Do female directors affect the cost of equity capital?

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Abstract

Purpose – We investigate the effect of female directors on the firm cost of equity capital.
Design/methodology/approach – We employ several analytical techniques, including univariate analysis, Ordinary Least Square regressions, and propensity score matching methodology. Our sample consists of US public firms from 2004–2018.
Findings – We find that firms can reduce their cost of equity capital when they have female directors on the board. We reveal that board gender diversity reduces the cost of equity by curbing firm information asymmetry. Our findings are consistent across several alternative contexts for a female director and are robust to endogeneity concerns. Also, we find a negative association between female directorship and the cost of equity capital is notably accentuated during the growth and mature stages of the firm life cycle. Our findings add to the growing literature on the business case for female representation on corporate boards.
Research limitations/implications – Our study shows that gender-diverse boards can reduce a firm's cost of equity capital. Shareholders perceive female directors as enhancing governance quality and lowering expected returns. Firms can leverage these insights by increasing female representation on the board, influencing their cost of equity and capital structure decisions. This has significant implications for firms and regulators promoting gender diversity.
Originality/value – Extant corporate governance research suggests that female directors improve firms' governance and monitoring. Consistently, we have evidence that shareholders place value on gender diversity on boards and expect lower returns from firms with gender-diverse boards compared to those with all-male boards.

Keywords Female director, Information asymmetry, Financial reporting quality, Cost of equity capital
Paper type Research article

1. Introduction

We investigate the impact of female directorship on the cost of equity. Empirical research suggests that gender diversity matters in corporate reporting practices and financial decision-making. The extant corporate governance and financial reporting literature indicate that females are less aggressive than their male counterparts, demonstrate less managerial opportunism, and choose lower-risk preferences in management decision-making (Siboni, Sangiorgi, Farneti, & de Villiers, 2016; Thiruvadi & Huang, 2011). Schubert (2006) argues that females have better communicative abilities, giving them a comparative advantage over men in tasks where communication within and among different groups is required. Some research evidence indicates that female directors have better oversight of managers (Adams & Ferreira, 2009) because they do not belong to old-boy networks, facilitating more independent decision-making (Adams, Hermalin, & Weisbach, 2010). Previous research has examined the various consequences of female directorship on corporate outcomes, including firm performance (Liu, Wei, & Xie, 2014; Rose, 2007; Lückerath-Rovers, 2013), corporate

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disclosure (Nadeem, 2020), financial reporting quality (Srinidhi, Gul, & Tsui, 2011), risk-taking (Faccio, Marchica, & Mura, 2016), and firm valuation (Gyapong, Monem, & Hu, 2016). Adams and Funk (2012) conducted a qualitative management survey and found that female directors are not only more risk-loving but also more benevolent, prioritizing universalism and stimulation while being less concerned with power, security, conformity, and tradition. Despite the progress made in understanding the implications of a gender-diverse board on corporate financial outcomes, surprisingly, little is known about how female directors affect the cost of equity capital. In this study, we attempt to fill this gap in the literature.

There are several reasons for the need to understand the impact a gender-diverse board has on the cost of equity. First, the cost of equity capital is one of the critical considerations for investment decisions as it captures investors' perception of risk. Second, a large amount of evidence suggests positive outcomes for firms that appoint female directors. However, one stream of empirical research shows inconclusive and mixed evidence regarding the benefits of having female directors on the corporate board. For instance, Shrader, Blackburn, and Iles (1997) evidence an insignificant negative association between female directorship and firm performance. Further, Farrell and Hersch (2005) report no wealth effect, as the stock market reaction to the announcement of female additions to the board shows an insignificant association. They conclude that the increase in female boardroom appointments has responded to calls for greater diversity rather than as a response to the "business case" for female directors. In contrast, corporate governance research suggests that female participants promote more effective board communications to investors (Joy, 2008). These mixed arguments warrant an empirical investigation of whether the existence of female directors is beneficial to the expansion of investment opportunities induced by reduced equity capital.

We postulate that female directors affect the cost of equity capital through a "direct" and an "indirect" channel. A direct effect may stem from a female director's broader advisory and monitoring role. For example, Adams and Ferreira (2009) report that gender-diverse boards have higher attendance at board meetings. Corporate governance research, in general, suggests that gender-diverse boards result in improved transparency and higher information quality. Srinidhi, Sun, Zhang, and Chen (2020) posit that female directors act as norm change catalysts to achieve significant governance changes. Following the Norm framework theory proposed by Ellickson (2001), Srinidhi *et al*. (2020) postulate that female directors possess the three skill sets relevant to norm changes: *leadership skills*, *social intelligence*, and *technical intelligence*, all of which lead to improved corporate governance. Strong corporate governance enhances transparency, accountability, and investor protection rights. Further, effective corporate governance ensures protection against capital expropriation, which reduces the risk perceived by investors of a lower required return, i.e. cost of capital. This suggests a *negative* relationship between female directors and the cost of equity capital.

An indirect effect may stem from female directors ensuring a strong monitoring mechanism and ethical decisions within group thinking. Also, female directors promote more effective board communications to investors and increase the diffusion and the quality of value-relevant firm-specific information (Srinidhi *et al.*, 2011). Jensen and Meckling (1976) suggest that information asymmetries may give rise to conflicts of interest between managers and shareholders, which can be mitigated through strong corporate governance. Carter, Simkins, and Simpson (2003) suggest that women are likely to act as independent directors and positively affect corporate governance. Archival research consistently finds that female directors on corporate boards impact firm risk, improve financial reporting quality and innovation while enhancing investment opportunities, and increase firm value, which leads to investor confidence and lower cost of equity capital. Both the direct and indirect effects explained above hold simultaneously. Our primary purpose in this paper is to empirically examine whether female directors affect the cost of equity capital.

Several studies have explored the association between female directorship and the cost of equity capital across various contexts, including France [1] (Nguyen, 2020), the USA (Sarang, Rind, Al-Faryan, & Saeed, 2022; Saleh, Afifa, Al-Hawatmah, & Albakkar, 2022;

Aljughaiman, Albarrak, Cao, & Trinh, 2022), and internationally (Jun, Qiyuan, Xiaofang, & Zhang, 2023). Consistent findings from existing research suggest that a gender-diverse board is associated with a lower cost of equity capital. However, caution is warranted when interpreting these findings for several reasons: *firstly*, endogeneity concerns have not been adequately addressed in some studies (Sarang *et al.*, 2022; Saleh *et al.*, 2022; Aljughaiman *et al.*, 2022); *secondly*, impact of mandatory gender quotas has not been incorporated into the research methodology (Nguyen, 2020); *thirdly*, some studies have utilized relatively small sample sizes, such as the 80 non-financial firms examined by Nguyen (2020), and *finally*, prior research has not contextualized empirical results within cross-sectional settings. To address these limitations, our study surpasses previous research by employing an extensive sample selection comprising 8,224 firm-year observations, including 1,344 non-financial firms, spanning the period from 2004 to 2018. Methodologically, we employ rigorous techniques to control for endogeneity, including the 2SLS instrumental variable approach and change analysis. Additionally, we conduct mediation analysis and assess the validity of critical mass arguments. Moreover, our study enhances the analysis by disaggregating the attributes of female directorship. We delve into the consistency of the association between female directorship and the cost of equity capital across diverse contexts, including scenarios where the female director is independent, in the presence of a female CEO, or when a firm appoints a female director for the first time. We also consider the impact of the firm's life cycle and examine whether the relationship between female directorship and the cost of equity capital remains resilient during global financial crisis periods. In summary, our research contributes to the existing literature by offering a comprehensive analysis that addresses the methodological limitations of prior studies and provides insights into the nuanced relationship between female directorship and the cost of equity capital across diverse organizational and economic contexts.

Using a sample of 8,224 firm-year observations from US companies from 2004 to 2018, we evidence a significant negative association between the cost of equity capital and female directors' presence on the corporate board. Regarding economic significance, the female directors' reported coefficient implies that a one standard deviation increase in female representation on the board reduces the cost of equity by 12 to 21 basis points. Our results remain robust when employing alternative measures for both female directorship and the cost of equity capital. Further, we conduct a mediation test to decompose female directorship's total effect on the cost of equity capital into "direct" and "indirect" effects. Our mediation test reveals the association between female directorship and the cost of equity capital channels by improving firm information asymmetry. We also find that female independent directors (i.e. not executive directors) significantly reduce the cost of equity capital. To gain further insights into the relationship between female directorship and the cost of equity, we observe a reduction in the cost of equity in the first year following the appointment of female directors to the board. A critical mass of female directors is required to realize the real impacts of board gender diversity. Additionally, our findings indicate that the cost of equity capital for firms tends to be lower when a female CEO is at the helm. We provide evidence that this negative association is particularly pronounced during the growth and mature stages of the firm life cycle. Furthermore, we observe weaker support for the association between female directorship and a lower cost of equity capital, suggesting the resilience of this relationship even amidst the challenges posed by the global financial crisis. Finally, we also address the potential sources of endogeneity that may arise from sample selection, omitted variable bias, or reverse causality and apply the Heckman two-stage estimation using an instrumental variable approach and a change analysis.

Our findings have important implications for both investors and regulators. From an investor perspective, we show that firms with gender-diverse boards, particularly those with a critical mass of female independent directors, tend to offer lower equity capital costs. This suggests that investors may benefit from more attractive risk-adjusted returns in firms with gender-diverse boards, as the reduced cost of equity could enhance firm performance and

stability. Consequently, investors should consider board diversity as a potential indicator of lower financial risk and more efficient corporate governance when making investment decisions. From a regulatory perspective, our results support the economic value of gender diversity mandates and quotas on boards. By demonstrating that gender-diverse boards can lower the cost of equity, our findings provide compelling evidence that such regulatory interventions can have positive capital market implications. Policymakers can use this evidence to advocate for diversity policies that promote equality, increase economic efficiency and lower capital costs. This reinforces the broader economic value of regulatory efforts aimed at increasing board diversity. Overall, our findings suggest that gender-diverse boards enhance governance quality by improving oversight and decision-making, leading to better organizational performance. Firms that prioritize diversity can strengthen their governance practices, which may also improve stakeholder trust and transparency. Additionally, promoting board diversity contributes to social equity and inclusion, aligns with broader societal values and improves a firm reputation among consumers, employees, and other stakeholders. This combination of governance and societal benefits strengthens the business case for gender diversity on boards.

The remainder of the paper is organized as follows. We review the relevant literature and develop testable hypotheses in Section 2. Section 3 describes the sample, the sources of the data and how the variables are measured. Section 4 reports the results of both the preliminary and sensitivity tests. Finally, we draw our conclusions in Section 5.

2. Literature review and hypothesis

2.1 Board gender diversity

The extant corporate governance literature has widely discussed the implications of gender-based behavioural differences in firms' financial and strategic decisions. Psychology and economics research consistently finds that women tend to be more risk-averse than men (Byrnes, Miller, & Schafer, 1999). Whether this difference extends to female corporate directors has been a subject of recent attention in economics and finance (Lara, Osma, Mora, & Scapin, 2017). Empirical studies suggest that women on boards exhibit distinct behaviours compared with men in strategic decision-making. For instance, Wilson and Altanlar (2011) found a negative relationship between the proportion of female directors and firms' insolvency risk. Similarly, Levi, Li, and Zhang (2014) show that male-dominated boards are more inclined to engage in risky projects, such as mergers and acquisitions, often paying higher acquisition premiums. In contrast, Usman, Farooq, Zhang, Makki, and Khan (2019) demonstrated that firms with at least one female board member are charged lower interest rates, attributing this to the role of female directors in reducing information asymmetry and lowering the cost of debt. Pandey, Biswas, Ali, and Mansi (2020) also found a negative relationship between female board representation and the cost of debt. Furthermore, Palvia, Vähämaa, and Vähämaa (2015) revealed that banks with female CEOs maintain more conservative capital levels and are less likely to fail during the financial crisis, indicating a cautious approach to risk management.

Beyond risk-aversion, women on boards also play a crucial role in moderating firm risk (Chen, Gramlich, & Houser, 2019). Sila, Gonzalez, and Hagendorff (2016) and Nadeem, Suleman, and Ahmed (2019) challenge the stereotype of female directors as risk-averse, suggesting instead that they act as better risk moderators. Their findings show that women on boards help reduce firm risk and enhance profitability through well-reasoned decision-making. This challenge the notion that gender diversity negatively impacts financial performance. In contrast, Galbreath (2018) finds a positive relationship between board gender diversity (BGD) and financial performance, moderated by corporate social responsibility (CSR) practices. Similarly, Post and Byron (2015), in their meta-analysis, argue that BGD is positively associated with financial performance, especially in countries with strong shareholder protections. Miller and del Carmen Triana (2009) support this, suggesting that female directors can optimize a firm's ability to profit from its assets and investments. Building

on the risk and return implications of BGD, several studies (e.g. Adams & Ferreira, 2009; Gul, Srinidhi, & Ng, 2011) support the view that women are perceived as stricter monitors, skilled at improving information sharing, enhancing collective intelligence, and demonstrating ethical behaviour.

