

**The Moderating Effect of Board Gender Diversity
on the Relation Between Corporate Social Responsibility and Firm Value**

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Abstract

We examine whether female board representation moderates the effect of corporate social responsibility (CSR) performance on firm value. Using a two-stage dynamic panel generalized method of moments (GMM) method, we find that the effect of CSR strengths (CSR concerns) on the market assessed firm value, measured by Tobin's Q and annual stock return, is incrementally more positive (more negative) for firms with greater female representation on the board. Further analysis suggests that female board representation positively moderates the effect of CSR strengths on firm financial performance measured by return on assets (ROA); however, female board representation does not significantly moderate the impact of CSR concerns on ROA. Our findings suggest that board gender diversity enhances the effect of positive CSR performance on firm value, but exacerbates the negative market reactions to CSR concerns. Overall, our evidence suggests that board gender diversity may enhance or destroy firm value depending on a firm's social and environmental performance in dimensions other than diversity.

Keywords: CSR; CSR concerns; CSR strengths; board gender diversity; firm value

1. Introduction

The economic benefits of corporate social responsibility (CSR) and workplace gender diversity are areas of growing interest for researchers, business leaders, and regulators (e.g., Grant Thornton, 2008; Connley, 2020).¹ A large body of literature examines the relation between firm CSR performance and firm value, with many studies providing evidence to support the view that socially responsible activities enhance firm value while irresponsible activities destroy value (e.g., Orlitzky, Schmidt & Rynes, 2003), and there is evidence that investors are prepared to accept lower returns in exchange for better CSR disclosure (De Villiers et al., 2021). The literature also suggests that females are socialized to be more empathic than males (e.g., Eagly, 2009), and that firms with more women directors on the corporate board tend to do better on social and environmental issues (e.g., Endrikat, De Villiers, Guenther & Guenther, 2021; Boulouta, 2013; Rao & Tilt, 2016). While existing research provides ample evidence on the direct effect of CSR or board gender diversity on firm value, the interplay between board gender diversity and CSR performance on firm value remains an unexplored empirical question.

In this paper, we examine whether female representation on the board moderates the effect of CSR performance on firm value.² *A priori*, it is unclear as to whether board gender diversity would exacerbate or alleviate the negative effect of CSR concerns on firm value. On the one hand, board gender diversity could reduce the negative effect of CSR concerns on firm value because female directors may be more concerned about negative CSR activities on stakeholder welfare than male directors (e.g., Dawson, 1997; Carlson, 1972; Bruns & Merchant, 1990; Cohen et al., 1998; Owhoso, 2002; Mason & Mudrack, 1996; Eagly & Johnson, 1990;

¹ The U.S. regulators are considering passing new legislations to mandate female representation on boards of directors (e.g., Hatcher, Latham, & Lewis, 2020).

² In the context of our study, we refer to negative CSR-related activities as CSR concerns or CSR controversies, and positive CSR-related activities as CSR strengths. In other words, CSR-related strengths (concerns) reflect a positive (negative) CSR performance. We use the term ‘board gender diversity’ to indicate when there is female representation on the board.

Eagly, Karau, & Makhijani, 1995; Eagly & Carli, 2007). Besides the greater incentive to rectify the CSR concerns, female board representation could lead to more timely remediation of CSR concerns by bringing in diverse perspectives to board room discussions and through more rigorous monitoring of the management (Daily & Dalton, 2003; Eagly & Johnson, 1990; Adams & Ferreira 2009; Hillman & Dalziel, 2003). In addition, investors may perceive negative CSR activities as less concerning when there are more female members on the board, as firms with gender-diverse boards tend to have better corporate reputations from good CSR performance (Wang & Coffey, 1992; Williams, 2003; Fombrun & Shanley, 1990; Russo & Fouts, 1997; Fombrun & Gardberg, 2000; Branco & Rodrigues, 2006; Vanhamme & Grobbs, 2009). These arguments suggest a less negative market response to CSR concerns for firms with gender-diverse boards compared to that for firms with no female board representation.

On the other hand, it is also probable that investors are more disappointed and unforgiving when firms with gender-diverse boards involve in CSR concerns because such concerns are less anticipated, suggesting a bigger negative surprise. When perceived socially responsible firms behave irresponsibly, stakeholders may lose trust in these firms, leading to a reputation loss and reassessments of the firm's CSR-related risk on future cash flows by investors (Godfrey, 2005; Karpoff, Lee, & Martin, 2008; De Villiers et al., 2021; Bartov, Marra, & Momenté, 2021). If so, the effect of CSR concerns on the market assessed firm value could be more negative for firms with female board representation compared to that for firms that do not exhibit gender diversity on the board. Thus, whether investors react more negatively or more positively to CSR concerns for firms with gender-diverse boards is an empirical question.

With respect to CSR strengths, we expect the effect of good CSR activities on firm value to be more positive when there is more female representation on the board for two reasons. First, firms with female directors on the board are more likely to enhance stakeholder relationships through substantive CSR programs and initiatives rather than symbolic, green-

washing activities, which could backfire and destroy firm value (Jo & Harjoto, 2011; Walker & Wan, 2012; Galbreath, 2011; Zhang, 2012; Levi, Li, & Zhang, 2014; Rao & Tilt 2016). Second, investors could perceive positive CSR performance to be more genuine and credible when firms have a board of greater gender diversity.

Following prior research, we measure market-assessed firm value using Tobin's Q and annual stock return (e.g. Daske, Hail, Leuz, & Verdi, 2008; Doidge, Karolyi, & Stulz, 2004; Jiao, 2011; Lang, Lins, & Miller, 2004), board gender diversity using the Blau index (e.g., Blau, 1977; Post & Byron, 2015), and firm CSR strengths and concerns using CSR performance indicators in the categories of community, human rights, product, employee, and environment from the Kinder, Lydenberg, and Domini (hereafter "KLD") dataset (e.g., Jiao, 2010). We employ an instrumental variables approach and the dynamic Generalized Method of Moments (GMM) method to account for unobserved heterogeneity, simultaneity, and the dynamic relation between the board structure and firm performance (Wintoki, Linck, & Netter, 2012).

Using a sample of U.S. firms for the period from 2009 to 2018, we find that female board representation significantly moderates the impact of firm CSR performance on firm value. Specifically, we find that the effect of overall CSR performance and CSR strengths on Tobin's Q and returns is more positive when there is more female representation on the board. In contrast, the effect of CSR concerns on firm value is more negative when there is more female representation on the board, suggesting that female board representation exacerbates the negative effect of CSR concerns on firm value. In robustness tests, we find similar results using alternative proxies to measure female board presentation and CSR performance.

To further investigate whether female board representation moderates the effect of CSR performance on firm value by influencing firm financial performance or through affecting investors' assessed market value of the firm, we examine whether female board representation moderates the effect of CSR strengths and concerns on return on assets (ROA), which is an

accounting-based measure of firm financial performance. We find that the relation between CSR strength and ROA is more positive when there is female representation on the board, suggesting that CSR initiatives enhance firm financial performance when there are more women on the board. On the other hand, the results suggest female board representation does not moderate the effect of CSR concerns on ROA. Taken together, the findings on CSR concerns suggest that female board representation influences the investors' perceived riskiness of a firm's CSR concerns, but does not make a difference on how CSR concerns affect a firm's accounting-based financial performance. The findings suggest a loss of trust in the management when firms that exhibit gender diversity perform poorly on CSR-related matters, resulting in a downward adjustment of reputational premium embedded in firm value (Godfrey, 2005; Bartov et al., 2021).

Our study contributes to the literature on *how* female board representation affects firm value (e.g., Isidro & Sobral, 2015). To the best of our knowledge, this study is the first to provide evidence on the moderating effect of board gender diversity on the relation between CSR performance and firm value in the U.S. Our findings contribute to the emerging body of research that examines the moderating effect of board gender diversity on firm value (e.g., Cumming, Leung, & Rui, 2015; Nadeem, Suleman, & Ahmed, 2019), and relate to research that examines market reactions to negative events with the interplay of a firm's CSR performance (e.g., Bartov et al., 2021). Our findings suggest firms that display gender diversity at the board level are penalized more strongly by the market when they perform poorly in other CSR areas. From a practical standpoint, our evidence that female board representation enhances the positive effect of CSR initiatives on firm value should be relevant to the current regulatory debate on the mandate of gender diversity on corporate boards of directors in the U.S. (e.g., Bruce & Rasmussen, 2020; Connley, 2020; Hatcher, Latham, & Lewis, 2020).

The rest of the paper is structured as follows. Section 2 reviews prior literature. Section

3 develops the hypotheses. Section 4 describes the research design. Section 5 reports the results. Section 6 concludes.

