEN	CEO tenure	The natural logarithm of the CEO's tenure.
CFOAGE	CFO age	The natural logarithm of the CFO's age.
CFOTEN	CFO tenure	The natural logarithm of the number of years since the CFO was hired.
IND_FPCT	Industry female employment	The percentage of female employees in the 3-digit NAICS industry category. These data are collected from the US Bureau of Labor Statistics.
RET	Return	Annual stock return during the fiscal year.
VWRETD	Value-weighted market return	Value-weighted annual market return during the fiscal year.
FAGE	Firm age	The natural logarithm of the number of years since the firm was included in the Compustat database.
TOTRISK	Total risk	Standard deviation in daily returns over fiscal year.
GROWTH	Sales growth	Average sales growth (*SALE*) over the last three fiscal years.
DIVERSIFICATION	Total diversification	Computed as $\sum_{i=1} P_i * \ln(1/P_i)$ where P_i is the share of the i^{th} industry segment in the total sales of the firm. Industries are classified according to the four-digit SIC code in which the firm operates.
DIR_MULTIPLE	Directorships	The average number of external directorships held by non-executive directors.
FP_RESID	Residual of female participation	The residual of female participation predicted from the model.

Appendix B

PSM analysis: Mean tests between treatment and control groups

	FDIR_DUM			***FIND_DUM***			***FCHAIR***		
	Treatment	**Control**	***t*-test (*p*-value)**	**Treatment**	**Control**	***t*-test (*p*-value)**	**Treatment**	**Control**	***t*-test (*p*-value)**
SIZE	6.745	6.747	0.943	6.924	6.908	0.590	7.660	7.652	0.956
ROA	0.012	0.015	0.439	0.014	0.017	0.377	0.046	0.042	0.610
FIN	0.065	0.063	0.792	0.058	0.060	0.650	0.020	0.024	0.807
TOBINQ	2.228	2.209	0.619	2.211	2.200	0.736	2.165	2.166	0.992
LEV	0.212	0.208	0.461	0.217	0.214	0.508	0.192	0.184	0.563
GLOBAL	0.403	0.399	0.681	0.412	0.403	0.462	0.472	0.522	0.222
LIQUIDITY	2.372	2.372	1.000	2.375	2.378	0.946	2.107	2.151	0.737
COMPETITION	0.157	0.232	0.277	0.362	0.376	0.823	0.645	0.527	0.630
LITG	0.338	0.337	0.920	0.329	0.333	0.728	0.349	0.355	0.865
ABS_EM	0.094	0.094	0.706	0.091	0.089	0.554	0.076	0.080	0.510
BSIZE	2.308	2.304	0.408	2.347	2.339	0.162	2.433	2.447	0.593
BIND	0.614	0.612	0.538	0.615	0.616	0.848	0.636	0.622	0.241
AC_SIZE	1.559	1.558	0.817	1.573	1.573	0.912	1.630	1.646	0.385
DUAL	0.474	0.484	0.394	0.462	0.464	0.833	0.601	0.591	0.804
CEO_AGE	4.193	4.195	0.521	4.191	4.192	0.809	4.168	4.163	0.598
CEO_TEN	1.561	1.588	0.150	1.551	1.561	0.566	1.530	1.532	0.977
CFO_AGE	4.124	4.125	0.880	4.123	4.122	0.809	4.122	4.124	0.782
CFO_TEN	1.138	1.125	0.485	1.116	1.115	0.960	1.010	0.940	0.256
	FAC_DUM			***FCEO***			***FCFO***		
	Treatment	**Control**	***t*-test (*p*-value)**	**Treatment**	**Control**	***t*-test (*p*-value)**	**Treatment**	**Control**	***t*-test (*p*-value)**
SIZE	7.488	7.436	0.092	7.499	7.437	0.571	7.435	7.440	0.932
ROA	0.026	0.022	0.098	0.029	0.027	0.754	0.022	0.020	0.779
FIN	0.043	0.045	0.551	0.026	0.029	0.832	0.041	0.048	0.437
TOBINQ	2.155	2.147	0.799	2.344	2.332	0.912	2.196	2.252	0.336
LEV	0.233	0.236	0.548	0.215	0.209	0.649	0.213	0.205	0.272
GLOBAL	0.470	0.457	0.198	0.379	0.385	0.846	0.424	0.431	0.685
LIQUIDITY	2.365	2.368	0.929	2.346	2.354	0.934	2.326	2.386	0.356
COMPETITION	0.620	0.638	0.748	0.660	0.750	0.597	0.428	0.487	0.591
LITG	0.303	0.301	0.877	0.400	0.414	0.655	0.359	0.369	0.570
ABS_EM	0.083	0.083	0.948	0.077	0.072	0.320	0.082	0.083	0.615
BSIZE	2.434	2.432	0.612	2.428	2.412	0.401	2.413	2.415	0.834
BIND	0.633	0.630	0.336	0.635	0.638	0.739	0.641	0.637	0.434
AC_SIZE	1.631	1.626	0.216	1.635	1.631	0.800	1.623	1.619	0.606
DUAL	0.484	0.469	0.160	0.357	0.320	0.208	0.460	0.454	0.742
CEO_AGE	4.185	4.184	0.679	4.154	4.154	0.934	4.175	4.173	0.603
CEO_TEN	1.523	1.517	0.718	1.356	1.387	0.505	1.491	1.494	0.923
CFO_AGE	4.120	4.121	0.721	4.107	4.103	0.602	4.081	4.082	0.891
CFO_TEN	1.125	1.126	0.944	0.960	0.913	0.311	1.052	1.049	0.912