Women's leadership style, characterized by a more participative and communal approach (Eagly, Johannesen-Schmidt, & Van Engen, 2003), contrasts with the more autocratic style often associated with male leaders (Eagly & Johannesen-Schmidt, 2001). This aligns with Bart and McQueen (2013), who argue that female directors, through cooperative decision-making, tend to make fairer decisions in situations involving competing interests. Most importantly, female directors significantly improve a firm's communication, reduce agency costs, and enhance access to critical resources (Nadeem, 2020). Their networking and socialization skills help firms navigate external uncertainties (Bear, Rahman, & Post, 2010).

Research also highlights the competencies and resourcefulness that female directors bring at various levels. For instance, firms with gender-diverse boards are more likely to reflect firm-specific information in their stock prices, as female directors tend to improve public disclosures (Gul *et al.*, 2011). Gender-diverse boards also increase stock liquidity, positively affecting market efficiency (Ahmed & Ali, 2017). Bernardi, Bosco, and Columb (2009) found that companies with more female directors are more likely to appear on the world's most ethical companies list, further indicating that gender diversity enhances firm outcomes across levels. Despite a wealth of literature on the risk and return implications of BGD, there is limited research on its impact on a firm's cost of equity capital. Female directors are believed to reduce firm risk by minimizing agency costs, enhancing monitoring, curbing information asymmetry, and improving both internal and external communication (Abbasi, Alam, & Bhuiyan, 2020). As a result, firms with gender-diverse boards may be perceived as less risky by shareholders, leading to lower equity capital costs. Given the importance of equity costs in financing decisions, we are motivated to explore the role of BGD in influencing a firm's cost of equity.

2.2 Cost of equity capital

A firm's cost of equity capital reflects the opportunity cost to shareholders—what they could earn elsewhere for the same level of risk (Dempsey, 1996). From the shareholders' perspective, the cost of equity serves as a benchmark for evaluating investment opportunities (Beneda, 2003), with investors favouring opportunities offering higher returns. For firms, the cost of equity represents the return paid to equity investors for the risk they assume by investing in the firm. The cost of equity is crucial for firms for several reasons: it influences investors' willingness to provide capital, affects the ability to expand the investor base, serves as a benchmark for evaluating financing costs, and impacts the financial market's appetite for the associated risks.

The literature has widely explored the cost of equity capital concerning various organizational factors, especially corporate governance. Chen, Chen, and Wei (2009) found that firm-level governance significantly impacts the cost of equity in emerging markets, a conclusion supported by Gupta, Krishnamurti, and Tourani-Rad (2018) in developed countries. These studies suggest that stronger governance mechanisms, such as improved transparency and public disclosure, reduce information asymmetry, enhancing shareholders' confidence and firm value (Botosan, 1997; Lambert, Leuz, & Verrecchia, 2007; Fu, Kraft, & Zhang, 2012). Further, effective corporate social responsibility strategies can lower the cost of equity, especially in markets with robust investor protection laws (Breuer, Müller, Rosenbach, & Salzmann, 2018). Mazzotta and Veltri (2014) show that corporate governance attributes like board independence and audit committees significantly reduce the cost of equity in Italian-listed firms, with firms exhibiting strong governance enjoying a 5% decrease in equity costs compared to those with weak governance. While a few prior studies have explored the relationship between board gender diversity and the cost of equity in various contexts (e.g.

France, USA, and internationally) discussed in the introduction, important gaps remain. These studies often overlook endogeneity concerns, rely on small samples, or fail to account for institutional factors like mandatory gender quotas. For instance, Nguyen (2020) examines a quota-based setting but lacks a robust identification strategy.

2.3 Board gender diversity and the cost of equity capital

The existing literature has extensively explored the impact of gender-diverse boards on various firm outcomes. A substantial body of research supports the notion that gender-diverse boards are better at safeguarding stakeholder interests (Chen *et al.*, 2019; Nadeem *et al.*, 2019; Lambert *et al.*, 2007; Fu *et al.*, 2012). However, these positive outcomes are contingent on reaching a critical mass of female directors, as highlighted by critical mass theory. For instance, Nadeem (2020) finds a strong relationship between board governance diversity and voluntary disclosures for firms with at least two women on their boards. Similarly, Ben-Amar, Chang, and McIlkenny (2017) and Pandey *et al.* (2020) find that a higher proportion of female directors is positively associated with voluntary climate change disclosures and a lower cost of debt. Wilson and Altanlar (2011) also demonstrate that a higher proportion of female directors reduces a firm's insolvency risk.

Lambert *et al.* (2007) provide a theoretical framework for understanding the determinants of a firm's cost of equity capital, emphasizing the role of accounting information quality. Their model suggests that improved information quality reduces perceived cash flow variability, thereby lowering the cost of equity. Empirical research has extended this framework to incorporate boardroom diversity, noting that female directors contribute to better governance practices and enhanced financial transparency. By fostering a culture of accountability and oversight, female directors improve the accuracy of cash flow assessments and reduce the cost of equity capital. Thus, in line with the framework of Lambert *et al.* (2007), female directors indirectly influence the cost of equity by improving the quality of accounting information, ultimately shaping investor perceptions and reducing equity costs.

The literature highlights the strengths of gender-diverse boards from a stakeholder perspective, emphasizing the unique contributions that female directors bring to the table. For instance, Terjesen, Sealy, and Singh (2009) note that women often reach board positions after acquiring advanced degrees and experience in non-business fields like academia or community service, which allows them to view stakeholders' interests differently (Dalton & Dalton, 2010). Additionally, women's leadership style, characterized as more participative, democratic, and communal (Eagly & Johannesen-Schmidt, 2001), contrasts with the more autocratic styles often associated with men. Women also tend to display more communal traits, such as empathy, helpfulness, and concern for others' welfare (Eagly *et al.*, 2003). Based on these findings, we argue that there may be a connection between board gender diversity and the cost of equity capital for the following reasons. *First*, female directors bring diverse perspectives, fostering more critical analyses and a broader consideration of stakeholder interests (Daily & Dalton, 2003). In contrast, homogenous boards may limit monitoring and decision-making effectiveness (Chen *et al.*, 2019). Women are also more likely to be independent-minded, reducing the risk of management influence (Simpson, Carter, & D'Souza, 2010). As a result, gender-diverse boards are associated with higher earnings quality, more accurate analyst forecasts, lower agency costs (Gul, Hutchinson, & Lai, 2013; Jurkus, Park, & Woodard, 2011), and fewer financial statement restatements (Abbott, Parker, & Presley, 2012). *Second*, female directors tend to exhibit higher ethical standards, with a greater focus on environmental and social responsibilities and a reduced likelihood of unethical behaviour (Peterson, Albaum, Merunka, Munuera, & Smith, 2010; Roxas & Stoneback, 2004; Lamsa, Vehkapera, Puttonen, & Pesonen, 2008). They are also more likely to perceive certain business practices as unethical (Franke, Crown, & Spake, 1997). *Third*, BGD has been shown to enhance firm value by promoting corporate social responsibility (Ben-Amar *et al.*, 2017;

Harjoto, Laksmana, & Lee, 2015) and improving environmental performance (Liao, Luo, & Tang, 2015; Liu, 2018).

Taken together, these above-mentioned traits suggest that firms with gender-diverse boards are perceived as less risky due to their improved monitoring, ethical standards, and alignment with stakeholder interests. Consequently, such firms are likely to face lower risk premiums from shareholders, which could reduce their cost of equity capital. This leads to the following hypothesis:

H1. Board gender diversity is negatively associated with the cost of equity.

3. Research methodology

3.1 Sample selection

We use multiple sources to collect relevant data on gender diversity and variables related to corporate governance, auditing, cost of capital, and firm fundamentals. The corporate governance and gender diversity data are extracted from Board Analyst (also known as The Corporate Library or MSCI GMI Rating), covering mainly S&P 500, S&P MidCap 400, and S&P SmallCap 600 between 2004 and 2018. For each firm, the Board Analyst lists the information on board independence, management ownership, CEO duality, and board meeting frequencies. Audit and auditor-related data are from "Audit Analytic" which includes the auditor's identity and audit opinion. Financial data are from the *COMPUSTAT* annual industrial file. We merged *COMPUSTAT*, Board Analyst, and Audit Analytics from 2004 to 2018, which provides us with a total of 43,049 firm-year observations. We further require non-missing data for firm-level variables in our main regression models, reducing the sample to 22,508 firm-year observations. We exclude a total of 3,112 firm-year observations that belong to the financial institutes (SIC code 6000-6999). Finally, we match the proxy for the implied cost of capital. To calculate the implied cost of capital (COC), we collect analyst earnings forecasts along with stock prices to calculate the implied COC from the Institutional Brokers' Estimate System (I/B/E/S). The calculation requires (1) at least one analyst forecast of one-year-ahead and two-year-ahead earnings per share (EPS), (2) at least one forecast of the long-term growth rate, and (3) one of our calculations of implied COC measures (*MPEG*) requires the two-year-ahead forecasted EPS to be higher than the one-year-ahead forecasted EPS, resulting in another 11,172 missing firm-year observations. Our final sample consists of 8,224 firm-year observations from 2004 through 2018. Our sample comprises a total of 1,344 distinct firms. Table 1 reports the sample selection process. Following the existing literature, all the continuous variables are winsorized top and bottom at a 1% level to rule out potential outlier biases.

Table 1. Sample selection

Details	# of observations
Matching sample with Audit Analytics, Board Analyst and COMPUSTAT Capital IQ	43,049
Less: Missing Observations among Audit Analytics, Board Analyst and COMPUSTAT Capital IQ	(20,541)
Remaining firm-year observation	22,508
Less: Firm with SIC code 6000-6999 (Financial Institutes)	(3,112)
After excluding missing and financial institutions	19,396
Less: Missing sample from IBES, which attributes COC sample	(11,172)
Final Sample (total unique firms = 1,344)	*8,224*

Source(s): Authors' work

3.2 Research model and variable measures

We estimate the following regression model to examine whether a female director's existence is associated with a lower cost of equity capital.

$$\begin{aligned} COC_t = {} & \partial_0 + \partial_1 LNFEM\ or\ FEMDUM\ or\ FEMPER_t + \partial_2 LNBOD_t + \partial_3 INDPER_t \\ & + \partial_4 CEODUAL_t + \partial_5 LNMEET_t + \partial_6 BIG4_t + \partial_7 AUDOPIN_t + \partial_8 LNSIZE_t \\ & + \partial_9 LEVER_t + \partial_{10} LOSS_t + \partial_{11} ROA_t + \partial_{12} BETA_t + \partial_{13} RESTATE_t + \partial_{14} SALEGR_t \\ & + \partial_{i,j} INDUSTRY\_FE_{i,j} + \partial_{i,j} YEAR\_FE_{i,j} + \varepsilon_t \end{aligned} \tag{1}$$

There remains a lack of consensus regarding the most effective model for determining the cost of equity capital, as noted by Botosan and Plumlee (2005) and Easton and Monahan (2005). As a result, empirical researchers increasingly rely on the implied cost of equity capital. In line with previous studies, we use implied approaches to estimate the cost of equity. We use two different measures for the cost of equity capital: price-earnings-growth (*PEG*), known as Easton's (2004) *PEG* ratio, and modified price-earnings-growth (*MPEG*). Both measures are calculated based on the analyst forecast information. The estimation formulae for PEG and MPEG are as follows:

$$PEG = \sqrt{(eps_2 - eps_1)/P_0} \tag{2}$$

$$MPEG = \sqrt{(eps_2 + MPEG * dps_1 - eps_1)/P_0} \tag{3}$$

Where, P_0 = the price per share at the current date; dps_1 = the expected dividend per share at the next period of the current date; eps_1 = the expected accounting earnings at the next period of the current date; eps_2 = the expected accounting earnings at two-periods-ahead of the current date. We evaluate female directorship using three distinct measures. Firstly, *LNFEM* represents a continuous variable, calculated as the natural logarithm of female directorship. Secondly, *FEMDUM* is a dichotomous variable assigned a value of 1 if the firm includes at least one female director on its board and 0 otherwise. Lastly, *FEMPER* is a continuous variable determined by scaling the total number of female directors by the board size.

We include several internal and external corporate governance proxies in our regression model that are consistent with previous studies. Following Ashbaugh, Collins, and LaFond (2004), we include board size (*LNBOD*), board independence (*INDPER*), CEO duality (*CEODUAL*), and board meeting frequencies (*LNMEET*). Drawing on previous research (Karjalainen, 2011; Fernando, Abdel-Meguid, & Elder, 2010), we also control auditing quality, such as auditor quality (*BIG4*) and audit opinion (*AUDOPIN*). The capital asset pricing model suggests a positive association between business risk and the cost of equity capital. Thus, we control several factors related to firm risk, including firm risk (*BETA*) and leverage (*LEVER*). We also control firm profitability, such as firm performance (*ROA*) and distress risk (*LOSS*). To capture firm stability and visibility, we control firm size (*LNSIZE*), as previous studies find that the cost of equity capital is lower for large firms (Botosan & Plumlee, 2005). To account for unobserved heterogeneity, the regression model includes industry-fixed effects to control for time-invariant industry-specific characteristics and year-fixed effects to capture common shocks across firms in a given year, such as macroeconomic or regulatory changes. In this Equation (1), i denotes the firm, where $i = 1,2,\ldots,N$; t represents the year or period, where $t = 1,2,\ldots,T$; and j indicates the industry classification, where each firm i belongs to one industry $j = 1,2,\ldots,J$.