2. Literature Review

2.1 Female board representation and firm value

A large body of existing research sheds light on whether and how female board representation affects firm value. Some suggest that board gender diversity should improve financial outcomes as diversity enables more effective problem solving resulting from a better understanding of the marketplace and having boarder perspectives, and improves board independence (e.g., Robinson & Dechant, 1997; Carter, Simkins, & Simpson, 2003; Carter et al., 2010; Campbell & Mínguez-Vera, 2008); others argue that greater diversity could increase board room conflicts, which may reduce decision-making efficiency and negatively affect firm performance (Earley & Mosakowski, 2000; Tajfel & Turner, 1986; Williams & O'Reilly, 1998; Richard et al., 2004).³

In a meta-analysis of 144 independent samples, Post and Byron (2015) find that female board representation is positively associated with firm accounting returns, and positively associated with firm market performance in countries with greater gender parity. In another meta-analysis of 73 empirical studies on the business case for women leaders, Hoobler, Masterson, Nkomo, and Michel (2018) find that female board representation is positively associated with firm financial performance, using both accounting and market-based measures. While the extant literature documents a direct link between female board representation and firm value, board female representation is less explored as a moderator variable on the

³ Among the studies that examine the direct effect of female board representation on firm value, while some find no significant association or a negative association (e.g. Rose, 2007; Carter et al., 2010; Chapple & Humphrey, 2014; Adams & Ferreira, 2009; Haslam et al., 2010; Matsa & Miller, 2013), many document a positive association between firm performance and board female representation using both accounting-based and market-based performance measures in a number of jurisdictions (e.g., Erhardt, Werbel, & Shrader, 2003; Lücknerath-Rovers, 2013; Campbell & Mínguez-Vera, 2008; Carter, Simkins, & Simpson, 2003; Reguera-Alvarado, de Fuentes & Laffarga, 2017; Terjesen, Couto, & Francisco, 2016; Francoeur, Labelle, & Sinclair-Desgagne, 2008).

determinants of firm value. In this paper, we explore a mechanism through which female board representation affects firm value via its moderating effect on the CSR performance-firm value link.

2.2 CSR performance and firm value

There has been a long debate in the literature on the business case for corporate social responsibility (CSR). CSR performance refers to the organizational practices and policies that consider the needs of various stakeholders, reflecting a firm's attitudes towards a complex range of social issues and environmental concerns (Aguinis, 2011; De Villiers, 1999). The debate on whether CSR performance positively affects firm value has produced substantial theoretical argument, which can be broadly grouped into the two opposing views represented by the agency perspective and the stakeholder perspective (e.g., Friedman, 1970; Berle & Means, 1932, Freeman, 1984; Jones, 1995; McWilliams & Siegel, 1997; Jensen, 2002; Cochran & Wood, 1984; Waddock & Graves, 1997; Greening & Turban, 2000; Turban & Greening, 1996; Fombrun, 1996; Moskowitz, 1972; Godfrey, 2005). The agency perspective asserts that CSR investments come at the expense of shareholder value and are a result of agency conflicts between managers and shareholders (e.g., Friedman, 1970; Berle & Means, 1932). In contrast, the stakeholder view conjectures that commitment to good CSR performance enhances stakeholder trust and firm reputation, which gives rise to a reputational premium embedded in the market assessed firm value (e.g., Godfrey et al., 2009; Pevzner, Xie, & Xin, 2015).

In a review of 127 empirical studies, Margolis and Walsh (2003, p. 277) observe that a 'simple compilation of the findings suggests there is a positive association, and certainly very little evidence of a negative association, between a company's social performance and its financial performance.' Similarly, results from a meta-analysis of 52 studies in Orlitzky et al. (2003) show a positive association between CSR performance and firm value across study

settings.⁴ Overall, despite some mixed findings, the documented evidence is in support of the view that good CSR performance positively contributes to firm value while bad CSR performance destroys value.

Beyond the direct link between CSR performance and firm value, the literature has moved towards providing more in-depth analysis of the complex CSR-firm value relation by exploring the effect of moderator and mediator variables, such as industry characteristics, corporate governance, managerial competencies, intangible resources, and competitive action (e.g., Russo & Fouts, 1997; Graves & Waddock, 1999; Jo & Harjoto, 2011; Wang & Sarkis, 2017; Surroca, Tribó, & Waddock, 2010; Barnett & Salomon, 2012; Kim, Kim, & Qian, 2018). However, the interplay of female board representation on the effect of CSR performance on firm value remains unexplored by the extant literature.

Prior research suggests that socially responsibly activities (positive CSR) and socially irresponsibly activities (negative CSR) are conceptually distinct and subject to different dynamics (Lange & Washburn, 2012; Mattingly & Berman, 2006). Given this, we consider the role of female board representation in moderating the effect of negative CSR-related activities (i.e., CSR concerns) and positive CSR-related activities (i.e., CSR strengths) on firm value separately, consistent with the approach in prior research (e.g., Kim et al., 2018; Muller & Kräussl, 2011; Strike, Gao, & Bansal, 2006; Boulouta, 2013). Similar to prior studies (e.g., Kim et al., 2018), CSR strengths in our context refer to voluntary corporate actions aimed at creating benefits for a wide range of stakeholders (Mackey, Mackey & Barney, 2007); CSR concerns refer to ‘the set of corporate actions that negatively affect identifiable social

⁴ In terms of the empirical evidence on how CSR performance relates to firm value, while some studies find a negative or no association between certain CSR activities and firm financial performance (e.g., Boyle, Higgins, & Rhee, 1997; Seifert, Morris, & Bartkus, 2003; Brammer, Brooks, & Pavelin, 2006), many studies in this area are conclusive of a positive relation (e.g., Herremans, Akathaporn, & McInnes, 1993; Klassen & McLaughlin, 1996; Preston & Bannon, 1997; Carter, Kale & Grimm, 2000; Ruf et al., 2001; Menguc & Ozanne, 2005; Van Beurden & Gössling 2008; Jiao, 2010; Chen & Wang, 2011).

stakeholders' legitimate claims' (Strike et al., 2006, p. 852). In the following section, we discuss the theoretical foundation for the moderating role of female board representation on the effect of CSR concerns and CSR strengths on firm value.

3. Hypothesis Development

3.1 CSR concerns

Whether female representation on the board should exacerbate or mitigate the negative effect of CSR concerns on firm value is *ex ante* ambiguous. Gender socialization theory suggests that men and women differ in moral orientations; men put more emphasis on achieving personal goals, while women tend to focus more on communal values (Dawson, 1997; Carlson, 1972). Studies find that women tend to be more ethically sensitive (e.g., Bruns & Merchant, 1990; Cohen, Pant, & Sharp, 1998; Owoso, 2002), and are more likely to respond ethically to moral dilemmas (Mason & Mudrack, 1996). Eagly (2009) suggests that women are socialized to show greater concern for others and are more willing to help people due to their stereotypical traits of empathic caring, emotionality, gentility, and prosocial orientation. Similarly, the social role theory of leadership suggests that female leaders have higher tendencies than male leaders to care for people and look out for others' welfare (Eagly & Johnson, 1990; Eagly et al., 1995; Eagly & Carli, 2007). Consistent with this line of argument, prior research generally documents a positive association of female board representation with voluntary CSR-related disclosure (e.g., Ben-Amar, Chang, & McIlkenny, 2017) and CSR strengths (e.g., Williams, 2003; Post, Rahman, & Rubow, 2011).⁵ These theories and evidence suggest that women directors may be more concerned about negative CSR activities compared to male directors, and are more likely to take actions to protect stakeholder interests by remedying the CSR concerns when issues arise. To the extent that female directors have a

⁵ See Rao and Tilt (2016) for a review of the empirical evidence on the association between board diversity and CSR performance and reporting.

greater incentive to do right by rectifying CSR concerns, boards with more female representation will likely respond to the CSR concerns more quickly and effectively to resolve the CSR-related issues.⁶ If so, CSR concerns should pose less risk for the firm in the long term, suggesting a less negative impact of CSR concerns on firm value when board gender diversity increases.

In addition to the incentive to do right, the presence of female directors on the board may enhance the board's ability to effectively address CSR-related problems. Female directors tend to come from diverse occupational backgrounds, which helps to bring in broader networks and perspectives that enable more effective decision-making in addressing stakeholder interests (Hillman, Cannella, & Harris, 2002; Daily & Dalton, 2003). Prior research also suggests that the female leadership style is more participative, democratic, and cooperative compared to the male leadership style (Eagly & Johnson, 1990; Eagly, Johannesen-Schmidt, & Van Engen, 2003; Rudman & Glick, 2001). If female board representation encourages collaboration and participation, the firm may be able to reach a consensus to resolve the CSR-related controversies in a timelier manner. Further, female representation on board is associated with more rigorous and effective monitoring of the management (Adams & Ferreira 2009; Hillman & Dalziel, 2003; Westphal & Zajac, 1995; Gul, Srinidhi, & Ng, 2011). These arguments suggest that a gender-diverse board may be more competent at overseeing the rectification of CSR concerns by the firm, leading to a less negative effect of CSR concern on firm value when female directors present on the board.