4. Results

4.1 Descriptive statistics

Table 2, Panel A, presents descriptive statistics for the variables used in the regression model. Our sample firms have a mean cost of equity capital (*PEG* and *MPEG*) of 0.09 and 0.11,

Table 2. Summary statistics

Panel A – descriptive statistics Variables	Mean	SD	Min	P25	Median	P75	Max
Dependent variables							
PEG	0.09	0.05	0.01	0.06	0.09	0.11	0.35
MPEG	0.11	0.05	0	0.08	0.10	0.13	0.75
Independent variables							
LNFEM	0.89	0.49	0	0	0.69	1.10	2.20
FEMDUM	0.86	0.34	0	1	1	1	1
FEMPER	0.15	0.11	0	0.10	0.14	0.20	0.67
Control variables							
LNBOD	2.38	0.30	1.39	2.20	2.40	2.57	3
INDPER	0.74	0.17	0.09	0.67	0.75	0.86	1
CEODUAL	0.58	0.49	0	0	1	1	1
LNMEET	2.11	0.31	2	1.95	2.20	2.20	3.26
BIG4	0.91	0.29	0	1	1	1	1
AUDOPIN	0.32	0.46	0	0	0	1	1
RESTATE	0.05	0.22	0	0	0	0	1
LNSIZE	7.82	1.63	0	6.65	7.70	8.89	13.59
LEVER	0.19	0.17	0	0.04	0.17	0.28	0.85
LOSS	0.06	0.24	0	0	0	0	1
ROA	0.08	0.17	−0.97	0.04	0.09	0.14	0.83
SALEGR	0.08	0.19	−0.85	−0.03	0.07	0.15	2.22
BETA	1.13	0.46	0.04	0.81	1.08	1.37	3.49
Other variables							
KCT	0.09	0.03	0	0.07	0.09	0.10	0.61
KGLS	0.09	0.03	0	0.08	0.09	0.11	0.43
FEMCEO	0.04	0.20	0	0	0	0	1
|DACC|	0.15	0.10	0	0.08	0.13	0.19	0.85
BIDASK	0.05	0.06	0	0.01	0.02	0.05	0.92

(*continued*)

Table 2. Continued

Panel B – year-wise female director and sample distribution

Year	FEMDUM 0	1	FEMPER Average	Total
2004	55	322	0.131	377
2005	61	328	0.132	389
2006	86	409	0.130	495
2007	99	432	0.129	531
2008	107	435	0.133	542
2009	122	451	0.129	573
2010	105	431	0.139	536
2011	104	408	0.134	512
2012	65	488	0.150	553
2013	88	542	0.151	630
2014	70	580	0.162	650
2015	57	561	0.172	618
2016	57	581	0.165	638
2017	38	601	0.185	639
2018	20	521	0.196	541
Total	*1,134*	*7,090*		*8,224*

Panel C – mean-difference test

Variables	(1) FEMDUM = 1	(2) FEMDUM = 0	(3) Mean diff	(4) *t*-statistic
	N = 7,090	N = 1,134		
PEG	0.089	0.098	−0.009***	−5.66
MPEG	0.110	0.120	−0.010***	−6.74
LNBOD	2.471	2.260	0.211***	24.19
INDPER	0.762	0.722	0.040***	7.60
CEODUAL	0.575	0.570	0.005	0.30

(*continued*)

Table 2. Continued

Panel C – mean-difference test

Variables	(1) FEMDUM = 1	(2) FEMDUM = 0	(3) Mean diff	(4) *t*-statistic
LNMEET	2.122	2.101	0.021**	2.15
BIG4	0.949	0.877	0.072***	9.31
AUDOPIN	0.305	0.351	−0.046***	−3.14
RESTATE	0.049	0.045	0.004	1.02
LNSIZE	8.226	7.229	0.998***	20.42
LEVER	0.204	0.171	0.033***	5.86
LOSS	0.044	0.069	−0.025***	−3.65
ROA	0.107	0.096	0.012***	2.99
SALEGR	0.072	0.082	−0.010**	−2.01
BETA	1.101	1.156	−0.056***	−3.96
KCT	0.088	0.093	−0.005***	−4.47
KGLS	0.093	0.098	−0.005***	−5.05
|DACC|	0.145	0.149	0.004	0.834
BIDASK	0.038	0.048	0.010***	−5.217

Note(s): ***, **, * Indicate statistical significance at the 1, 5 and 10% levels, respectively, based on a two-tailed test

Panel D – correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) PEG	1.00																	
(2) MPEG	0.40*	1.00																
(3) LNFEM	−0.10*	−0.16*	1.00															
(4) FEMDUM	−0.08*	−0.11*	0.69*	1.00														
(5) FEMPER	−0.08*	−0.12*	0.72*	0.73*	1.00													
(6) LNBOD	−0.08*	−0.15*	0.66*	0.48*	0.39*	1.00												
(7) INDPER	−0.02†	−0.03	0.24*	0.18*	0.19*	0.18*	1.00											
(8) CEODUAL	0.02	−0.05*	−0.02†	−0.01	−0.01	−0.06*	0.01	1.00										

(*continued*)

Table 2. Continued

Panel D – correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(9) LNMEET	0.09*	0.01	0.09*	0.06*	0.07*	0.10*	0.09*	−0.09*	1.00									
(10) BIG4	−0.05*	−0.06*	0.23*	0.23*	0.18*	0.23*	0.09*	−0.01	0.02†	1.00								
(11) AUDOPIN	0.08*	0.01	−0.07*	−0.04*	−0.06*	−0.06*	0.00	0.04*	0.03*	0.06*	1.00							
(12) RESTATE	0.02†	0.04*	−0.01	−0.01*	−0.01	0.00	−0.05*	−0.02†	0.01	−0.01	0.01	1.00						
(13) LNSIZE	−0.08*	−0.13*	0.50*	0.40*	0.38*	0.53*	0.18*	0.06*	0.11*	0.34*	0.01	−0.01	1.00					
(14) LEVER	0.09*	0.06*	0.20*	0.15*	0.14*	0.24*	0.09*	−0.01	0.10*	0.10*	0.02	0.03†	0.27*	1.00				
(15) LOSS	0.25*	0.19*	−0.11*	−0.10*	−0.09*	−0.10*	−0.02†	−0.05*	0.06*	−0.11*	0.02	0.01	−0.19*	−0.05*	1.00			
(16) ROA	−0.25*	−0.19*	0.04*	0.02†	0.04*	0.02†	−0.01	0.03*	−0.09*	0.06*	−0.04*	−0.01	0.09*	−0.12*	−0.38*	1.00		
(17) SALEGR	−0.08*	−0.01†	−0.07*	−0.06*	−0.07*	−0.03*	−0.04*	−0.05*	0.01	−0.03*	0.01	0.00	−0.01	−0.03*	−0.19*	0.22*	1.00	
(18) BETA	0.21*	0.21*	−0.11*	−0.09*	−0.11*	−0.06*	−0.02	−0.05*	0.05*	−0.03*	0.03*	−0.04*	−0.07*	−0.03*	0.15*	−0.15*	−0.01	1.00

Note(s): † and * shows statistical significance at the 0.05 and 0.01 levels

Source(s): Computed by authors

consistent with Hasan and Marwick (2022). A total of 86% of sample firms have at least one female director on the board (*FEMDUM*). In an alternative measure, 15% of the total board members are female directors (*FEMPER*), consistent with Atif, Alam, and Hossain (2020). On average, board independence (*INDPER*) is 0.74, indicating that most board directors are independent in the sample firms. A total of 58% of the sample firms have CEO duality (*CEODUAL*). The mean (standard deviation) of leverage (*LEVER*) is 0.19 (0.17), indicating that the capital structure of sample firms is mostly equity-based. Further, the average return on assets (*ROA*) of the sample firms was 8%, and 6% of the sample firms made a negative profit. A total of 32% of the sample firms experienced either a going concern or a modified audit opinion. The mean value of firm size (*LNSIZE*) is 7.82. Table 2, Panel B, reports the year-wise distribution of female directors, showing the proportion of female director (*FEMPER*) representation on corporate boards increases over the sampling period of 2004 (13.1%) to 2018 (19.6%) firm-years.

4.2 Mean difference test

Table 2, Panel C, reports the mean-difference test of the independent variables for firm-year observations with female directors (*FEMDUM = 1*) and without (*FEMDUM = 0*) the existence of a female director. Our findings suggest that the cost of equity capital (both measures) is lower for firm-year observations with female directors than non-female directors representing counterparts. For example, firms with no female directors (*FEMDUM = 0*) on the corporate boards have a mean value for *PEG*(*MPEG*) of 0.098 (0.120), which is significantly lower for female director-represented firms with a mean value for *PEG*(*MPEG*) of 0.089 (0.110). The differences are statistically significant at $p < 0.01$. Consistent with the existing literature on gender diversity in accounting and finance, our results show that firms with a female director on the board are large (*LNSIZE*) and highly leveraged (*LEVER*). Also, female-represented firms generally have a large board size (LN*BOD*), a board with a majority of independent directors (*INDPER*), and a board primarily audited by a BIG4 auditor (*BIG4*). Our mean-difference test also reveals that female director-represented firms have lower market risk (*BETA*). Our reported findings are statistically significant at the 1% level.

4.3 Correlation analysis

Table 2, Panel D presents the correlation matrix. The primary variables of interest, *LNFEM*, *FEMDUM*, *FEMPER*, and *COC* proxies (both the measures *PEG* and *MPEG*), are negative and statistically significant at the 1% level, indicating that the cost of equity reduces when female directors are present in the firms. Firms with higher leverage (*LEVER*), non-profit generating (*LOSS*), and received modified or going concern opinions (*AUDOPIN*) show a higher cost of equity. The correlation between firms with higher profitability (*ROA*) and the cost of equity shows a negative relationship, indicating that firm profitability reduces the cost of capital. Also, firm systematic risk (*BETA*) and the cost of equity show a positive relationship, suggesting that a firm with systematic risk has an increase in the cost of equity capital. Firms with higher sales growth (*SALEGR*) show a negative correlation with the cost of equity. All the above variables are statistically significant at the 5% level or better. Within the independent variables, a correlation between board size (*LNBOD*) and firm size (*LNSIZE*) is 0.53, suggesting that autocorrelation is not a concern within our regression analysis, as the correlation falls below the threshold of 0.80.

4.4 Regression analysis

4.4.1 Female directorship and cost of equity. We now turn our attention to ordinary least square regression analysis. Table 3 reports the results for H1. Our dependent variable is *COC*, which has two different proxies – *PEG* and *MPEG*. Also, we consider three proxies for female directorships – *LNFEM*, *FEMDUM* and *FEMPER*. We include one proxy at a time for the

Table 3. Regression analysis – impact of female directors on the cost of equity capital

Variables	(1) PEG	(2) PEG	(3) PEG	(4) MPEG	(5) MPEG	(6) MPEG	(7) VIF
Intercept	0.076***	0.080***	0.081***	0.140***	0.151***	0.148***	
	(12.186)	(14.006)	(14.355)	(24.387)	(28.599)	(28.348)	
LNFEM	−0.004***			−0.006***			1.96
	(−2.831)			(−4.783)			
FEMDUM		−0.005***			−0.003**		1.39
		(−2.867)			(−2.373)		
FEMPER			−0.011**			−0.019***	1.28
			(−2.098)			(−3.872)	
LNBOD	−0.007***	−0.008***	−0.009***	−0.015***	−0.02***	−0.019***	1.52
	(−2.978)	(−4.031)	(−4.651)	(−7.111)	(−10.208)	(−10.166)	
INDPER	−0.001	−0.002	−0.002	0.003	0.001	0.002	1.07
	(−0.44)	(−0.575)	(−0.595)	(0.891)	(0.364)	(0.669)	
CEODUAL	0.002**	0.002**	0.002**	−0.003***	−0.003***	−0.003***	1.03
	(2.003)	(2.026)	(2.00)	(−3.449)	(−3.406)	(−3.457)	
LNMEET	0.008***	0.008***	0.008***	−0.001	−0.001	−0.001	1.05
	(5.209)	(5.18)	(5.206)	(−0.757)	(−0.822)	(−0.752)	
BIG4	−0.001	−0.001	−0.001	0.001	0.001	0.001	1.15
	(−0.514)	(−0.372)	(−0.535)	(0.762)	(0.676)	(0.74)	
AUDOPIN	0.006***	0.006***	0.006***	−0.003***	−0.003**	−0.003***	1.02
	(5.91)	(6.006)	(5.956)	(−2.808)	(−2.574)	(−2.746)	
RESTATE	0.005**	0.005**	0.005**	0.009***	0.009***	0.009***	1.01
	(2.283)	(2.296)	(2.291)	(4.247)	(4.277)	(4.258)	
LNSIZE	−0.001**	−0.001**	−0.001**	−0.001***	−0.001***	−0.001***	1.67
	(−2.195)	(−2.322)	(−2.368)	(−2.803)	(−3.563)	(−3.03)	
LEVER	0.032***	0.032***	0.032***	0.027***	0.027***	0.027***	1.13
	(10.742)	(10.711)	(10.726)	(9.581)	(9.523)	(9.555)	
LOSS	0.030***	0.030***	0.030***	0.019***	0.019***	0.019***	1.29
	(12.65)	(12.621)	(12.658)	(8.703)	(8.733)	(8.712)	
ROA	−0.062***	−0.062***	−0.062***	−0.040***	−0.040***	−0.040***	1.31
	(−15.558)	(−15.612)	(−15.578)	(−10.892)	(−10.961)	(−10.922)	
SALEGR	−0.006**	−0.006**	−0.006**	0.006**	0.007***	0.006**	1.08
	(−2.248)	(−2.213)	(−2.203)	(2.412)	(2.644)	(2.465)	
BETA	0.018***	0.018***	0.018***	0.017***	0.018***	0.017***	1.05
	(16.038)	(16.122)	(16.096)	(17.145)	(17.469)	(17.213)	
Industry	Yes	Yes	Yes	Yes	Yes	Yes	
Year	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	8,224	8,224	8,224	8,224	8,224	8,224	
Adj R^2	14.22	14.21	14.23	11.36	11.14	11.23	