In addition, investors may perceive negative CSR activities to be of less concern when female members sit on the board. The signaling theory suggests that the market could perceive a favorable signal regarding a firm's CSR performance when there is female representation on

⁶ Decision-making is likely shaped by the traits and values of the board members. Boards with a higher female director ratio are more likely to have characteristics and behaviors associated with the style of women leaders (Nielsen & Huse, 2010a, 2010b).

board, as having women on board could indicate that the firm supports socially responsible behavior such as workplace diversity and gender equality. Thus, it is possible that higher female board representation lowers the perceived riskiness of CSR concerns because investors may have more trust and confidence in the firm to act responsibly and address the CSR concerns when there are more female directors on the board. This suggests a reduced effect of CSR concerns on firm value with greater female board representation.⁷ In addition, firms with gender-diverse boards tend to perform better with respect to CSR related issues (e.g., Wang & Coffey, 1992; Johnson & Greening, 1999; Williams, 2003; Bernardi, Bosco, & Vassill, 2006; Bear, Rahman, & Post, 2010; Post et al., 2011). Positive CSR performance can serve as a safety net in the event of a crisis by improving corporate reputation and credibility (Fombrun & Shanley, 1990; Russo & Fouts, 1997; Fombrun & Gardberg, 2000; Branco & Rodrigues, 2006; Pfau et al., 2008; Vanhamme & Grobbsen, 2009). This line of reasoning suggests that female board representation could mitigate the negative consequences of CSR concerns on firm value because of the more positive CSR image and better corporate reputation partially attributed to having a more gender-diverse board. However, Shiu and Yang (2017) find that while long-term CSR commitment protects firms against the effects of negative events on firms' bond and stock prices, such insurance-like effects disappear following a repeated occurrence of negative events. These findings suggest that it is unlikely that investors will disregard the

⁷ Female board representation may also lead to more effective crisis management, which helps to mitigate the negative effect of CSR concerns on firm value. CSR-related controversies, such as the revelation of CSR concerns, could constitute an organizational crisis, i.e., a situation that significantly threatens or damages the operations, financial conditions, and reputation of a firm (e.g., Hamblin, 1958; Barton, 1993; see a discussion about the BP oil spill crisis at <https://pagecentertraining.psu.edu/public-relations-ethics/ethics-in-crisis-management/lesson-1-prominent-ethical-issues-in-crisis-situations/case-study-tbd/>). Prior literature in leadership and crisis management suggests that leadership abilities that coincide with the stereotypical feminine characteristics, such as being people-oriented, empathic, understanding, and showing concern for others are particularly valuable in managing crisis situations (Eagly & Johnson, 1990; Eagly et al., 1995; Mano-Negrin & Sheaffer, 2004; Ryan & Haslam, 2007). Female leaders are expected to excel at reducing interpersonal conflicts and facilitating mutual understanding and collaboration (Carli, 1990; Eagly, 1992, 2007). Post, Latu and Belkin (2019, p. 216) find evidence supporting the idea of a female leadership trust advantage during crises through interpersonal emotions management, i.e., 'threat reducing behaviors that anticipate and manage the emotions of others.' However, to the extent that not all CSR concerns are organizational crises, the interacted effect of female board representation and CSR concerns on firm value through effective crisis management may be limited.

negative CSR activities of a firm simply because the firm displays board gender diversity or has a good CSR reputation.

While reasons can be given for why female board representation may reduce the negative effect of CSR concerns on firm value, it is also possible that board gender diversity would exacerbate this effect. Specifically, the market's expectations of CSR concerns associated with a firm should vary with the level of board gender diversity exhibited. This is because diversity is a dimension of CSR performance, and firms with female directors on the board also tend to perform well in other CSR areas (Rao & Tilt, 2016). If firms with gender-diverse boards are perceived by the market as being committed to CSR, CSR concerns would likely be unforeseen or less expected by the market and stakeholders of these firms. This implies a bigger negative surprise, leading to a more negative reaction to CSR concerns for firms with gender-diverse boards. In other words, stakeholders would be more disappointed and unforgiving when firms directed by a gender-diverse board involve in CSR concerns, as they would have expected better CSR performance for these firms. If conscious irresponsible conduct by a perceived socially responsible firm erodes stakeholder trust in the firm, investors will downward adjust the reputational premium embedded in the stock price and revise their assessed CSR-related risk on the firm's future cash flows, resulting in lower firm value (Godfrey, 2005; Karpoff et al., 2008). These arguments suggest that firms with female board representation are associated with a more negative relation between CSR concerns and firm value. Overall, the net effect as to whether board gender diversity reduces or magnifies the negative effect of CSR concerns on firm value is an empirical issue.

The extant literature provides some empirical support for the conjecture that female representation on the board moderates the effect of negative corporate events on firm value. However, the direction for the moderating effect is mixed. Cumming et al. (2015) show that investors' negative reaction to securities fraud announcements is less pronounced when firms

have more female directors on the board. Cumming et al. (2015) suggest given the differences in ethicality between men and women, fraud is likely perceived by investors as being less severe when there are more women on board, and investors may have more confidence in the company to rectify the matter when there is higher female representation on the board. In contrast, Bartov et al. (2021) show that investors respond more negatively to fraudulent restatement announcements for firms with better CSR performance. They conjecture that because conscious management misconduct is less expected for firms with good CSR performance, negative events lead to broken trust and a loss of reputational or CSR premium previously embedded in firm value. Drawing on the theory and evidence in Bartov et al. (2021), it is possible that female board representation exacerbates, rather than alleviates, the effect of negative CSR performance on firm value (Karpoff et al., 2008). Overall, whether investors react more negatively or more positively to CSR concerns for firms with gender-diverse boards is an empirical question. Based on these discussions, we propose the following hypothesis:

Hypothesis 1: Female board representation moderates the relationship between firm CSR concerns and firm value.

3.2 CSR strength

Board gender diversity could have a moderating effect on the association between CSR strengths and firm value for the following reasons. The gender socialization theory and social role theory suggest women are more community-minded, empathic, and caring of others (e.g., Carlson, 1972; Eagly & Crowley, 1986; Eagly, 2009). Thus, it is possible that firms with more female board members will better consider stakeholder needs and monitor the implementation of CSR programs and initiatives to achieve long-term value, instead of engaging in symbolic CSR actions or green-washing activities, which could destroy firm value (Jo & Harjoto, 2011; Walker & Wan, 2012; Galbreath, 2011; Zhang, 2012; Levi, Li, & Zhang, 2014; Rao & Tilt

2016).⁸ If this is the case, the positive relation between CSR performance and firm value could be enhanced when there is more female representation on the board. In addition, if investors perceive positive CSR performance to be more genuine and value-enhancing for firms with gender-diverse boards according to the prediction of signaling theory, the market's assessment of CSR strengths on firm value may be more positive when there is higher female representation on the board.

Based on the discussions above, we test the following hypothesis:

Hypothesis 2: Female board representation positively moderates the relationship between firm CSR strengths and firm value.

4. Research Design

4.1 Data selection and sampling

We test our hypothesis using a sample of S&P1500 firms in the U.S., which cover a wide range of firm sizes and industries.⁹ The sample period is from 2009 to 2018 to avoid any potential impact from the global financial crisis in 2008. CSR performance data for these firms are obtained from MSCI ESG KLD STATS dataset on an annual basis; data on the gender of boards of directors and other board characteristics are collected from Institutional Shareholder Services (ISS), which offers a range of variables related to individual board directors. The firm performance measures and other financial variables are constructed using data from Compustat and Centre for Research in Security Prices (CRSP). Initially, the sample comprises 15,021 firm-year observations from the Compustat database during the 2009-2018 period. After dropping 6,057 observations for firms not covered by the KLD database, 617 firm-year observations with insufficient board data in ISS, and 574 observations for firms with missing

⁸ For example, Volkswagen suffered huge financial losses because of their 'clean diesel' scandal (See <https://www.bbc.com/news/business-34324772>).

⁹ The ISS Director database only covers the S&P 1500 firms, which cover approximately 90 percent of the U.S. market capitalization (Hope & Lu, 2020).

data of control variables, our final sample is an unbalanced panel dataset of 7,773 firm-year observations with 1,507 unique firms over the 10-year time frame. Table 1 reports the sample selection procedure.¹⁰ Although our sample selection process (and the extent of reduction in sample size) is similar to prior research on CSR performance using the KLD database, we acknowledge the potential concern that our findings may not be generalizable to the firms that do not disclose CSR information (not covered by the KLD database).