Note(s): This table reports regression results of the relation between the cost of equity capital and female directorship. The dependent variables are PEG and MPEG. ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. VIF stands for Variance Inflation Factor. See Appendix for variable definitions

Source(s): Computed by authors

independent variable in testing Equation (1) and report the results in Table 3 Columns (1) – (6). We find that female directorship (*LNFEM*, *FEMDUM* and *FEMPER*) has a negative association with both the proxies of cost of equity capital, indicating that firms with female directors on the board are likely to have a lower cost of equity capital. For instance, the coefficients denoting the association between female directorship variables (*LNFEM*, *FEMDUM*, and *FEMPER*) and *PEG* are −0.004, −0.005, and −0.011 (corresponding t-statistics are −2.831, −2.867, and −2.098, respectively). These findings are consistent with

the argument that a female director's existence leads to better monitoring, which is likely to reduce agency costs, resulting in a lower cost of equity. Thus, H1 is supported. Regarding the economic significance of our findings, the coefficient on *FEMPER* is −0.011 (*t*-statistic −2.098, $p < 0.05$) in column (3), suggesting that a one standard deviation increase in *FEMPER* decreases *PEG* by 12-basis points [(0.011) (coefficient estimate) * 0.11 (standard deviation on *FEMPER*)]. Additionally, the coefficients representing the relationship between female directorship variables (*LNFEM*, *FEMDUM*, and *FEMPER*) and MPEG are −0.006, −0.003, and −0.019, respectively, with corresponding t-statistics of −4.783, −2.373, and −3.872, respectively. In Column (6), the corresponding coefficient in the *MPEG* model is −0.019 (t-statistic −3.872, $p < 0.01$), which translates into a 21-basis point reduction in *MPEG* for a standard deviation increase in *FEMPER* [2]. Our results, showing a negative association between female directorship and the cost of equity capital, build upon existing research on the governance benefits of board diversity. Specifically, our findings echo the work of Adams and Ferreira (2009), who argue that female directors bring different perspectives and enhance monitoring, potentially reducing agency costs and improving governance quality. Our results also extend the literature on the role of women in leadership positions, such as those of Carter, D'Souza, Simkins, and Simpson (2010) and Post and Byron (2015), who infer that gender-diverse boards are linked to better firm performance and lower risk premiums. Our findings are consistent with the stream of corporate governance and finance literature, which suggests that board quality is linked to investors' decisions who use corporate governance as a construct, except for gender diversity (Upadhyay & Sriram, 2011; Zhu, 2014; Goncalves, Rossoni, & Mendes-Da-Silva, 2019; Tran, 2014). Thus, our findings suggest that a firm with female directors on the corporate board is likely to benefit from a lower cost of equity capital. Incorporating these insights, our study contributes to the ongoing debate by providing further empirical evidence that female directors play a crucial role in reducing a firm's cost of equity capital, thus emphasizing the importance of gender diversity as a corporate governance mechanism.

Our results show that higher leveraged (*LEVER*) and non-profit generating firms (*LOSS*) have a higher cost of equity, indicating that higher business risk is related to a higher cost of equity. Firms that engage in financial restatements (*RESTATE*) exhibit a positive association with the cost of equity, indicating that restatements raise concerns about the reliability of financial reporting. This perceived weakness in reporting quality likely increases investor risk perceptions, leading to a higher cost of equity. Further, firm size (*LNSIZE*) and profitability (*ROA*) show a negative association with the cost of equity, suggesting that larger firms and firms with higher profitability have a lower cost of equity. All the control variables mentioned above are statistically significant at the 5% level. We calculate the variable inflation factor (*VIF*), which ranges from 1.01 (*RESTATE*) to 1.96 (*LNFEM*), indicating that the multivariate regression equation is not biased for reasons of multicollinearity. Regarding heteroscedasticity, we perform the Breuch-Pegan test, which fails to null homoscedasticity, suggesting that heteroscedasticity is not a factor in the regression model. The adjusted R^2 of the ordinary least square regression models ranges from 11.14 to 14.23%.

4.4.2 Alternative measures for the cost of equity. In our primary analysis, we employ two distinct measures for assessing the cost of equity capital, both derived from the price–earnings growth metric. In this section, we introduce two additional measures, *KCT* and *KGLS*, as per the methodologies outlined by Claus and Thomas (2001) and Gebhardt, Lee, and Swaminathan (2001). The findings incorporating these alternative measures are presented in Table 4. Notably, the coefficients associated with female directorship (*LNFEM*, *FEMDUM* and *FEMPER*) consistently maintained a negative and statistically significant trend, with coefficients ranging from −0.002 to −0.013. This indicates that the conclusions drawn from our primary analysis endure when considering alternative cost of equity measures.

4.4.3 Independent female directorship and cost of equity. Thus far, we have generalized the impact of female directorship on the cost of equity without isolating the impact of the directorial role, such as executive or independent directorship. Generally, executive directors

Table 4. Regression analysis – alternative measure of the cost of equity capital

Variables	(1) KCT	(2) KCT	(3) KCT	(4) KGLS	(5) KGLS	(6) KGLS
Intercept	0.114***	0.122***	0.120***	0.096***	0.102***	0.101***
	(29.384)	(34.276)	(33.839)	(26.532)	(30.659)	(30.664)
LNFEM	−0.004***			−0.003***		
	(−4.767)			(−4.688)		
FEMDUM		−0.002			−0.002**	
		(−0.346)			(−2.37)	
FEMPER			−0.013***			−0.012***
			(−3.801)			(−3.832)
LNBOD	−0.019***	−0.023***	−0.022***	−0.006***	−0.008***	−0.008***
	(−13.346)	(−17.438)	(−17.304)	(−4.467)	(−6.908)	(−7.094)
INDPER	−0.001	−0.001	−0.001	−0.004**	−0.005***	−0.004**
	(−0.091)	(−0.529)	(−0.139)	(−2.234)	(−2.674)	(−2.456)
CEODUAL	0.002***	0.002***	0.002***	0.001	0.001	0.001
	(3.449)	(3.486)	(3.439)	(0.232)	(0.271)	(0.223)
LNMEET	−0.003***	−0.003***	−0.003***	0.002**	0.002**	0.002**
	(−3.017)	(−3.086)	(−3.013)	(2.248)	(2.186)	(2.252)
BIG4	0.002	0.002	0.002	−0.001	−0.001	−0.001
	(1.625)	(1.441)	(1.60)	(−0.416)	(−0.402)	(−0.435)
AUDOPIN	−0.001	−0.001	−0.001	−0.006***	−0.006***	−0.006***
	(−1.069)	(−0.81)	(−1.005)	(−9.589)	(−9.389)	(−9.529)
RESTATE	0.001	0.001	0.001	0.002	0.002	0.002
	(0.309)	(0.347)	(0.323)	(1.378)	(1.407)	(1.39)
LNSIZE	0.002***	0.002***	0.002***	0.001***	0.001***	0.001***
	(7.473)	(6.616)	(7.252)	(4.541)	(4.007)	(4.337)
LEVER	0.017***	0.017***	0.017***	0.010***	0.010***	0.010***
	(8.821)	(8.766)	(8.795)	(5.472)	(5.419)	(5.448)
LOSS	−0.009***	−0.009***	−0.009***	−0.003*	−0.003*	−0.003*
	(−6.245)	(−6.17)	(−6.229)	(−1.802)	(−1.786)	(−1.79)
ROA	−0.017***	−0.017***	−0.017***	−0.037***	−0.037***	−0.037***
	(−6.932)	(−7.001)	(−6.963)	(−15.779)	(−15.848)	(−15.807)
SALEGR	−0.004**	−0.004**	−0.004**	0.004***	0.005***	0.004***
	(−2.491)	(−2.208)	(−2.432)	(2.736)	(2.913)	(2.785)
BETA	0.011***	0.011***	0.011***	0.008***	0.008***	0.008***
	(15.546)	(15.931)	(15.619)	(12.07)	(12.324)	(12.136)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224	8,224	8,224
Adj R^2	7.74	7.53	7.76	7.14	6.93	7.34

Note(s): This table reports regression results of the relation between the cost of equity capital (using alternative measures) and female directorship. The dependent variables are KCT and KGLS. ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

hold a position on the board of directors and are company employees. They have "executive responsibilities" for running the firm operating activities. In comparison, independent directors are recognized as strong monitors who advise corporate boards on strategic decisions, improving the firm's economic and financial performance (Fama, 1980). Fama and Jensen (1983) propose that a higher proportion of independent directors on the corporate board should result in more efficient and effective board monitoring. Consistent with their arguments, we conjecture that a firm with a higher proportion of female independent directors will reduce its cost of equity. Now, we examine an association between the proportion of female independent directors and the cost of equity capital.

Table 5, columns 1 and 2 shows that both measures for the cost of equity capital (*PEG* and *MPEG*) have a negative association with female independent directors (*%FEMINDDIR*), i.e. (coefficient = −0.002*** and −0.002***; *t*-statistics = −3.478 and −2.944). Both associations are statistically significant at the 1% level. In brief, the findings support the beneficial effects of independent female directors, evidencing a lower cost of equity (Zalata, Ntim, Choudhry, Hassanein, & Elzahar, 2019). Overall, the control variables show consistent evidence compared to previous findings.

4.4.4 Impact of female CEO and cost of equity capital. Empirical research evidences that a firm with a female CEO is more effective in monitoring (Srinidhi *et al.*, 2011). Wang and Fung

Table 5. Independent female directors and cost of equity capital

Variables	(1) PEG	(2) MPEG	(3) PEG	(4) MPEG
Intercept	0.076***	0.147***	0.084***	0.152***
	(12.826)	(26.683)	(15.156)	(29.646)
%FEMINDDIR	−0.002***	−0.002***		
	(−3.478)	(−2.944)		
FEMCEO			−0.003***	−0.011***
			(−3.285)	(−4.096)
LNBOD	−0.007***	−0.018***	−0.01***	−0.02***
	(−3.506)	(−9.277)	(−5.217)	(−11.198)
INDPER	−0.001	0.002	−0.003	0.001
	(−0.42)	(0.585)	(−0.845)	(0.286)
CEODUAL	0.002**	−0.003***	0.002*	−0.003***
	(2.07)	(−3.37)	(1.82)	(−2.777)
LNMEET	0.008***	−0.001	0.008***	−0.001
	(5.186)	(−0.814)	(5.12)	(−0.697)
BIG4	−0.001	0.001	−0.001	0.001
	(−0.532)	(0.641)	(−0.634)	(0.537)
AUDOPIN	0.006***	−0.003***	0.007***	−0.002**
	(5.983)	(−2.621)	(6.054)	(−2.475)
RESTATE	0.005**	0.009***	0.005**	0.009***
	(2.267)	(4.25)	(2.299)	(4.303)
LNSIZE	−0.001*	−0.001***	−0.001***	−0.001***
	(−1.92)	(−3.032)	(−2.725)	(−4.099)
LEVER	0.032***	0.027***	0.032***	0.027***
	(10.722)	(9.533)	(10.662)	(9.668)
LOSS	0.03***	0.019***	0.03***	0.02***
	(12.609)	(8.697)	(12.679)	(8.816)
ROA	−0.062***	−0.04***	−0.062***	−0.040***
	(−15.533)	(−10.899)	(−15.595)	(−10.979)
SALEGR	−0.006**	0.006**	−0.006**	0.007***
	(−2.321)	(2.495)	(−2.097)	(2.792)
BETA	0.017***	0.018***	0.018***	0.018***
	(15.883)	(17.191)	(16.315)	(17.642)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224
Adj R^2	14.26	11.14	14.14	11.23

Note(s): This table reports regression results of the relation between the cost of equity capital with independent female directorship and female CEO. The dependent variables are PEG and MPEG. ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

(2022) revealed that female CEOs are associated with decreased tail risk, and that female CEOs prioritize M&A activities, ultimately contributing positively to firm value. Extend research further evidences that a firm with a female CEO produces higher comparable financial statements (Wang, Zhang, Ho, & Usman, 2023), has lower performance-matched absolute discretionary accruals and lower absolute accrual estimation error (Barua, Davidson, Rama, & Thiruvadi, 2010). Therefore, combining these findings, we conjecture that the presence of female CEOs is associated with improved firm performance, lower risk, and enhanced financial reporting quality. These factors collectively contribute to investor confidence and reduced perceived risk, potentially leading to a lower cost of equity for firms with female leadership.