TABLE 1
Sample Selection

	Observations
All firm-year observations from Compustat database from fiscal year 2009 to 2018	15,021
Less: Firm-year observations with insufficient data for CSR measure from KLD database;	(6,057)
Less: Firm-year observations with insufficient board data in ISS;	(617)
Less: Firm-year observations for firms with missing data of control variables;	(574)
Final sample	7,773

4.2. Measuring firm performance

We use Tobin's Q (*TobinQ*) and stock return (*Return*) as market-based performance measures of firm performance during the fiscal year. *TobinQ* is calculated as book value of assets minus book value of equity, minus deferred taxes, plus market value of equity, and divided by its book value of total assets (Servaes & Tamayo, 2013). *Return* is the raw stock return during the fiscal year, which captures the market participants' evaluation of firm performance. Both measures are forward-looking and reflect market expectations on a firm's profitability and growth potential by assessing the firm's ability to generate future cash flows and the associated risks (Luo & Bhattacharya, 2006). According to Kanter (2011), the economic value of CSR is more likely to be seen in the long-run and not necessarily translated into short-term profits. Thus, we use those two measures that consider not only financial

¹⁰ Following prior studies on the effect of CSR performance and firm value (e.g., Buchanan et al., 2018; Servaes & Tamayo, 2013), we do not exclude financial firms from our sample. To check the robustness of our results, we exclude the firms in the financial industry (SIC code 6000-6999) and our main results are qualitatively unchanged.

outcomes but also various non-financial aspects, which are important for the long-term expected value of a firm. In our additional tests in section 4.6, we also use an accounting-based performance measure, return on asset (*ROA*), as the dependent variable, to investigate the moderating effect of board gender diversity on the CSR-firm financial performance relation.¹¹

4.3. Measuring CSR performance

To compute the CSR performance measures, we use the Kinder, Lydenberg, Domini, & Co., Inc. (KLD) dataset by MSCI ESG KLD STATS, which provides CSR performance indicators in the categories of community, corporate governance, diversity, employee relations, environment, human rights, and product. In the KLD dataset, a firm's CSR performance in each category is assessed and rated every year according to several positive and negative performance indicators (e.g., Garcia et al., 2021). For each performance indicator, a firm is assigned a score of 1 (0) in the KLD dataset if it meets (does not meet) the evaluation criteria for that indicator. Following Boulouta (2013), we exclude the 'diversity' dimension in computing our measures of CSR performance to avoid overlap with the board gender diversity measures. In addition, consistent with the approach in prior studies that examine the relation between CSR and firm value, we exclude the corporate governance dimension, which does not conceptually capture a firm's CSR performance (Servaes & Tamayo, 2013; Chen, Dong & Lin, 2020).¹² Thus, we focus on a firm's CSR performance in the remaining five dimensions, i.e., community, employee relations, environment, human rights, and product.

As discussed in section 3 in developing our hypotheses, we argue that examining CSR concerns and CSR strengths separately is necessary for our study. Nevertheless, an overall measure of CSR performance is commonly used in prior literature when investigating the CSR

¹¹ As our arguments used in developing the hypotheses relate to the *perception* of the investors, it is more suitable to use market assessed firm value rather than accounting-based performance proxy to assess these hypotheses as our main tests.

¹² Shleifer and Vishny (1997, p. 737) state that "Corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment." CSR, on the other hand, deals with social objectives and stakeholders other than shareholders.

performance-firm value relation. Thus, in addition to examining CSR concerns and CSR strengths separately, we use an overall CSR measure to examine the moderating effect of board gender diversity on the association between net CSR performance (*CSR*) and firm value to benchmark against prior findings. Specifically, *CSR* is the scaled aggregate net CSR performance score calculated by subtracting the total score of negative performance indicators (CSR concerns) from the total score of positive performance indicators (CSR strengths) in each of the five categories for each firm-year (e.g., Wang & Choi, 2013). Despite its popularity, the overall CSR performance measure has its shortcomings. Specifically, by aggregating the rating scores on CSR concerns and strengths, useful information can be lost (Boulouta, 2013; Griffin & Mahon 1997; Johnson & Greening 1999; Van Oosterhout & Heugens 2006). For example, a net CSR performance score of zero could mean a firm with no CSR strengths or concerns, or a firm that excels in certain dimensions but performs poorly in others. Specific to our setting, a firm's positive and negative CSR activities will likely be assessed by the market separately rather than as a net. Further, the role of female board representation in affecting the CSR-firm value relation may differ depending on the nature of CSR activities. Given this, we separately examine CSR concerns and CSR strengths in testing our proposed hypotheses.

To examine H1 and H2, we construct two measures that capture a firm's CSR concerns and CSR strengths, based on its scores for the negative and positive CSR performance indicators provided in the KLD dataset, respectively. Specifically, *CSR_Con* (*CSR_Str*) is the sum of a firm's total score on negative (positive) performance in terms of the community relations, humanity, product, employee relations, and environment components of the MSCI ratings, divided by each component's possible maximum of each year (Boulouta, 2013; Wang & Choi, 2013). By using measures that capture a firm's CSR concerns (i.e., negative CSR-related activities) and CSR strengths (i.e., positive CSR-related activities), we can gain more insights into how female board representation influences the effect of different CSR-related

activities on firm value.

4.4. *Measuring female board representation*

Prior research measures female board representation in various ways (Post & Byron, 2015). Following Campbell and Mínguez-Vera (2008), Miller and del Carmen Triana (2009), and Reguera-Alvarado et al. (2017), we use the Blau index as our primary measure for board gender diversity (Blau, 1977). The Blau Index is widely employed in social-economic studies and is regarded as an ideal measure that captures the concept of *diversity* within a group of individuals (Harrison & Sin, 2006; Harrison & Klein, 2007). Specifically, *Female_Blau* is computed as $1 - p^2 - (1 - p)^2$, where p is the percentage of female directors on board (Blau, 1977). As none of the firms in our sample have a proportion of female directors over 50%, a higher value for *Female_Blau* indicates greater female representation on the board. Further, in line with prior studies (e.g., Campbell & Mínguez-Vera, 2008), we examine the robustness of our findings to using two additional board gender diversity measures, (1) the percentage of female members on the board (*Female_Pct*), and (2) an indicator variable that is equal to 1 if there is at least one female director on the board, and 0 otherwise (*Female_Dum*).

4.5. *Control variables*

We consider a group of variables on board characteristics to control for both structural diversity of the boards and demographic diversity in the boards. Specifically, *BoardSize* is the natural logarithm of the number of directors on the board (Hillman et al., 2001; Luoma & Goodstein, 1999). Larger boards are more likely to create an effective linkage between firms and their external environment through obtaining more useful resources and information and preventing environmental disruptions (Alexander, Fennell, & Halpern, 1993). Moreover, society may put pressure on firms to hire directors from wider backgrounds; as a result, firms tend to establish larger boards for long-term survival (Hillman & Keim, 2001). *%Independence* is the ratio of independent (non-executive) directors to total number of directors on the board.

Independent directors are beneficial for enhancing board monitoring effectiveness and better firm performance (Westphal & Milton, 2000). *Dual* is an indicator variable that equals 1 if the chairman also serves as the CEO, and 0 otherwise, which reflects the additional power exercised by the board in affecting and monitoring managers' decision-making process. The extant literature suggests that CEO duality could negatively affect CSR (De Villiers, Naiker, & Van Staden, 2011) and strategic decision making (Ruigrok, Peck, & Keller, 2006), but provides mixed findings on the effect of CEO duality on firm value. *DirectorAge* is the average age of directors on a given board in a given year. Age reflects business experiences and risk tolerance of directors when making decisions (Schnatterly & Hill, 2013). In particular, younger directors are more open to new ideas and willing to initiate strategic changes (Zajac & Westphal, 1996), while firms with older directors are associated with a lower likelihood of bankruptcy (Platt & Platt, 2012). *DirectorTenure* is the average tenure of directors on a given board in a given year. Directors with longer tenure tend to possess better knowledge of the business, a more in-depth understanding of strategic issues, and greater familiarity with the management team, leading to high-quality decision-making (Huang & Hilary, 2018). *#OtherDirectorships* is the average number of board positions held in other firms by directors on a given board in a given year. On the one hand, as directors hold more board seats in other firms, they may become too busy and less committed to each directorship, which harms firm value (Hauser, 2018). On the other hand, board members holding multiple directorships could gain more experiences and knowledge from different companies as well as establish a broader networking base (Field, Lowry, & Mkrtchyan, 2013). *EthnicDiversity* is an indicator variable that equals one if the firm has at least one non-Caucasian director in a given year, and zero otherwise. All-Caucasian groups show a tendency for individualism, whereas racially diverse groups are more likely to exhibit collectivistic behaviors (Cox, Lobel, & McLeod, 1991). Boards with members from diverse ethnicity are positively related to innovative ideas and firm value because minority

directors may offer different perspectives and information that helps in decision making (Hafsi & Turgut, 2013).

Furthermore, we include firm-level control variables following previous literature examining the relation between CSR and Tobin's Q (e.g., Cahan et al., 2016) and the effect of board diversity on CSR (Canyon & He, 2017). Specifically, we control for the natural logarithm of total assets (*FirmSize*), leverage ratio (*Leverage*), capital expenditure divided by total assets (*Capex*), R&D expenses divided by total assets (*RnD*), advertising expenses divided by total assets (*Advertise*), standard deviation of daily stock return in a given year (*Ret_STD*), average daily stock turnover during the fiscal year (*Turnover*), and firm age (*FirmAge*). Based on prior studies, we expect the coefficients on *Capex*, *RnD*, and *Advertise* to be positive and those on *FirmSize*, *Ret_STD*, *FirmAge* to be negative.

4.6. Empirical model

One may be concerned about the endogeneity between women directors, CSR performance, and firm performance, since firm performance can affect the board structure and CSR performance. For example, Adams and Ferreira (2009) show that firm performance affects both the incentive of women joining the boards and the motivation of boards hiring women directors. Waddock and Graves (1997) document that prior financial performance is positively associated with CSR performance. Hong, Kubik, and Scheinkman (2012) show that financial constraints are important drivers of corporate goodness. Such endogeneity concern (i.e., past financial performance may affect current financial performance, CSR performance and board structure) could lead to biased and inconsistent parameter estimates (Roberts & Whited, 2013).

To mitigate endogeneity bias, we employ the instrumental variables approach and the dynamic GMM estimator to examine how board gender diversity interacts with CSR performance to affect firm value (e.g., Wintoki et al., 2012; Mollah, Liljeblom, & Mobarek,

2021). Compared to other methods on reducing endogeneity concerns (e.g., 2-stage OLS model using instrument variable, matched sample, etc.), GMM is particularly relevant in our setting because current values of CSR performance and board structure are a function of past firm performance.¹³ GMM accounts for unobserved heterogeneity, simultaneity, and the dynamic relation of board structure and CSR performance with past performance. Following Wintoki et al. (2012), we employ the two-step ‘system GMM’ that uses first-differenced variables as instruments for the equations in levels.¹⁴ Such estimations are robust to undetected heterogeneity, causality problems, and dynamic endogeneity.

Our empirical models are constructed as follows:

$$y_{t+1} = \alpha + \beta_1 CSR_t \times Female_Blau_t + \beta_2 CSR_t + \beta_3 Female_Blau_t + \sum \beta Controls_t + Year\ Dummies + \varepsilon \quad (1)$$

$$y_{t+1} = \alpha + \beta_1 CSR_Str_t \times Female_Blau_t + \beta_2 CSR_Con_t \times Female_Blau_t + \beta_3 CSR_Str_t + \beta_4 CSR_Con_t + \beta_5 Female_Blau_t + \sum \beta Controls_t + Year\ Dummies + \varepsilon \quad (2)$$

The dependent variable y is either *TobinQ* or *Return*, as discussed earlier in section 4.2. To alleviate endogeneity concerns, we use the firm value measures at $t+1$ (e.g., Liu, Wei, & Xie, 2014). *Female_Blau* is the Blau index of board gender diversity.¹⁵ The coefficient on the interaction between *CSR* and *Female_Blau* in equation (1) captures the incremental effect of overall CSR performance on firm value when the extent of female board representation increases. In equation (2), we are interested in the interaction of *Female_Blau* with *CSR_Str* and *CSR_Con*, which shows the incremental effect of positive and negative CSR-related activities on firm value when there is increasing female representation on the board, relative to

¹³ We thank an anonymous reviewer for suggesting this method.

¹⁴ The system GMM estimations are based on Roodman (2006) using Stata module ‘xtabond2’. Refer to Wintoki et al. (2012, p.605) for the codes of running the estimation in Stata.

¹⁵ We find similar results using two alternative measures of board gender diversity, as shown in section 5.3.

that effect for firms with no female representation on the board. *Controls* are the battery of control variables defined in section 4.4.

Following Wintoki et al. (2012), we include two lags of performance in the dynamic model. This makes historical performance and historical firm characteristics, lagged three periods or more, available for use as instruments. We use variables lagged three and four periods as instruments for all the endogenous variables in the GMM estimation. The assumption in the GMM regression is that all the regressors except firm age and the year dummies are endogenous. We winsorized all continuous variables at the 1st and 99th percentile. See Appendix A for detailed definitions of the variables in the model.

5. Empirical Results

5.1 Univariate analyses

Panel A of Table 2 reports descriptive statistics for key variables used in this analysis. The average number of female directors on the board in our sample is 1.24, with a standard deviation of 1.013, ranging from 0 to 7. The average percentage of female directors on board is 12.3%, making the mean value of *Female_Blau* 0.185. Our dependent variable, *TobinQ (Return)*, has an average value of 1.858 (0.155) with a median being 1.484 (0.129), indicating that market participants expect the investments to create value in the future. In terms of CSR performance, the overall score is -0.019 on average and 0.289 (0.309) for the strength (concern) measure.

Panel B of Table 2 provides the comparative descriptive statistics of the various characteristics of individual directors in our sample by gender. All the differences between female and male directors are shown to be significant. For example, female directors are more likely to be independent directors, younger, have shorter tenure, hold more other directorships, and are more likely to be Caucasian. These results highlight the importance of controlling for these variables in our model to alleviate the concerns that these other characteristics of the

board other than gender are driving our results.

TABLE 2
Summary Statistics

Panel A Descriptive statistics							
Variable	Mean	SD	P5	P25	Median	P75	P95
<i>TobinQ</i>	1.858	1.136	0.928	1.115	1.484	2.158	4.168
<i>Return</i>	0.155	0.399	-0.436	-0.081	0.129	0.344	0.848
<i>ROA</i>	0.049	0.073	-0.049	0.015	0.047	0.086	0.160
<i>CSR</i>	-0.019	0.534	-0.900	-0.250	0.000	0.200	0.850
<i>CSR_Str</i>	0.289	0.477	0.000	0.000	0.000	0.450	1.271
<i>CSR_Con</i>	0.309	0.494	0.000	0.000	0.000	0.450	1.383
<i>Female_Blau</i>	0.185	0.138	0.000	0.000	0.198	0.278	0.408
<i>BoardSize</i>	9.529	2.483	6.000	8.000	9.000	11.000	14.000
<i>%Independent</i>	0.740	0.141	0.500	0.667	0.769	0.857	0.909
<i>Dual</i>	0.662	0.473	0.000	0.000	1.000	1.000	1.000
<i>DirectorAge</i>	61.149	3.943	54.444	58.600	61.273	63.750	67.500
<i>DirectorTenure</i>	8.800	3.740	3.500	6.143	8.333	10.917	16.000
<i>#OtherDirectorships</i>	0.802	0.550	0.000	0.375	0.750	1.143	1.778
<i>EthnicDiversity</i>	0.420	0.493	0.000	0.000	0.000	1.000	1.000
<i>FirmSize</i>	8.018	1.641	5.602	6.774	7.851	9.056	10.918
<i>Leverage</i>	0.176	0.157	0.000	0.030	0.152	0.281	0.475
<i>Capex</i>	0.043	0.045	0.000	0.013	0.030	0.057	0.133
<i>RnD</i>	0.024	0.044	0.000	0.000	0.000	0.029	0.124
<i>Advertise</i>	0.011	0.027	0.000	0.000	0.000	0.006	0.065
<i>Ret_STD</i>	0.024	0.012	0.011	0.016	0.022	0.029	0.048
<i>Turnover</i>	9.885	7.127	2.782	5.050	7.891	12.388	24.182
<i>FirmAge</i>	3.110	0.700	1.946	2.639	3.135	3.738	4.060
N				7,773			

Panel B. Differences in the characteristics of male vs. female directors						
	Male Directors		Female Directors		Diff.	<i>p</i> -value
	Mean	SD	Mean	SD		
<i>Independent</i>	0.778	0.415	0.930	0.256	-0.152	0.000
<i>DirectorAge</i>	63.321	8.433	59.940	15.728	3.381	0.000
<i>#OtherDirectorships</i>	0.775	0.998	0.920	1.037	-0.146	0.000
<i>EthnicDiversity</i>	0.088	0.284	0.140	0.347	-0.051	0.000
<i>DirectorTenure</i>	9.471	8.124	6.911	6.055	2.560	0.000

5.2. Multivariate analysis

Table 3 presents the results from estimating model (1) using the dynamic GMM method (Wintoki et al., 2012). In columns (1) and (2), *TobinQ* is the dependent variable. In column (1), the coefficient on the interaction term of interest ($CSR \times Female_Blau$) is positive and significant ($p < 0.01$), suggesting that the presence of female directors on board moderates the

effect of CSR performance on firm value. Notably, the coefficient on *CSR* is negative and significant ($p < 0.01$), suggesting that, in the absence of female directors, investors on average view CSR activities as value-destroying. When board gender diversity increases, the CSR performance is perceived to be more value-creating.