We construct a separate dummy variable to examine the influence of female CEOs (*FEMCEO*). *FEMCEO* is assigned a value of 1 if a firm has a female CEO and 0 otherwise. The findings are presented in Table 5, columns (3) and (4), where we observe a negative coefficient for *FEMCEO* on firm cost of equity (*PEG* and *MPEG*), suggesting that firms with female CEOs have a lower cost of equity capital. These results are statistically significant at the 1% level. Overall, our findings support the conclusion that firms with female CEOs have a lower cost of equity capital.

4.5 Mediation test results

We found a statistically significant negative association between female directorship and the cost of equity capital. However, we have not identified the mediating channels for this relationship, so we present mediation results for potential channels in this section. We hypothesize that female directorship is associated with the cost of equity capital. The association between female directorship and equity capital cost could also stem from several channels, such as "*information asymmetry*" and "*financial reporting quality*". Conventional wisdom suggests that robust corporate governance reduces information asymmetry and agency conflict. Hermalin and Weisbach (2012) posit that the principal desire for strong corporate governance is to provide higher-quality disclosure. Diamond and Verrecchia (1991) assert that higher disclosure reduces information asymmetry and capital cost as greater transparency enhances stock market liquidity and reduces transaction costs for a firm's stock. Also, firms that disclose higher quality information attract more analysts due to lower information processing costs, leading to increased stock liquidity (Healy, Hutton, & Palepu, 1999). Disclosure can therefore reassure investors, resulting in benefits such as reduced cost of equity capital (Botosan, 1997). Extent corporate governance research posits that gender diversity on boards enhances corporate governance quality by increasing managers' monitoring and improving communication and discussions (Gul *et al.*, 2011). Female directors are strict monitors and increase public and private disclosure (Adams & Ferreira, 2009). Wang (1993) suggests that increasing the percentage of informed investors in the economy lowers capital costs because the information is partially communicated through price when investors condition their expectations over price in determining their trade. Armstrong, Core, Taylor, and Verrecchia (2011) assert that information asymmetry has no separate effect on the cost of capital in an imperfect capital market. The appointment of a female director is a firm-specific and independent choice; it is an empirical question of whether female directors reduce the cost of equity through the channel of lower information asymmetry.

One stream of capital market research evidence is that higher-quality reporting is negatively associated with the implied cost of capital estimation (Botosan, 1997; Botosan & Plumlee, 2002; Hail, 2002). Hribar and Jenkins (2004) find that a firm's cost of equity capital increases following the year of a financial restatement. Ashbaugh Skaife, Collins, Kinney, and LaFond (2009) show that a firm with internal control weakness suffers an increase in equity capital cost. Ogneva, Subramanyam, and Raghunandan (2007) found no reportable association between internal control weakness and the cost of equity capital. In sum, the literature has overwhelming evidence that the cost of equity capital impacts financial reporting quality. Therefore, we suggest that financial reporting quality is a potential channel between

female directors and the cost of equity capital. In brief, we postulate that both "information asymmetry" and "financial reporting quality" are simultaneous channels for the association between female directorship and the cost of equity capital.

We use the four-step process to establish mediation following Baron and Kenny (1986). First, the independent variable (i.e. *FEMDUM* or *LNFEM* or *FEMPER*) is associated with the dependent variable (i.e. cost of equity capital, *COC*; Equation (4A), α_1), which confirms the possibility that there is a mediation effect. Second, the independent variable, female directors (i.e. *FEMDUM*), is associated with the mediator (i.e. *M*; Equation (4B), β_1). Third, the mediator (i.e. *M*) has a significant effect on the dependent variable (i.e. *COC*; Equation (4C), γ_2). Fourth, the significant relationship between *FEMDUM* and *COC* (Equation (4A)) becomes insignificant after controlling *M* (complete mediation, γ_1 becomes insignificant), or the significance level reduces after controlling *M* (partial mediation, γ_1 reduces). The following set of equations are developed to conduct the mediation test:

$$COC_{i,t} = \alpha_0 + \alpha_1 FEMDUM\ or\ LNFEM\ or\ FEMPER_{i,t} + Controls + INDUSTRY_{FE} + YEAR_{FE} + \varepsilon_{i,t} \quad (4a)$$

$$M_{i,t} = \beta_0 + \beta_1 FEMDUM\ or\ LNFEM\ or\ FEMPER_{i,t} + Controls + INDUSTRY\_FE + YEAR\_FE + \varepsilon_{i,t} \quad (4b)$$

$$COC_{i,t} = \gamma_0 + \gamma_1 FEMDUM\ or\ LNFEM\ or\ FEMPER_{i,t} + \gamma_2 M_{i,t} + Controls + INDUSTRY\_FE + YEAR\_FE + \varepsilon_{i,t} \quad (4c)$$

Consistent with the abovementioned arguments, we suggest two different channels |*DACC*| and *BID_ASK*, potentially mediating the association between the female director and the cost of equity capital. Our first mediator (i.e. M) is |*DACC*| following Kothari, Leone, and Wasley (2005), a proxy of financial reporting quality. Our second mediator (i.e. *M*) is *BID_ASK*, following Stoll (1989), a proxy of information asymmetry. The total effect of *FEMDUM* on *COC* (i.e. α_1 from Equation (4A)) can be decomposed into direct effects and indirect effects (i.e. through the mediator). The direct effect is γ_1 from Equation (4C), whereas the indirect effect is $\beta_1 * \gamma_2$ for a proposed mediator. The core of the mediation effect tests the null hypothesis that $H_0 : \beta_1 * \gamma_2 = 0$. We first used the OLS regression using |DACC| as a mediator to perform Baron and Kenny's (1986) causal step regression for the above estimation.

Table 6 provides evidence of a negative association between female board representation and the cost of equity capital, with limited mediation through earnings quality and information asymmetry. Across all three measures, *LNFEM*, *FEMDUM*, and *FEMPER*, greater female presence is consistently linked to lower cost of equity capital. All the proxies of female directorships, *LNFEM*, *FEMDUM* and *FEMPER* show significant negative relationships with BID_ASK spreads and cost of equity proxies (PEG, MPEG), suggesting reduced information asymmetry. In contrast, the impact on financial reporting quality (|DACC|) is weak or insignificant. Although indirect effects via BID_ASK and |DACC| are statistically significant in some models, especially for FEMDUM and FEMPER, they are economically small. The dominant direct effects indicate that female board representation primarily reduces the cost of equity through direct channels, potentially reflecting improved governance, oversight, or investor confidence. Our findings suggest that female board representation is associated with a lower cost of equity capital, indicating that investors perceive gender-diverse boards as a sign of stronger governance and lower risk. While the mediating effects through earnings quality and information asymmetry are limited, the consistently strong direct effects imply that the presence of female directors enhances investor confidence through broader governance

Table 6. Mediating test – female directors and cost of equity capital

Variables	(1) |DACC|	(2) BID_ASK	(3) PEG	(4) MPEG	(5) PEG	(6) MPEG
Panel A: LNFEM						
Intercept	0.229***	0.102***	0.074***	0.143***	0.073***	0.147***
	(8.045)	(7.223)	(7.182)	(14.357)	(7.542)	(15.083)
LNFEM	−0.001	−0.003**	−0.002**	−0.006***	−0.004**	−0.006***
	(−1.223)	(−2.247)	(−2.001)	(−3.325)	(−2.117)	(−3.354)
|DACC|			0.004	0.026***		
			(1.518)	(3.374)		
BID_ASK					0.014**	0.013**
					(1.997)	(2.039)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224	8,224	8,224
Adj R^2	5.442	6.863	14.132	12.155	14.331	11.965
Indirect effect			0.0000	0.0000	0.0000	0.0000
Direct effect			0.0034	0.0058	0.0036	0.0059
Total effect			0.0034	0.0058	0.0037	0.0059
Panel B: FEMDUM						
Intercept	0.226***	0.107***	0.080***	0.152***	0.079***	0.158***
	(8.312)	(8.166)	(8.225)	(15.49)	(8.792)	(17.416)
FEMDUM	−0.009*	−0.003***	−0.005**	−0.003***	−0.005**	−0.003**
	(−1.731)	(−3.240)	(−2.250)	(−2.756)	(−2.346)	(−2.541)
|DACC|			0.004	0.026***		
			(0.561)	(3.402)		
BID_ASK					0.014**	0.013***
					(1.992)	(4.047)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224	8,224	8,224
Adj R^2	5.510	6.870	14.160	11.961	14.361	11.777
Indirect effect			0.0000	0.0002	0.0001	0.0000
Direct effect			0.0048	0.0033	0.0050	0.0032
Total effect			0.0048	0.0031	0.0050	0.0032
Panel C: FEMPER						
Intercept	0.227***	0.106***	0.079***	0.151***	0.079***	0.156***
	(8.359)	(8.052)	(8.137)	(16.329)	(8.664)	(17.165)
FEMPER	−0.000	−0.013**	−0.010**	−0.022***	−0.011**	−0.022***
	(−0.917)	(−2.421)	(−2.466)	(−3.168)	(−2.453)	(−3.204)
|DACC|			0.004**	0.025***		
			(2.501)	(3.352)		
BID_ASK					0.014**	0.013**
					(1.997)	(2.022)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224	8,224	8,224
Adj R^2	5.433	6.870	14.101	12.116	14.308	11.924
Indirect effect			0.0000	0.0001	0.0002	0.0002
Direct effect			0.0101	0.0221	0.1082	0.0224
Total effect			0.0101	0.0222	0.0110	0.0226

Note(s): ***, **, * indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are clustered by firm and year two-way. See Appendix for variable definitions

Source(s): Computed by authors

improvements. Perceptions of better oversight, ethical standards, and transparency lead to reduced equity risk premiums.

4.6 Additional tests

In this section, we conduct a series of sensitivity tests to examine whether our hypothesis—that the presence of a female director on the board reduces the cost of equity – holds under alternative assumptions, model specifications, and potential endogeneity concerns, among other checks. While the results from these sensitivity tests, as reported in Tables 7 and 8, are generally consistent with those of the primary analysis, we acknowledge that endogeneity remains a complex issue, and the results should be interpreted with caution.

4.6.1 Endogeneity concern: two-stage least squares. Our results show that the presence of a female director on the board reduces the cost of equity capital. However, the analysis may potentially suffer from self-selection bias because one possible reason to appoint a female director to the board is to strengthen corporate governance. We use a two-stage procedure to control for potential endogeneity biases (Heckman, 1979) and find that several firm-specific attributes and corporate governance characteristics affect both the existence of a female director and the cost of equity. Therefore, we adopt the two-stage least squares procedure. In the first stage, we estimate the following probit regression model.

$$\begin{aligned}\Pr\left(FEMDUM\right)_t = {} & \alpha_0 + \alpha_1 LNBOD_t + \alpha_2 INDPER_t + \alpha_3 CEODUAL_t + \alpha_4 BIG4_t \\ & + \alpha_5 LNSIZE_t + \alpha_6 LEVER_t + \alpha_{10} LOSS_t + \alpha_{11} ROA_t + \alpha_{12} BETA_t \\ & + \alpha_{13} RESTATE_t + \alpha_{14} SALEGR_t + \alpha_{15} INDAVGFEM_t \\ & + \alpha_{i,j} INDUSTRY\_FE_{i,j} + \alpha_{i,j} YEAR\_FE_{i,j} + \varepsilon_t \end{aligned} \quad (5)$$

The above equation (Equation (5)) includes an instrumental variable that captures the existence of female directors across the whole industry (*INDAVGFEM*, based on 2-digit SIC). Equation (5) computes the inverse Mills ratio (*IMR*). We will eliminate the instrument variable (*INDAVGFEM*) in the second stage of regression analysis. The second-stage regression model is estimated, including the IMR, as follows:

$$\begin{aligned} COC_t = {} & \mu_0 + \mu_1 LNFEM_t \, or \, FEMDUM_t \, or \, FEMPER_t + \mu_2 LNBOD_t + \mu_3 INDPER_t \\ & + \mu_4 CEODUAL_t + \mu_5 LNMEET_t + \mu_6 BIG4_t + \mu_7 AUDOPIN_t + \mu_8 LNSIZE_t \\ & + \mu_9 LEVER_t + \mu_{10} LOSS_t + \mu_{11} ROA_t + \mu_{12} BETA_t + \mu_{13} RESTATE_t \\ & + \mu_{14} SALEGR_t + \mu_{15} IMR_t + \mu_{i,j} INDUSTRY\_FE_{i,j} + \mu_{i,j} YEAR\_FE_{i,j} + \varepsilon_t \end{aligned} \quad (6)$$

Equation (6) is analogous to Equation (1), except that the obtained *IMR* (i.e. λ) is included in Equation (6).

Table 7 reports the findings for Equations (5) and (6). In the first stage, we examine the determinants of female directorship and calculate the IMR (i.e. λ). The determinants of female directorship are reported in column 1, and we find that corporate governance variables strongly predict the existence of one or more female directors on the board. For example, firms with a large (*LNBOD*) and independent board (*INDPER*) are positively associated with the existence of female directors (*FEMDUM*). We find that large firms (*LNSIZE*), profitable firms (*ROA*), and firms that are audited by a BIG4 auditor (*BIG4*) are likely to have a female director on the board. As indicated earlier, our second stage analysis includes IMR (i.e. λ) as an additional predictor of the cost of equity capital. Consistent with the primary findings, we find a negative association between female directors (*LNFEM*, *FEMDUM* and *FEMPER*) and both the

Table 7. 2SLS regression analysis

Variables	(1) LNFEM 1st stage	(2) PEG	(3) MPEG	(4) FEMDUM 1st stage	(5) PEG	(6) MPEG	(7) FEMPER 1st stage	(8) PEG	(9) MPEG
Intercept	−9.561*** (−21.880)	0.081*** (13.965)	0.146*** (27.199)	−15.209*** (−38.26)	0.071*** (9.889)	0.126*** (19.1)	−15.466*** (−39.414)	0.073*** (11.554)	0.148*** (25.274)
INDAVGFEM	22.24*** (16.766)			20.208*** (18.883)			16.504*** (18.512)		
LNFEM					−0.006*** (−3.022)	−0.011*** (−6.508)			
FEMDUM								−0.009*** (−3.68)	−0.004* (−1.80)
FEMPER		−0.012* (−1.829)	−0.027*** (−4.447)						
LNBOD	2.326*** (14.516)	−0.009*** (−4.489)	−0.018*** (−9.436)	3.992*** (27.106)	−0.005* (−1.724)	−0.009*** (−3.659)	3.976*** (31.54)	−0.005** (−2.159)	−0.018*** (−8.115)
INDPER	0.945*** (4.439)	−0.002 (−0.564)	0.003 (0.929)	1.79*** (9.759)	−0.001 (−0.152)	0.005* (1.707)	1.401*** (8.432)	−0.001 (−0.075)	0.002 (0.599)
CEODUAL	−0.068 (−0.965)	0.002** (1.997)	−0.003*** (−3.483)	−0.093 (−1.581)	0.002** (1.986)	−0.003*** (−3.504)	0.004 (0.081)	0.002** (2.016)	−0.003*** (−3.411)
BIG4	0.196 (1.614)	−0.001 (−0.514)	0.002 (0.925)	0.488*** (5.274)	−0.001 (−0.356)	0.002 (1.219)	0.364*** (2.781)	0.001 (0.172)	0.002 (0.927)
RESTATE	0.037 (0.231)	0.005** (2.292)	0.009*** (4.264)	−0.071 (−0.549)	0.005** (2.282)	0.009*** (4.249)	−0.044 (−0.362)	0.005** (2.31)	0.009*** (4.283)
LNSIZE	0.315*** (10.371)	−0.001** (−2.313)	−0.001*** (−2.693)	0.438*** (16.194)	−0.001* (−1.832)	−0.001* (−1.811)	0.267*** (12.761)	−0.001 (−1.635)	−0.001*** (−3.148)
LEVER	−0.529*** (−2.696)	0.032*** (10.727)	0.027*** (9.576)	−0.441** (−2.486)	0.033*** (10.764)	0.027*** (9.656)	−0.238 (−1.447)	0.032*** (10.723)	0.027*** (9.528)
LOSS	0.186 (1.173)	0.03*** (12.647)	0.019*** (8.65)	−0.006 (−0.052)	0.03*** (12.592)	0.019*** (8.552)	0.011 (0.067)	0.03*** (12.443)	0.019*** (8.638)
ROA	−0.210 (−0.913)	−0.062*** (−15.577)	−0.04*** (−10.924)	−0.22 (−1.09)	−0.062*** (−15.546)	−0.04*** (−10.867)	−0.028 (−0.113)	−0.062*** (−15.653)	−0.04*** (−10.979)

(*continued*)

Table 7. Continued

Variables	(1) LNFEM 1st stage	(2) PEG	(3) MPEG	(4) FEMDUM 1st stage	(5) PEG	(6) MPEG	(7) FEMPER 1st stage	(8) PEG	(9) MPEG
SALEGR	−0.324*	−0.006**	0.006**	−0.739***	−0.006**	0.005**	−0.507***	−0.006**	0.006**
	(−1.729)	(−2.212)	(2.342)	(−5.028)	(−2.355)	(2.071)	(−3.324)	(−2.428)	(2.523)
BETA	0.043	0.018***	0.017***	−0.148**	0.017***	0.017***	0.022	0.017***	0.018***
	(0.505)	(16.031)	(16.996)	(−2.328)	(15.788)	(16.589)	(0.344)	(15.709)	(17.194)
LNMEET		0.008***	−0.001		0.008***	−0.001		0.008***	−0.001
		(5.207)	(−0.74)		(5.217)	(−0.735)		(5.165)	(−0.831)
AUDOPIN		0.006***	−0.003***		0.006***	−0.003***		0.006***	−0.003**
		(5.956)	(−2.748)		(5.888)	(−2.875)		(6.055)	(−2.549)
IMR		0.001	0.002**		0.001	0.004***		0.003**	0.001
		(1.23)	(2.239)		(1.493)	(4.434)		(2.536)	(1.259)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224	8,224	8,224	8,224	8,224	8,224
Adj R^2/Pseudo	16.45	14.23	11.24	32.84	14.25	11.39	26.11	14.24	11.19

Note(s): ***, **, * indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

measures of the cost of equity capital (*PEG* and *MPEG*). Overall, the empirical results are consistent with the primary findings.

4.6.2 Critical mass test. Globally, females have limited representation on corporate boards. Empirical research studies have found that the existence of a female director in the USA (Manita, Bruna, Dang, & Houanti, 2018), Europe (García Sánchez, Oliveira, & Martínez-Ferrero, 2020), Australia (Pandey *et al.*, 2020), and China (Chen & Keefe, 2020) is 15.85, 13.45, 31.4, and 15.1%, respectively. Our research also shows that approximately 15% of directors in the USA are female, which raises concerns about tokenism. Tokenism theory argues that female directors are a minority group and often encounter barriers in expressing their opinions. Considering their limited representation, female directors could face significant limitations in influencing board decision-making. Critical mass theory suggests that at least three female directors on the board are necessary for them to collectively exert their influence over decisions (Torchia, Calabrò, & Huse, 2011). Consistent with this argument, we test the critical mass theory in this section. We create three dummy variables: *FD1* (if there is only one female director), *FD2* (if there are two female directors on the board), and *FD3* (if there are three or more female directors on the board). We rerun our primary model by including these three dummy variables. The results are reported in Table 8. Regarding the measure of *PEG*, the results in columns 1 to 3 indicate that *FD1* is insignificant with the cost of equity, *FD2* is significant at the 5% level, and *FD3* at the 5% level. Also, columns 4 to 6 show that the association between *MPEG* and female directorship (*FD1*, *FD2* and *FD3*) are consistent with the earlier findings. Overall, our reported results indicate that critical mass theory indeed holds in our setting, meaning that the real effect of board gender diversity on the cost of equity occurs only when there are at least two or more female directors.

4.6.3 Effect on cost of equity capital when a firm appoints a female director for the first time. We also examine the impact of a female director when she is appointed for the first time in the firm. We try to capture the effect of appointing a female director in the very first year. We use a dummy variable (*FEM_FIRST*), assigning a value of 1 when a firm appoints a female director for the first time within the sample period and 0 otherwise. We use the following regression model to identify the effect of a female director on the cost of equity:

$$\begin{aligned} COC_t = {} & \mu_0 + \mu_1 FEMFIRST_t + \mu_2 LNBOD_t + \mu_3 INDPER_t + \mu_4 CEODUAL_t \\ & + \mu_5 LNMEET_t + \mu_6 BIG4_t + \mu_7 AUDOPIN_t + \mu_8 LNSIZE_t + \mu_9 LEVER_t \\ & + \mu_{10} LOSS_t + \mu_{11} ROA_t + \mu_{12} BETA_t + \mu_{13} RESTATE_t + \mu_{14} SALEGR_t \\ & + \mu_{i,j} INDUSTRY\_FE_{i,j} + \mu_{i,j} YEAR\_FE_{i,j} + \varepsilon_t \end{aligned} \tag{7}$$

Table 9 presents the results for Equation (7). Our findings show that a female director's appointment for the first time in a firm reduces the cost of equity, which is consistent with the results reported earlier. We find *FEM_FIRST* has a negative association with both proxies for the cost of equity (coefficient = −0.002** and −0.003**; *t*-statistics = −2.21 and −2.151) and is statistically significant at the 5% level, indicating the higher explanatory power of the regression model.

4.6.4 Propensity score matching analysis. Our previous discussion evidenced a negative association between female firm directorship and the cost of equity capital. However, the finding may have model misspecification or omission variable bias, which may violate the assumptions of the ordinary least square model. To avoid such concerns, we use propensity score matching (PSM) analysis and create a closely matched sample to check whether firms with and without a female director on the corporate board differ in the cost of equity capital. We regard those firms with female directors on the board (*FEMDUM* = 1) as the treatment group. We then use propensity score matching to identify a control group based on all the control variables, such as board size (*LNBOD*), board independence (*INDPER*), CEO duality (*CEODUAL*), firm size (*LNSIZE*), leverage (*LEVER*), sales growth (*SALEGR*), earnings

Table 8. Tokenism – regression model

Variables	(1) PEG	(2) PEG	(3) PEG	(4) MPEG	(5) MPEG	(6) MPEG
Intercept	0.084***	0.083***	0.083***	0.151***	0.152***	0.143***
	(14.964)	(14.884)	(13.897)	(29.048)	(29.631)	(25.929)
FD1	−0.002			−0.002		
	(−1.187)			(−1.465)		
FD2		−0.003**			−0.004**	
		(−2.171)			(−2.527)	
FD3			−0.003**			−0.006***
			(−2.296)			(−4.509)
LNBOD	−0.01***	−0.01***	−0.01***	−0.02***	−0.02***	−0.017***
	(−5.194)	(−5.017)	(−4.618)	(−10.871)	(−11.143)	(−8.363)
INDPER	−0.003	−0.002	−0.002	0.001	0.001	0.002
	(−0.834)	(−0.77)	(−0.805)	(0.269)	(0.258)	(0.615)
CEODUAL	0.002**	0.002**	0.002**	−0.003***	−0.003***	−0.003***
	(2.025)	(2.053)	(2.026)	(−3.384)	(−3.398)	(−3.423)
LNMEET	0.008***	0.008***	0.008***	−0.001	−0.001	−0.001
	(5.164)	(5.132)	(5.17)	(−0.826)	(−0.837)	(−0.708)
BIG4	−0.001	−0.001	−0.001	0.001	0.001	0.001
	(−0.625)	(−0.539)	(−0.651)	(0.394)	(0.575)	(0.358)
AUDOPIN	0.007***	0.007***	0.007***	−0.003***	−0.003**	−0.003***
	(6.078)	(6.064)	(6.054)	(−2.59)	(−2.544)	(−2.765)
RESTATE	0.005**	0.005**	0.005**	0.009***	0.009***	0.009***
	(2.306)	(2.299)	(2.303)	(4.27)	(4.279)	(4.252)
LNSIZE	−0.001***	−0.001***	−0.001***	−0.001***	−0.001***	−0.001***
	(−2.819)	(−2.605)	(−2.778)	(−3.797)	(−3.767)	(−3.409)
LEVER	0.032***	0.032***	0.032***	0.027***	0.027***	0.027***
	(10.71)	(10.72)	(10.712)	(9.539)	(9.527)	(9.54)
LOSS	0.031***	0.03***	0.031***	0.02***	0.019***	0.02***
	(12.687)	(12.672)	(12.693)	(8.807)	(8.763)	(8.801)
ROA	−0.062***	−0.062***	−0.062***	−0.04***	−0.04***	−0.04***
	(−15.599)	(−15.611)	(−15.589)	(−10.93)	(−10.959)	(−10.874)
SALEGR	−0.006**	−0.006**	−0.006**	0.007***	0.007***	0.007***
	(−2.074)	(−2.141)	(−2.078)	(2.719)	(2.696)	(2.649)
BETA	0.018***	0.018***	0.018***	0.018***	0.018***	0.018***
	(16.325)	(16.336)	(16.273)	(17.612)	(17.589)	(17.277)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,224	8,224	8,224	8,224	8,224	8,224
Adj R^2	14.14	14.19	14.18	11.13	11.12	11.24

Note(s): ***, **, * indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

(*LOSS*), profitability (*ROA*) and firm risk (*BETA*) in the regression analysis. Thus, our treatment and control groups are nearly identical across all dimensions. Finally, we use the 1:1 nearest-neighbour modelling approach to ensure that firms with female directors on the board (*FEMDUM* = 1) are functionally equivalent to the matched firms with non-female director-affiliated firms (*FEMDUM* = 0).