Column (2) reports the moderating effects of female directors on the relation of CSR strengths and CSR concerns with firm value. Regarding the effect of CSR concerns, *CSR_Con*×*Female_Blau* shows a significantly negative coefficient ($p < 0.01$). This suggests that compared to the effect of CSR concerns on firm value for firms with no female representation on the board (as indicated by the standalone term of *CSR_Con*), the effect of *CSR_Con* on firm value is increasingly more negative when there is greater female representation on the board. This result suggests that board gender diversity exacerbates, rather than alleviates, the negative effect of CSR concerns on firm value. This finding is consistent with the theory suggesting that investors are more disappointed and react more negatively when firms with women on board are associated with CSR concerns, as they would have expected better CSR performance for these firms (e.g., Bartov et al., 2021).

Further, we find that the coefficient on *CSR_Str*×*Female_Blau* is positive and significant ($p < 0.05$), which supports our prediction in H2 that the relation between CSR strengths and firm value is more positive for firms with more female board representation. The sum of the coefficient on *CSR_Str*×*Female_Blau* (2.784) and *CSR_Str* (-0.624), 2.16, is statistically significant at the 5 percent level, suggesting that CSR strengths increase firm value when there is female board representation. On the other hand, the coefficient on *CSR_Str* is negative and significant, suggesting that CSR strengths are associated with lower Tobin's Q in the absence of board gender diversity.

Columns (3) and (4) report similar results supporting a moderating effect of board gender diversity on the CSR-firm value relation using *Return* as the dependent variable.

Specifically, the coefficient on $CSR \times Female_Blau$ is positive and significant ($p < 0.05$) in column (3); the coefficient on $CSR_Str \times Female_Blau$ is positive and significant ($p < 0.05$) and the coefficient on $CSR_Con \times Female_Blau$ is negative and significant ($p < 0.05$) in column (4).

The stability of the dynamic system GMM depends on two major conditions. The first condition is the serial independence of the residuals, where the first difference residuals should be serially correlated ($AR(1)$) by means of their structure. However, residuals in the second difference should not be serially correlated ($AR(2)$). We find that, across all the four specifications, $AR1$ is significant ($p < 0.01$) while $AR2$ is statistically insignificant. The second condition is the validity of instruments used in dynamic estimation. Using Hansen J -statistic of over-identifying restrictions, we also confirm the validity of instruments in the respective estimations.

TABLE 3
Main Tests

Dep. Var. =	(1) <i>TobinQ</i>	(2) <i>TobinQ</i>	(3) <i>Return</i>	(4) <i>Return</i>
<i>CSR</i> × <i>Female_Blau</i>	3.802*** (3.69)		1.724** (2.54)	
<i>CSR_Str</i> × <i>Female_Blau</i>		2.784** (2.32)		1.609** (2.06)
<i>CSR_Con</i> × <i>Female_Blau</i>		-2.048*** (-2.61)		-1.566** (-1.98)
<i>CSR</i>	-0.867*** (-3.61)		0.085 (1.53)	
<i>CSR_Str</i>		-0.624*** (-2.94)		-0.321 (-1.53)
<i>CSR_Con</i>		0.051 (0.73)		-0.322** (-2.37)
<i>Female_Blau</i>	-0.047 (-1.45)	0.020 (0.33)	0.039** (2.19)	0.050 (1.29)
<i>BoardSize</i>	0.090 (0.16)	-0.339 (-0.34)	-0.570* (-1.94)	0.240 (0.43)
<i>%Independent</i>	0.014 (0.20)	0.050 (0.28)	0.061 (1.49)	0.101 (1.14)
<i>Dual</i>	-0.021 (-0.90)	-0.055 (-1.08)	-0.000 (-0.02)	-0.010 (-0.37)
<i>DirectorAge</i>	-0.001	0.027	-0.008	-0.001

	(-0.06)	(0.62)	(-0.97)	(-0.06)
<i>DirectorTenure</i>	0.111	0.089	0.010	0.286
	(0.95)	(0.22)	(0.15)	(1.53)
<i>#OtherDirectorships</i>	0.070	-0.030	0.060	-0.039
	(0.94)	(-0.15)	(1.36)	(-0.36)
<i>EthnicDiversity</i>	0.088	-0.117	0.027	-0.063
	(1.40)	(-1.21)	(0.96)	(-1.15)
<i>FirmSize</i>	0.382	0.469	-0.035	-0.068
	(1.45)	(0.64)	(-0.25)	(-0.19)
<i>Leverage</i>	1.473	-1.426	-0.231	-1.943*
	(1.11)	(-0.65)	(-0.29)	(-1.83)
<i>Capex</i>	1.626	-1.027	-0.951	-2.370
	(0.75)	(-0.29)	(-0.89)	(-1.27)
<i>RnD</i>	0.839	2.213	1.212	-0.990
	(0.18)	(0.40)	(0.57)	(-0.28)
<i>Advertise</i>	17.328	7.493	-11.701**	-16.249***
	(1.61)	(0.66)	(-2.29)	(-2.85)
<i>Ret_STD</i>	-0.023*	-0.017	0.009	0.009
	(-1.94)	(-0.69)	(1.28)	(0.76)
<i>Turnover</i>	-0.047	0.020	-0.039**	-0.050
	(-1.45)	(0.33)	(-2.19)	(-1.29)
Dep. Var. Lag(1)	0.787***	0.746***	-0.097	-0.486***
	(7.00)	(4.26)	(-0.70)	(-4.81)
Dep. Var. Lag(2)	0.108	0.138	-0.065***	0.010
	(1.01)	(0.95)	(-4.20)	(0.36)
Year Dummy	Yes	Yes	Yes	Yes
AR(1) test (<i>p</i> -value)	0.000	0.000	0.000	0.000
AR(2) test (<i>p</i> -value)	0.702	0.592	0.958	0.842
Hansen test of over-identification (<i>p</i> -value)	0.029	0.031	0.139	0.096
Diff-in-Hansen tests of exogeneity (<i>p</i> -value)	0.124	0.128	0.225	0.256
N	7,773	7,773	7,773	7,773

This table presents the baseline results of regressions in relation to the effect of our main tests. All the variables are defined in Appendix A. We include year fixed effects but do not report their coefficients for brevity. Robust *t*-statistics are reported in parentheses. *, **, and *** indicate that the estimated coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

5.3 Alternative measures of female board representation

To check the robustness of our results, we use two alternative measures of female board representation, specifically, the percentage of female directors on board (*Female_Pct*) and a

dummy variable that indicates there is at least one female director on board (*Female_Dum*), for further analyses. Table 4 and Table 5 report the results using the two alternative measures of board gender diversity, respectively. Across all the four specifications in both tables, our results on the incremental effect of CSR activities on firm value when there is female board representation are similar to those reported in Table 3. Specifically, we continue to find a significant and positive coefficient on $CSR \times Female_Pct$ and $CSR_Str \times Female_Pct$, and a significant and negative coefficient on $CSR_Con \times Female_Pct$, as shown in Table 3. In addition, the results in Table 5 suggest that the moderating effect of female board representation on the CSR-firm value relation is present when there is at least one female director on the board.

Prior studies propose a critical mass theory that firms with at least three female directors achieve a significantly higher level of organizational innovation (Torchia, Calabrò, & Huse, 2011), higher KLD strength score in the environment dimension (Post et al., 2011), and improved firm performance (Green & Homroy, 2018). Thus, we examine whether our results change when there are at least three female directors on board. We find qualitatively similar results as those reported in Tables 3 to 5 using this measure for female board representation (untabulated).

Overall, our findings suggest that female board representation significantly moderates the impact of firm CSR performance on firm value. Specifically, the effect of overall CSR performance and CSR strengths on firm value is more positive when there is more female representation on the board, suggesting that investors perceive positive CSR activities to be more value-enhancing for firms with gender-diverse boards. In contrast, the effect of CSR concerns on firm value is more negative when there is more female representation on the board, which suggests that investors discount firm value more heavily when firms with female

directors have CSR concerns.¹⁶

TABLE 4
Robustness: Using Percentage of Female Directors

Dep. Var. =	(1)	(2)	(3)	(4)
	<i>TobinQ</i>	<i>TobinQ</i>	<i>Return</i>	<i>Return</i>
<i>CSR×Female_Pct</i>	4.621*** (3.36)		1.742** (2.08)	
<i>CSR_Str×Female_Pct</i>		2.997* (1.93)		1.510** (1.92)
<i>CSR_Con×Female_Pct</i>		-2.983*** (-3.48)		-1.717*** (-2.66)
<i>CSR</i>	-0.658*** (-3.32)		-0.240* (-1.96)	
<i>CSR_Str</i>		-0.403 (-1.52)		-0.159 (-0.98)
<i>CSR_Con</i>		0.415 (1.35)		0.308** (2.19)
<i>Female_Pct</i>	0.297 (0.71)	-0.208 (-0.47)	0.395 (1.57)	0.292 (0.98)
Controls	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
N	7,773	7,773	7,773	7,773

This table presents the baseline results of regressions in relation to the effect of our analyses using *Female_Pct*. All the variables are defined in Appendix A. We include year fixed effects but do not report their coefficients for brevity. Robust *t*-statistics are reported in parentheses. *, **, and *** indicate that the estimated coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

¹⁶ In the results reported in Tables 3-5, we find that the standalone term, *CSR_Con*, is insignificantly related to *TobinQ*. This suggests that for firms with no female directors on the board, CSR concerns are not negatively related to market assessed firm value as measured by Tobin's Q. An explanation for this finding is that CSR concerns for firms with no female representation on the board likely come as no surprise to the market since firms' CSR performance tends to be sticky (Habib & Hasan, 2019; Amin et al., 2020). It is also likely that the market does not consider the concerns in the firm valuation because they may not be considered relevant.