Table 10 reports the findings of the PSM analysis. Panel A reports a proper balance between the treatment and control groups in the matched sample, as none of the covariates are statistically significant except firm size (*LNSIZE*) and firm performance (*LOSS*). Table 10 Panel B reports the OLS results for the Propensity Score matched sample, showing that the

Table 9. Female director for the first time

Variables	(1) PEG	(2) MPEG
Intercept	0.084***	0.152***
	(15.042)	(29.654)
FEM_FIRST	−0.002**	−0.003**
	(−2.21)	(−2.151)
LNBOD	−0.01***	−0.02***
	(−5.183)	(−11.172)
INDPER	−0.002	0.001
	(−0.819)	(0.25)
CEODUAL	0.002**	−0.003***
	(2.012)	(−3.412)
LNMEET	0.008***	−0.001
	(5.162)	(−0.83)
BIG4	−0.001	0.001
	(−0.637)	(0.553)
AUDOPIN	0.007***	−0.003**
	(6.083)	(−2.534)
RESTATE	0.005**	0.009***
	(2.30)	(4.278)
LNSIZE	−0.001***	−0.001***
	(−2.796)	(−3.818)
LEVER	0.032***	0.027***
	(10.713)	(9.526)
LOSS	0.031***	0.019***
	(12.689)	(8.768)
ROA	−0.062***	−0.04***
	(−15.599)	(−10.957)
SALEGR	−0.005**	0.007***
	(−2.065)	(2.719)
BETA	0.018***	0.018***
	(16.336)	(17.59)
Industry	Yes	Yes
Year	Yes	Yes
Observations	8,224	8,224
Adj R^2	14.12	11.14

Note(s): This table reports regression results of the relation between the cost of equity capital and female directors who are appointed for the first time. The dependent variables are PEG and MPEG. ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

coefficients of female directorship are negative and statistically significant at a 5% level or better. In brief, our findings suggest that firms benefit from a lower cost of equity capital when a board has a female director. Our propensity score matching analysis confirms the previous inference.

4.6.5 Does firm life cycle influence the association between female directorship and cost of equity?. Hasan, Hossain, and Habib (2015) observed a U-shaped firm cost of equity trend. It is higher during the introduction and decline phases but lower during the growth and maturity phases. Early-stage firms face higher information asymmetry and lower investor interest because of their smaller size and lower visibility, which drives up equity costs. Conversely, established firms have lower equity costs because of their extended market presence and increased investor scrutiny. These results support Easley and O'hara (2004), who stress the

Table 10. PSM analysis

Panel A – descriptive statistics: covariate matching

Variables	Treated [ATE]	Control [ATE]	Difference	*t*-statistics
LNBOD	2.471	2.471	−0.000	−0.01
INDPER	0.761	0.768	−0.007	−0.32
CEODUAL	0.575	0.563	0.012	0.77
LNMEET	2.122	2.156	−0.034	−0.83
BIG4	0.918	0.901	0.017	1.17
AUDOPIN	0.304	0.311	−0.007	−0.92
RESTATE	0.049	0.043	0.006	1.20
LNSIZE	8.226	8.203	0.023	1.80*
LEVER	0.203	0.201	0.002	1.07
SALEGR	0.071	0.063	0.008	0.86
LOSS	0.044	0.064	0.020	2.42**
ROA	0.085	0.083	0.002	0.73
BETA	1.100	1.093	0.007	1.30

Panel B – regression results using the PSM sample

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	PEG	PEG	PEG	MPEG	MPEG	MPEG
Intercept	0.075***	0.081***	0.08***	0.149***	0.159***	0.158***
	(10.962)	(12.602)	(12.459)	(23.833)	(26.967)	(26.686)
LNFEM	−0.004***			−0.006***		
	(−2.724)			(−4.813)		
FEMDUM		−0.005***			−0.003**	
		(−3.147)			(−2.198)	
FEMPER			−0.011**			−0.022***
			(−1.964)			(−4.421)
LNBOD	−0.007***	−0.009***	−0.009***	−0.019***	−0.023***	−0.023***
	(−2.867)	(−4.033)	(−4.433)	(−8.706)	(−11.746)	(−11.821)
INDPER	−0.002	−0.003	−0.002	−0.001	−0.002	−0.001
	(−0.634)	(−0.807)	(−0.764)	(−0.327)	(−0.756)	(−0.476)
CEODUAL	0.003**	0.003**	0.003**	−0.003***	−0.003**	−0.003***
	(2.378)	(2.414)	(2.375)	(−2.69)	(−2.547)	(−2.615)
LNMEET	0.009***	0.009***	0.009***	−0.001	−0.002	−0.001
	(4.823)	(4.774)	(4.817)	(−0.844)	(−0.923)	(−0.834)
BIG4	−0.004*	−0.004	−0.004*	−0.001	−0.001	−0.001
	(−1.704)	(−1.626)	(−1.723)	(0.021)	(0.026)	(−0.001)
AUDOPIN	0.007***	0.007***	0.007***	−0.002**	−0.002*	−0.002**
	(6.143)	(6.232)	(6.189)	(−2.02)	(−1.793)	(−1.992)
RESTATE	0.005*	0.005*	0.005*	0.009***	0.01***	0.009***
	(1.928)	(1.948)	(1.931)	(4.259)	(4.276)	(4.262)
LNSIZE	−0.001	−0.001	−0.001	−0.001	−0.001*	−0.001
	(−1.411)	(−1.537)	(−1.543)	(−1.28)	(−1.833)	(−1.365)
LEVER	0.03***	0.029***	0.029***	0.025***	0.025***	0.025***
	(9.303)	(9.257)	(9.292)	(8.704)	(8.64)	(8.691)
LOSS	0.034***	0.034***	0.034***	0.026***	0.026***	0.026***
	(12.293)	(12.294)	(12.289)	(10.139)	(10.132)	(10.131)
ROA	−0.061***	−0.061***	−0.061***	−0.039***	−0.039***	−0.039***
	(−14.069)	(−14.122)	(−14.085)	(−9.831)	(−9.901)	(−9.849)
SALEGR	−0.007**	−0.007**	−0.007**	0.005*	0.006**	0.005*
	(−2.459)	(−2.396)	(−2.434)	(1.910)	(2.076)	(1.908)
BETA	0.019***	0.019***	0.019***	0.018***	0.018***	0.018***
	(15.841)	(15.959)	(15.885)	(16.298)	(16.567)	(16.312)

(*continued*)

Table 10. Continued

Panel B – regression results using the PSM sample Variables	(1)	(2)	(3)	(4)	(5)	(6)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,160	6,216	6,208	6,142	62,10	6,198
Adj R^2	14.29	14.27	14.13	11.88	11.69	11.73

Note(s): ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

importance of a long operational history in reducing the cost of capital. Additionally, investors tend to favour assets with fewer costs and risks (Botosan, 2006). O'Connor and Byrne's (2015) research, which emphasizes the continued relevance of governance functions across different stages, supports the association between corporate governance mechanisms and life cycle stages, as proposed by Filatotchev, Toms, and Wright (2006), even though no research directly addresses the relationship between gender diversity and firm life cycle stages. Furthermore, Habib, Bhuiyan, and Hasan (2018) distinguish between advisory and monitoring directors, highlighting their dynamic requirements during the life cycle. Firm life-cycle theory suggests that firm risk varies across lifecycle stages. In the introduction and decline stages, firms typically face higher levels of uncertainty and volatility due to market unpredictability, resource constraints, and strategic challenges. In contrast, firms in the growth and maturity stages tend to experience more stable risk profiles, although they still face competition, innovation, and market saturation risks. Based on these observations, we hypothesize that risks may have a greater impact on the cost of equity during the early and declining stages of the firm lifecycle. Based on these observations, we conjecture that risks may have a greater effect on the cost of equity in the early and declining stages of the equity market. To further improve our understanding of corporate governance dynamics and life cycle stages, our research seeks to investigate this relationship across various life cycle stages.

Table 11 reports the findings. Our study, inspired by recent studies (Dickinson, 2011; Hasan & Cheung, 2018; Hasan, Al-Hadi, Taylor, & Richardson, 2017), delineates firm life cycles into five distinct stages: Introduction, Growth, Maturity, Decline, and Shake-out. In Columns 1 through 5, we explore the relationship between a firm's cost of equity and its female directorship across these stages. Notably, our analysis reveals a significant negative association between the firm's cost of equity (*PEG*) and the presence of female directors (*LNFEM*), particularly during the growth and maturity stages of the life cycle, which is statistically significant at the 5% level. In Columns 6 through 10, we revisit the analysis using an alternative cost of equity (MPEG) measure, and our findings remain robust. Our findings remain consistent with alternative measures of female directors (results unreported for brevity). Our finding that the cost of equity is lower with higher female directorship during the growth and mature stages may be attributed to several factors. Female directors could enhance board monitoring and governance, which are crucial during these stages of complexity and visibility. Gender-diverse boards may also boost investor confidence, lowering perceived risk and the cost of equity. In contrast, other governance mechanisms, like management ownership or creditor monitoring, may be more important in the introduction and declining stages. Overall, female directorship may signal strong governance practices, leading to a lower cost of equity in more established firms.

4.6.6 Does the global financial crisis influence the association between female directorship and cost of equity?. Empirical studies have conclusively established the detrimental effects of financial crises on firms' capacity to raise capital, resulting in increased capital costs and

Table 11. Impact of firm life cycle on the association between female directorship and cost of equity capital

Variables	(1) PEG INTRO	(2) PEG GROWTH	(3) PEG MATURE	(4) PEG DECLINE	(5) PEG SHAKE	(6) MPEG INTRO	(7) MPEG GROWTH	(8) MPEG MATURE	(9) MPEG DECLINE	(10) MPEG SHAKE
Intercept	0.138**	0.101***	0.078***	0.324**	0.089***	0.269***	0.176***	0.161***	0.223*	0.126***
	(2.007)	(6.581)	(10.055)	(2.395)	(3.306)	(4.138)	(11.886)	(22.657)	(1.953)	(5.61)
LNFEM	−0.014	−0.004**	−0.003**	0.009	0.002	0.016	−0.005*	−0.006***	−0.031	−0.008*
	(−0.963)	(−2.216)	(−2.269)	(0.326)	(0.293)	(1.186)	(−1.931)	(−4.111)	(−1.331)	(−1.80)
LNBOD	−0.036	−0.006	−0.001	−0.032	−0.004	−0.045*	−0.02***	−0.018***	0.008	−0.024***
	(−1.427)	(−1.246)	(−0.488)	(−0.773)	(−0.462)	(−1.896)	(−4.098)	(−7.164)	(0.227)	(−3.066)
INDPER	0.013	0.002	−0.004	0.026	−0.003	0.001	−0.002	−0.001	0.022	−0.018
	(0.55)	(0.374)	(−1.14)	(0.319)	(−0.182)	(0.004)	(−0.34)	(−0.075)	(0.316)	(−1.287)
CEODUAL	0.009	0.001	0.003**	−0.022	0.002	0.011	−0.004	−0.001	0.021	−0.007*
	(0.728)	(0.549)	(2.123)	(−1.015)	(0.53)	(1.01)	(−1.594)	(−1.113)	(1.054)	(−1.939)
LNMEET	0.005	0.001	0.007***	−0.044	0.013*	−0.008	−0.01**	−0.001	−0.057*	0.014**
	(0.302)	(0.273)	(3.517)	(−1.296)	(1.842)	(−0.456)	(−2.557)	(−0.77)	(−1.978)	(2.435)
BIG4	−0.012	−0.002	−0.006**	−0.038	0.014	−0.035*	−0.001	−0.002	0.015	0.011
	(−0.60)	(−0.546)	(−2.085)	(−1.267)	(1.622)	(−1.818)	(−0.18)	(−0.803)	(0.599)	(1.497)
AUDOPIN	0.022*	0.005**	0.005***	0.026	0.012***	−0.016	0.002	−0.002	−0.004	−0.008**
	(1.839)	(2.059)	(3.53)	(1.138)	(2.623)	(−1.404)	(0.875)	(−1.478)	(−0.193)	(−2.10)
RESTATE	0.015	0.007	0.002	−0.046	0.004	0.031	0.009*	0.006**	0.027	−0.001
	(0.773)	(1.385)	(0.559)	(−1.127)	(0.382)	(1.645)	(1.666)	(2.398)	(0.781)	(−0.146)
LNSIZE	−0.002	−0.001	−0.001	−0.004	−0.006***	−0.001*	−0.001	−0.001**	−0.008	0.002
	(−0.417)	(−0.753)	(−1.524)	(−0.44)	(−3.54)	(−1.714)	(−0.484)	(−2.43)	(−1.015)	(1.388)
LEVER	0.003	0.031***	0.018***	−0.018	0.028***	−0.007	0.019**	0.019***	0.082**	0.032***
	(0.102)	(3.644)	(4.995)	(−0.40)	(2.677)	(−0.226)	(2.29)	(5.645)	(2.116)	(3.654)
LOSS	0.038***	0.010	0.02***	0.038	0.014*	0.019	0.012*	0.014***	−0.028	0.027***
	(2.785)	(1.601)	(4.471)	(1.318)	(1.739)	(1.495)	(1.96)	(3.343)	(−1.123)	(3.86)
ROA	0.013	−0.157***	−0.113***	−0.024	−0.085***	0.017	−0.062***	−0.09***	−0.094	−0.062***
	(0.993)	(−8.817)	(−16.094)	(−0.311)	(−5.545)	(1.403)	(−3.605)	(−13.948)	(−1.464)	(−4.866)
SALEGR	−0.036*	0.004	−0.007*	0.056	−0.016	−0.009	0.013**	0.011***	−0.024	−0.001
	(−1.781)	(0.764)	(−1.702)	(1.327)	(−1.482)	(−0.49)	(2.36)	(2.868)	(−0.687)	(−0.152)
BETA	0.05***	0.012***	0.017***	0.001	0.015***	0.059***	0.015***	0.014***	0.036**	0.012***
	(3.742)	(4.695)	(11.782)	(0.04)	(3.303)	(4.663)	(5.996)	(10.509)	(2.171)	(3.167)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	139	1,745	4,835	62	660	139	1,745	4,835	62	660
Adj R^2	22.90	11.76	13.98	32.52	18.47	27.58	7.82	12.95	33.61	19.34

Note(s): This table reports regression results of the relation between the cost of equity capital and female directorship across different firm life cycles (INTRO, GROWTH, MATURE, DECLINE and SHAKE-out stage; *N = 7,441*). The dependent variables are PEG and MPEG. ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

worsening economic constraints. Moscariello, Fera, and Cinque (2020) posit that during such crises, there is a greater likelihood that market volatility and uncertainty would negatively affect economic fundamentals, exacerbating the problems that come with poor quality of firm profits. Our study aims to investigate the relationship between female directorship and the cost of equity capital in the context of the global financial crisis, taking advantage of this well-established understanding.