TABLE 5
Robustness: Using Indicator of at least One Female Director

Dep. Var. =	(1) <i>TobinQ</i>	(2) <i>TobinQ</i>	(5) <i>Return</i>	(6) <i>Return</i>
<i>CSR×Female_Dum</i>	1.620*** (3.16)		1.287*** (3.30)	
<i>CSR_Str×Female_Dum</i>		1.181* (1.89)		1.528*** (2.83)
<i>CSR_Con×Female_Dum</i>		-1.918** (-2.09)		-1.816** (-2.49)
<i>CSR</i>	-1.428*** (-3.13)		1.137 (1.18)	
<i>CSR_Str</i>		-0.973* (-1.67)		-0.327 (-0.58)
<i>CSR_Con</i>		0.979 (1.35)		0.799 (1.63)
<i>Female_Dum</i>	0.064 (0.63)	-0.011 (-0.04)	0.095 (1.49)	-0.003 (-0.02)
Controls	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
N	7,773	7,773	7,773	7,773

This table presents the baseline results of regressions in relation to the effect of our analyses using *Female_Dum*. All the variables are defined in Appendix A. We include year fixed effects but do not report their coefficients for brevity. Robust *t*-statistics are reported in parentheses. *, **, and *** indicate that the estimated coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

5.4. Using $t+2$ dependent variables

In our main analyses, we use dependent variables measured at one year ahead ($t+1$) to mitigate endogeneity concerns in addition to using the GMM method (e.g., Wintoki et al., 2012; Amin et al., 2020). To investigate to what extent the moderating effect of board gender diversity on the relation between CSR performance and firm value persists, we estimate our main models using the dependent variables (*TobinQ* and *Return*) measured at the end of fiscal year $t+2$. The results reported in Table 7 suggest that the moderating effect of female board representation on the relation between firm CSR performance and firm value last for at least two years.

TABLE 6
Robustness: Using $t+2$ Dependent Variables

Dep. Var. =	(1) <i>TobinQ_{t+2}</i>	(2) <i>TobinQ_{t+2}</i>	(5) <i>Return_{t+2}</i>	(6) <i>Return_{t+2}</i>
<i>CSR×Female_Blau</i>	2.298** (2.27)		1.595*** (2.68)	
<i>CSR_Str×Female_Blau</i>		3.379** (2.32)		1.964*** (2.69)
<i>CSR_Con×Female_Blau</i>		-2.848* (-1.77)		-1.231** (-2.31)
<i>CSR</i>	-0.208 (-0.87)		-0.267* (-1.88)	
<i>CSR_Str</i>		-0.268 (-0.97)		-0.438** (-2.29)
<i>CSR_Con</i>		0.063 (0.25)		-0.062 (-0.35)
<i>Female_Blau</i>	0.108 (0.35)	-0.075 (-0.18)	0.100 (0.48)	-0.395 (-1.20)
Controls	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes
N	7,773	7,773	7,773	7,773

This table presents the baseline results of regressions in relation to the results of our analyses using dependent variables measured at the end of year $t+2$. All the variables are defined in Appendix A. We include year fixed effects but do not report their coefficients for brevity. Robust t -statistics are reported in parentheses. *, **, and *** indicate that the estimated coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

5.5. Using ROA as Dependent Variable

Finally, we investigate whether female board representation affects the impact of CSR performance on a shorter-term, past-looking accounting-based measure for firm financial performance, i.e., ROA. In performing this test, we aim to find out whether female board representation moderates the effect of CSR performance on firm value by influencing actual firm financial performance, or the market assessed risks and cashflows, or both. We re-estimate all the tests above using ROA_{t+1} as the dependent variable in our models and report the results in Table 8.

Results reported in panels A-C of Table 7 reveal that relation between CSR strength and ROA is incrementally more positive when there is more female representation on the board,

suggesting that CSR initiatives enhance firm financial performance when there are more women directors on the board. On the other hand, the coefficient of *CSR_Con*×*Female_Blau* in column (2) is insignificant, which suggests that female board representation does not exacerbate nor mitigate the effect of CSR concerns on the accounting-based measure of firm financial performance. We find similar evidence using two-year ahead ROA as the dependent variable in panel D.

Taken together, the findings reported in Tables 3 to 8 suggest that board gender diversity influences the investors' perceived riskiness of a firm's CSR concerns on firm value, although female board representation does not significantly moderate the impact of CSR concerns on firms' accounting-based financial performance. These findings are consistent with the loss of trust explanation, suggesting that CSR concerns for firms with gender-diverse boards are less expected by the market, leading to a downward adjustment in market assessed firm value and a loss of reputational premium embedded in the stock prices (Godfrey, 2005; Bartov et al., 2021). The results on CSR strengths suggest that board gender diversity enhances the positive impact of CSR strengths on actual firm financial performance as well as the market perceived firm value. These findings suggest that female board representation affects firm value through its impact on how CSR activities of a firm affect its actual and market-perceived financial performance.

TABLE 7
Channel Tests: the Effect on ROA

Dep. Var. =	(1)	(2)
	<i>ROA</i>	<i>ROA</i>
<i>CSR×Female_Blau</i>	0.179* (1.93)	
<i>CSR_Str×Female_Blau</i>		0.236** (2.16)
<i>CSR_Con×Female_Blau</i>		0.111 (0.90)
<i>CSR</i>	-0.021 (-0.92)	
<i>CSR_Str</i>		-0.044 (-1.40)
<i>CSR_Con</i>		-0.036 (-1.29)
<i>Female_Blau</i>	0.001 (0.45)	0.000 (0.09)
<i>BoardSize</i>	0.011 (0.21)	0.016 (0.23)
<i>%Independent</i>	0.001 (0.21)	-0.001 (-0.06)
<i>Dual</i>	-0.000 (-0.09)	0.001 (0.29)
<i>DirectorAge</i>	-0.000 (-0.19)	0.002 (0.79)
<i>DirectorTenure</i>	0.013 (1.24)	0.026 (1.04)
<i>#OtherDirectorships</i>	0.004 (0.55)	0.020 (1.50)
<i>EthnicDiversity</i>	0.002 (0.42)	-0.002 (-0.21)
<i>FirmSize</i>	-0.014 (-0.62)	-0.044 (-0.86)
<i>Leverage</i>	0.029 (0.24)	-0.126 (-0.83)
<i>Capex</i>	0.253 (1.57)	-0.244 (-0.91)
<i>RnD</i>	0.074 (0.24)	0.490 (1.20)
<i>Advertise</i>	0.031 (0.04)	-0.308 (-0.42)
<i>Ret_STD</i>	0.000	-0.000

	(0.12)	(-0.16)
<i>Turnover</i>	0.001	0.000
	(0.45)	(0.09)
Dep. Var. Lag(1)	0.248	0.376**
	(1.24)	(2.16)
Dep. Var. Lag(2)	0.069	0.041
	(1.06)	(0.69)
Year Dummy	Yes	Yes
N	7,773	7,773

TABLE 7
Panel B. Using Percentage of Female Directors

Dep. Var. =	(1) <i>ROA</i>	(2) <i>ROA</i>
<i>CSR×Female_Pct</i>	0.183** (2.39)	
<i>CSR_Str×Female_Pct</i>		0.207** (2.28)
<i>CSR_Con×Female_Pct</i>		0.176 (1.10)
<i>CSR</i>	-0.002 (-0.12)	
<i>CSR_Str</i>		-0.015 (-0.58)
<i>CSR_Con</i>		-0.036 (-1.59)
<i>Female_Pct</i>	0.001 (0.02)	-0.090* (-1.78)
Controls	Yes	Yes
Year Dummy	Yes	Yes
N	7,773	7,773

TABLE 7
Panel C. Using Indicator of at least One Female Director

Dep. Var. =	(1) <i>ROA</i>	(2) <i>ROA</i>
<i>CSR×Female_Dum</i>	0.151*** (3.06)	
<i>CSR_Str×Female_Dum</i>		0.140*** (2.81)
<i>CSR_Con×Female_Dum</i>		-0.079 (-1.05)
<i>CSR</i>	-0.116 (-1.56)	
<i>CSR_Str</i>		-0.102 (-1.08)
<i>CSR_Con</i>		0.060 (0.92)
<i>Female_Dum</i>	0.008 (0.76)	-0.009 (-0.52)
Controls	Yes	Yes
Year Dummy	Yes	Yes
N	7,773	7,773

TABLE 7
Panel D. Using $t+2$ Dependent Variables

Dep. Var. =	(1) ROA_{t+2}	(2) ROA_{t+2}
$CSR \times Female_Blau$	0.230*** (2.62)	
$CSR_Str \times Female_Blau$		0.208* (1.95)
$CSR_Con \times Female_Blau$		-0.090 (-0.91)
CSR	-0.040* (-1.91)	
CSR_Str		-0.037 (-1.27)
CSR_Con		0.016 (0.68)
$Female_Blau$	0.018 (0.54)	-0.030 (-0.65)
Controls	Yes	Yes
Year Dummy	Yes	Yes
N	7,773	7,773

This table presents the results on the effect of female directors on the impact of CSR on ROA. All the variables are defined in Appendix A. We include year fixed effects but do not report their coefficients for brevity. Robust t -statistics are reported in parentheses. *, **, and *** indicate that the estimated coefficient is statistically significant at the 10%, 5%, and 1% levels, respectively.