We categorize our sample into two distinct groups following the existing literature (Jones & Johnstone, 2012): the *GFC period*, representing observations from the Global Financial Crisis (*GFC*) years (i.e. financial years 2008, 2009, and 2010), and *non-GFC period*, encompassing financial years 2004-2007 and 2011-2018. Table 12 presents our findings. Although our results consistently demonstrate a negative association between female directorship and firm cost of equity across both the *GFC* and *non-GFC* periods, the statistical significance is relatively weaker within the *GFC* period compared to the *non-GFC* period sample group. One of the plausible interpretations could be that in stable economic time (*non-GFC* period), diverse boards, including increased female representation, are seen as beneficial for risk management, leading to a stronger impact on reducing the firm cost of equity capital. However, during financial crises like the Global Financial Crisis (GFC), the focus shifts toward prioritizing immediate financial stability over long-term strategies, such as diversity (Muppidathi, 2020).

5. Conclusion

We examine the association between the cost of equity capital and the existence of a female director on the board. In general, we argue that female directors improve corporate governance and that shareholders value the effect of diversity on the board's monitoring. We test our hypothesis on US firms listed between 2004–2018 and evidence a negative association between female directors and cost of equity capital, implying that gender-diverse firms have a lower cost of equity capital. Our analysis reveals that firms experience reduced costs of equity when they have a higher proportion of independent female directors and a female CEO. We establish that information asymmetry mediates the relationship between female directors and the cost of equity capital. Furthermore, our findings indicate that the advantages of lower cost of equity are more prominent in firms with two or more female directors on the board. Importantly, our results remain robust across alternative measures of gender diversity and cost of equity.

Our study makes significant contributions to the literature on female directorship and the cost of equity capital by addressing key limitations in prior research (Nguyen, 2020; Sarang *et al.*, 2022; Saleh *et al.*, 2022; Aljughaiman *et al.*, 2022; Jun *et al.*, 2023). Specifically, we address endogeneity concerns through rigorous econometric methods, including the 2SLS instrumental variable approach and propensity score matching analysis, ensuring greater robustness in our findings. Furthermore, we extend the analysis by incorporating the firm life cycle and conducting a comprehensive cross-sectional examination. This includes assessing the impact of first-time female director appointments, investigating tokenism, and analyzing the role of independent female directors in firm cost of equity. To further investigate the mechanisms underlying this, we performed a channel analysis to evaluate whether enhanced board diversity, improved investor perceptions, or reduced information asymmetry mediate the relationship between female directorship and the cost of equity capital. By integrating these methodological and contextual dimensions, our research offers a nuanced and comprehensive understanding of how female directorship influences the cost of equity across varying organizational and economic settings.

Firms are under social and ethical pressure to increase female representation on their boards to maintain their legitimacy. Considering this, a recent academic scholarship has attempted to ask an important question: is there a business case for board gender diversity? This line of research attempts to link board gender diversity with firm value, thereby nullifying the claims that increasing female representation on boards is just a social or ethical makeup; female

Table 12. Impact of GFC on the association between female directorship and cost of equity capital

Variables	(1) PEG GFC = 0	(2) PEG GFC = 1	(3) PEG GFC = 0	(4) PEG GFC = 1	(5) PEG GFC = 0	(6) PEG GFC = 1	(7) MPEG GFC = 0	(8) MPEG GFC = 1	(9) MPEG GFC = 0	(10) MPEG GFC = 1	(11) MPEG GFC = 0	(12) MPEG GFC = 1
Intercept	0.09***	0.044**	0.096***	0.045**	0.094***	0.046**	0.177***	0.086***	0.186***	0.091***	0.184***	0.096***
	(12.871)	(2.014)	(14.592)	(2.101)	(14.376)	(2.15)	(26.241)	(5.103)	(29.261)	(5.538)	(28.981)	(5.832)
LNFEM	−0.003**	−0.002*					−0.005***	−0.008***				
	(−2.267)	(−1.75)					(−3.618)	(−2.686)				
FEMDUM			−0.004**	−0.003*					−0.001	−0.008***		
			(−2.572)	(−1.867)					(−0.792)	(−2.817)		
FEMPER					−0.012**	−0.001					−0.02***	−0.024**
					(−1.977)	(−0.088)					(−3.451)	(−2.164)
LNBOD	−0.004	0.007	−0.005**	0.007	−0.006***	0.006	−0.022***	0.005	−0.026***	0.003	−0.025***	−0.001
	(−1.466)	(0.859)	(−2.443)	(0.869)	(−2.692)	(0.756)	(−9.331)	(0.695)	(−12.381)	(0.477)	(−12.223)	(−0.057)
INDPER	−0.003	−0.001	−0.003	0.001	−0.003	−0.001	−0.005	0.012	−0.006*	0.012	−0.005	0.011
	(−0.793)	(−0.016)	(−0.985)	(0.011)	(−0.867)	(−0.058)	(−1.44)	(1.557)	(−1.839)	(1.578)	(−1.53)	(1.424)
CEODUAL	0.001	0.001	0.001	0.001	0.001	0.001	−0.003**	−0.001	−0.002**	−0.001	−0.003**	−0.001
	(1.288)	(0.282)	(1.315)	(0.282)	(1.281)	(0.269)	(−2.345)	(−0.485)	(−2.312)	(−0.506)	(−2.359)	(−0.51)
LNMEET	0.003	0.016***	0.003	0.016***	0.003	0.016***	−0.004**	0.003	−0.004**	0.002	−0.004**	0.002
	(1.616)	(3.494)	(1.586)	(3.491)	(1.619)	(3.48)	(−2.129)	(0.723)	(−2.165)	(0.692)	(−2.12)	(0.709)
BIG4	−0.004*	−0.006	−0.004*	−0.005	−0.004*	−0.006	−0.001	0.003	−0.001	0.003	−0.001	0.003
	(−1.819)	(−0.893)	(−1.772)	(−0.857)	(−1.839)	(−0.898)	(−0.382)	(0.545)	(−0.447)	(0.652)	(−0.407)	(0.548)
AUDOPIN	0.006***	0.005*	0.006***	0.005*	0.006***	0.005*	0.001	−0.007***	0.001	−0.008***	0.001	−0.007***
	(4.413)	(1.759)	(4.493)	(1.749)	(4.418)	(1.758)	(0.662)	(−3.194)	(0.846)	(−3.232)	(0.656)	(−3.197)
RESTATE	0.001	0.021***	0.001	0.021***	0.001	0.021***	0.007***	0.009	0.006***	0.009	0.007***	0.009
	(0.204)	(2.641)	(0.208)	(2.647)	(0.204)	(2.668)	(2.66)	(1.446)	(2.623)	(1.496)	(2.665)	(1.455)
LNSIZE	−0.001	−0.004***	−0.001	−0.004***	−0.001	−0.004***	−0.001**	−0.002**	−0.001***	−0.002**	−0.001**	−0.002**
	(−1.514)	(−3.051)	(−1.629)	(−3.116)	(−1.569)	(−3.161)	(−2.152)	(−2.255)	(−2.655)	(−2.531)	(−2.194)	(−2.342)
LEVER	0.021***	0.04***	0.02***	0.04***	0.021***	0.04***	0.016***	0.042***	0.016***	0.041***	0.016***	0.042***
	(6.432)	(4.08)	(6.398)	(4.071)	(6.428)	(4.076)	(5.159)	(5.619)	(5.148)	(5.585)	(5.151)	(5.61)
LOSS	0.01***	0.055***	0.01***	0.055***	0.010***	0.055***	0.014***	0.022***	0.014***	0.021***	0.014***	0.022***
	(3.055)	(8.399)	(3.064)	(8.389)	(3.046)	(8.388)	(4.60)	(4.268)	(4.576)	(4.217)	(4.587)	(4.267)

(*continued*)

Table 12. Continued

Variables	(1) PEG GFC = 0	(2) PEG GFC = 1	(3) PEG GFC = 0	(4) PEG GFC = 1	(5) PEG GFC = 0	(6) PEG GFC = 1	(7) MPEG GFC = 0	(8) MPEG GFC = 1	(9) MPEG GFC = 0	(10) MPEG GFC = 1	(11) MPEG GFC = 0	(12) MPEG GFC = 1
ROA	−0.12***	−0.019***	−0.12***	−0.019***	−0.12***	−0.019***	−0.114***	−0.005	−0.114***	−0.005	−0.114***	−0.005
	(−17.939)	(−2.674)	(−17.969)	(−2.685)	(−17.957)	(−2.661)	(−17.57)	(−0.863)	(−17.641)	(−0.882)	(−17.591)	(−0.866)
SALEGR	−0.007**	0.006	−0.007**	0.006	−0.007**	0.006	−0.002	0.032***	−0.001	0.032***	−0.002	0.032***
	(−2.353)	(0.811)	(−2.275)	(0.807)	(−2.345)	(0.808)	(−0.589)	(5.271)	(−0.389)	(5.256)	(−0.598)	(5.272)
BETA	0.016***	0.023***	0.016***	0.023***	0.016***	0.023***	0.016***	0.015***	0.016***	0.015***	0.016***	0.015***
	(12.709)	(6.471)	(12.816)	(6.491)	(12.729)	(6.529)	(13.137)	(5.546)	(13.396)	(5.652)	(13.147)	(5.588)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,573	1,651	6,573	1,651	6,573	1,651	6,573	1,651	6,573	1,651	6,573	1,651
Adj R^2	13.52	16.14	13.62	16.11	13.51	16.13	16.32	9.33	16.31	9.31	16.33	9.29

Note(s): This table reports regression results of the relation between the cost of equity capital and female directorship in the context of the Global Financial Crisis (GFC). GFC period (GFC = 1) is considered the financial year 2008, 2009 and 2010. The dependent variables are PEG and MPEG. ***, **, * Indicate statistical significance at the 1, 5 and 10 percent levels, respectively, based on a two-tailed test. *t*-statistics are in parentheses. Standard errors are two-way clustered by firm and year to correct for cross-sectional and time-series dependence. See Appendix for variable definitions

Source(s): Computed by authors

directors directly impact firm value. However, the empirical evidence is mixed to date. It is questionable whether gender differences in the general population can be extrapolated to prestigious positions such as corporate boards. Nonetheless, many prior studies suggest that female directors indeed behave differently in the workplace and that gender-diverse boards impose strict monitoring while improving overall governance quality. To this end, our empirical results provide further and original evidence that female directors significantly reduce the cost of equity capital. Our channel analysis supports prior arguments that board gender diversity is associated with lower information asymmetry. Thus, our study provides fresh support to the argument that a business case exists for increasing female representation on corporate boards. Our findings offer potential insights for extending the current research trajectory by exploring female directors' distinct supervisory and advisory roles. Gupta, Raman, and Shang (2018) report that lower social capital increases a firm's cost of equity capital. Therefore, investigating whether gender diversity within firms can serve as a mitigating factor in reducing the firm's cost of equity capital holds significant relevance.

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Notes

1. In France, gender quotas were implemented in January 2011. The law required all listed companies and non-listed companies with more than 500 employees or revenues above €50 million a minimum of 20% of women on boards by January 2014, raised to 40% by January 2017 (Bennouri, De Amicis, & Falconieri, 2020).
2. We recognize that while the reduction in the cost of equity due to increased female representation on the board is statistically significant, the economic magnitude – ranging from 12 to 21 basis points – may appear modest. However, we emphasize that even small reductions in the cost of equity can have meaningful implications for firms, particularly over the long term and at scale.

Supplementary material

The supplementary material for this article can be found online.

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