5.6 Other additional tests

We report findings from two additional tests (untabulated). First, we check the alternative explanation that *Female_Blau* merely captures other board characteristics by controlling for the interaction terms of other board characteristics (i.e., *BoardSize*, *%Independent*, *Dual*, *DirectorAge*, *DirectorTenure*, *#OtherDirectorships*, and *EthnicDiversity* as defined in section 4.5) and *CSR* in estimating our models. We find our results in Table 3 are qualitatively unchanged after controlling for these interaction terms, suggesting that *Female_Blau* is not merely a proxy for the other board characteristics. Second, we investigate whether the moderating effect of board gender diversity is only present for one of the five dimensions of CSR performance. We find that female board representation enhances the value of CSR performance in the dimensions of community, human rights, and product

when *TobinQ* is the dependent variable, and enhances the value of CSR performance in human rights, product, and environment when *Return* is the dependent variable. These results suggest that the moderating effect of female board representation is observed for most CSR dimensions.

6. Conclusions and Discussion

We examine the moderating effect of board gender diversity on the impact of firm CSR performance on firm value. Using dynamic GMM estimation to control for potential endogeneity issues (Wintoki et al., 2012), our findings suggest that the effect of CSR strengths (CSR concerns) on the market assessed firm value is more positive (more negative) for firms with more female representation on the board, compared with firms with no female members on the board. Further analysis suggests that female board representation enhances the effect of CSR strengths on firm financial performance measured by ROA; however, female board representation does not have a significant moderating effect on the impact of CSR concerns on ROA. These findings suggest that female directors on the board enhance the effect of positive CSR initiatives on firm value. On the other hand, investors react more negatively to CSR concerns for firms with female board representation. This finding is likely explained by a loss of trust from investors and a market revision of reputational premium in the firm value when firms with female representation on the board perform poorly in other areas of CSR (Karpoff et al., 2008; Bartov et al., 2021).

Our study is relevant to managers and international regulators who are interested in promoting CSR and gender diversity in the workplace by providing evidence on how CSR performance and board gender diversity interact to affect firm value (e.g., Bruce & Rasmussen, 2020; Connley, 2020; Hatcher et al., 2020). Our findings suggest that board gender diversity could enhance the positive effect of CSR activities on firm value. However, once firms commit to gender diversity, they may be penalized more strongly by the market when they show poor performance in other CSR dimensions. We add to the literature that investigates the

mechanisms through which board gender diversity affects firm value (e.g., Isidro & Sobral 2015), and the growing body of research that examines the moderating effect of board gender diversity and firm CSR performance on the prior-documented relations with firm value (e.g., Cumming et al., 2015; Bartov et al., 2021).

Our study is subject to several caveats. First, while we employ the GMM estimation method and include a number of control variables in our model to mitigate endogeneity concerns, we cannot completely rule out the possibility of omitted correlated variables that affect board structure, CSR performance, and/or firm value. Future research should explore quasi-experimental settings, if possible, to further shed light on the causal effect of board gender diversity and CSR performance on firm value by employing research methods such as a difference-in-differences model. Second, prior studies document a curvilinear relation between CSR and firm financial performance (e.g., Barnett & Salomon, 2012; Wang et al., 2016). While these studies use accounting-based performance measures such as ROA and we focus on the interaction effect of CSR and board gender diversity on the market assessed firm value, we cannot rule out the possibility that the underlying relation between board gender diversity, CSR, and firm value is non-linear. An in-depth analysis of the complex interaction between female board representation, CSR performance, and firm value using non-linear function forms is beyond the scope of this paper. Thus, we call for future research to investigate if a non-linear association exists between the interaction of board gender diversity, CSR performance, and firm value. Finally, we use aggregated scores to measure a firm's CSR performance encompassing five CSR performance dimensions for most of our tests, and the analysis for each dimension of CSR performance discussed in additional tests provides only preliminary evidence. Future research could conduct a more differentiated analysis to further examine the interacted effect between corporate governance and different dimensions of CSR performance on firm value.

In addition, we suggest the following avenues for future research. Firstly, while our study focuses on the U.S. context, future studies could examine the moderating effect of board gender diversity on the CSR-firm value link in other settings, because the same findings may or may not hold in different settings due to country-level institutional factors (e.g., Van Beurden & Gössling 2008). From a methodological perspective, our findings suggest that it is necessary for future research to investigate CSR strengths and CSR concerns separately in evaluating the interacted effect of CSR performance and other firm characteristics on firm value. In addition, the dynamic association between CSR strengths and CSR concerns could be further examined to see how they impact each other, and under which circumstances a firm would strategically use CSR initiatives to cover up CSR concerns. Finally, future studies could explore alternative aspects of CSR activities, such as the amount of money invested in CSR activities (Godfrey, Merrill, & Hansen, 2009) and CSR disclosures (Cahan et al., 2016).

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Appendix A Variable Definitions

Variable	Definitions
<i>CSR</i>	The sum of a firm's total strengths minus its total concerns in terms of the community relations, human rights, product, employee relations, and environment components of the MSCI ratings, divided by each component's possible maximum of each year. Source: MSCI ESG KLD STATS.
<i>CSR_Str</i>	The sum of a firm's total strengths in terms of the community relations, humanity, product, employee relations, and environment components of the MSCI ratings, divided by each component's possible maximum of each year. Source: MSCI ESG KLD STATS.
<i>CSR_Con</i>	The sum of a firm's total concerns in terms of the community relations, humanity, product, employee relations, and environment components of the MSCI ratings, divided by each component's possible maximum of each year. Source: MSCI ESG KLD STATS.
<i>TobinQ</i>	(Book value of assets – book value of equity – deferred taxes + market value of equity) / book value of assets. (Servaes and Tamayo, 2013). Source: Compustat.
<i>ROA</i>	Earnings before extraordinary items divided by total asset. Source: Compustat.
<i>Return</i>	Stock return during the fiscal year. Source: CRSP.
<i>Female_Blau</i>	Blau index of female directors, which is $1 - p^2 - (1 - p)^2$, where p is the percentage of female directors on board. Source: ISS Director.
<i>Female_Pct</i>	Percentage of female directors on board. Source: ISS Director.
<i>Female_Dum</i>	A dummy variable equals to 1 if there is at least one female director on board, and 0 otherwise. Source: ISS Director.
<i>BoardSize</i>	Natural logarithm of the number of directors. Source: ISS Director.
<i>%Independent</i>	Proportion of board members not employees. Source: ISS Director.
<i>Dual</i>	A dummy variable equals to 1 if the chairman also serves as the CEO, and 0 otherwise. Source: ISS Director.
<i>DirectorAge</i>	Average age of directors on a given board. Source: ISS Director.
<i>DirectorTenure</i>	Average tenure of directors on a given board. Source: ISS Director.
<i>#OtherDirectorships</i>	Average number of board positions held in other firms by directors on a given board. Source: ISS Director.
<i>EthnicDiversity</i>	A dummy variable equals to 1 if the firm has at least one non-Caucasian director, and 0 otherwise. Source: ISS Director.
<i>FirmSize</i>	Nature logarithm of total assets. Source: Compustat.
<i>Leverage</i>	The ratio of long-term debt to total assets. Source: Compustat.
<i>Capex</i>	The ratio of capital expenditures to total assets at the end of fiscal year. Source: Compustat.
<i>RnD</i>	The ratio of R&D expense to total assets at the end of fiscal year. Source: Compustat.
<i>Advertise</i>	The ratio of advertising expenditures to total assets at the end of fiscal year. Source: Compustat.
<i>Ret_STD</i>	Standard deviation of daily stock return during the fiscal year.
<i>Turnover</i>	Average daily stock turnover during the fiscal year, multiplied by 1,000. Source: CRSP.