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CEO daughter and gender capital: evidence from the top 100 high market capitalisation firms in Malaysia under upper echelons theory

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Abstract

Purpose – This study attempted to introduce a novel integrative framework that examined how familial gender exposure (CEO daughters), institutional gender capital (qualified female executives in finance, law, accounting, and economics), and female board directors collectively influence corporate performance in Malaysia. Grounded in upper echelons theory, agency theory, stakeholder theoryand the female socialisation hypothesis, the study reconceptualised gender diversity as a strategic governance mechanism rather than a numeric target.

Design/methodology/approach – The study used 397 firm-year observations from Malaysia's top 100 revenue-generating firms (2018–2021). This study also employed generalised least squares (GLS), propensity score matching (PSM) and Durbin-Watson tests to ensure robust causal inference and address potential endogeneity concerns. Firm performance was measured using Tobin's Q and return on equity (ROE).

Findings – The results revealed that CEOs with daughters improve firm performance. Gender capital boosts governance and female directors enhance profits. Its impact declined slightly during COVID-19.

Research limitations/implications – The study focuses on Malaysia's corporate elite over four years, limiting generalisability. Future research could explore other contexts, timeframes or psychological links between family and leadership.

Practical implications – The findings suggest gender-inclusive, qualified leadership improves oversight, investor trust and firm value—supporting merit-based gender appointments over symbolic quotas.

Originality/value – This study contributes by framing gender diversity through familial ties and institutional expertise. It is among the first to explore how CEOs with daughters and gender capital influence governance and financial outcomes in Malaysia.

Keywords Board diversity, Upper echelons theory, Gender capital, CEO daughters, Covid-19, Integrated reporting, Green washing

Paper type Research article

1. Introduction

Recent social science research highlights how family environments shape behaviours. While parental influence on children is well studied, evidence shows reverse influence—children shaping parents. This study examines whether U.S. corporate executives are influenced by

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raising daughters, supporting the "female socialisation hypothesis" seen in other elites like judges and lawmakers (Glynn and Sen, 2015; Washington, 2008). While combining CEO daughters, gender capital, and female directors offers a novel lens for governance studies, the role of CEO daughters as a proxy for gender exposure needs clearer theoretical and contextual grounding—especially within Malaysia—to strengthen the study's contribution.

Therefore, this study focuses on the role of CEOs' daughters as a channel of gender socialisation and examines how the experience of raising a daughter may shape executives' views and behaviours concerning gender representation in corporate governance (Fiador, 2023; Kaczmarek, 2017). This study introduces the concept of gender capital, defined as gender-relevant expertise and influence within firms—such as female auditors from Big 4 firms or qualified female executives in finance, law, or economics. It examines how gender capital relates to female board inclusion and shifts in gender outcomes.

A CEO having a daughter may adopt more ethical, cautious leadership, prioritizing long-term stability and reputation over short-term gains due to family influence (Adams and Funk, 2012; Beutel and Marini, 1995). Investors may perceive CEOs with daughters as more responsible and stakeholder-focused, boosting trust and confidence. This perception can enhance firm value by attracting investors who prioritize governance, consistency, and reduced risk-taking (Feng *et al.*, 2024).

Firms led by women or with women on boards tend to show stronger governance, better risk management, and ethical decision-making, contributing to improved long-term performance and resilience (Kang *et al.*, 2024; Najaf *et al.*, 2024, 2025; Najaf and Najaf, 1988; Wut *et al.*, 2021). Prior studies have also reported the role of board diversity and regulatory measures that Malaysia has taken to improve the number of women in leadership positions.

In this study, the relationship between the stated factors were assessed by using a sample of top 100 revenue-generating firms in Malaysia (Jayaraman *et al.*, 2011). Widely known for their governance practices and engaging with stakeholders from all backgrounds, the companies make up a significant number of organisations in the corporate sector. The companies are also known for following global standards for accountability and diverse leadership. Thus, these companies are suitable for addressing the study's intention of studying the influence of gender-related leadership characteristics in influencing financial performance and firm value (Isidro and Sobral, 2015).

Malaysia's multicultural background, its unique institutions and corporate governance, uniquely positions Malaysia for an examination into the intersection between gender capital and firm performance (Karim *et al.*, 2023). In Malaysia, traditional gender norms limit women's leadership advancement. Efforts like the MCCG aim to ensure 30% female board representation in public-listed firms (Najaf and Najaf, 2021a; Najaf *et al.*, 2025).

Malaysia's board structures feature concentrated ownership, family control, and low board independence—factors that affect gender initiatives (Najaf and Najaf, 2021b). Malaysia's unique cultural and structural traits offer a context to study gender exposure, gender capital, and board diversity, helping address geographic gaps in corporate governance research. (Hallinger *et al.*, 2018).

The present study provides a case for originality by uniquely integrating three distinct but related concepts, which are familial gender exposure (CEOs having daughters), institutional gender capital (presence of female executives with advanced qualifications), and female board directors, into a unified theoretical framework (Beloskar *et al.*, 2024; Terjesen *et al.*, 2009). The study specifically applies these combined concepts to the Malaysian context by examining their collective impact on corporate performance, which is indeed a relatively underexplored area in existing literature (Khatib *et al.*, 2022).

However, to strengthen the justification of its originality, the authors attempted to elaborate further by.

(1) Clearly highlighting how each dimension (CEO raising daughters, gender capital, and female board directors) individually and collectively expands on the existing literature.

(2) Explicitly identifying the gaps in prior studies that this study uniquely addresses, especially emphasising how the focus on CEO raising daughters provides distinct findings compared to general gender-diversity studies.

(3) Detailing why the Malaysian context is particularly novel by discussing cultural or institutional specificities beyond simply stating its geographic uniqueness, which makes these findings significantly different from previous research in other contexts.

The study used a solid conceptual framework and a robust sample of top Malaysian firms. It applied GLS, PSM, and the Durbin-Wu-Hausman test to address endogeneity, justifying the use of instrumental variables for unbiased results. (Khatib, 2025; Yue *et al*., 2025).

The paper contributes to corporate governance by examining CEO daughters (familial gender exposure), institutional gender capital, and women's board representation (Wu *et al*., 2024). This integrated approach offers a fresh perspective and adds conceptual depth to existing discussions on gender diversity in leadership (Mishra *et al*., 2025; Pandey *et al*., 2025). The use of CEO daughters as a proxy for gender exposure is particularly interesting and adds a unique angle to the analysis.

The study uses upper echelons theory to frame gender diversity as a strategic asset. While Malaysia's context is relevant, the link between local cultural and institutional traits and gender dynamics needs clearer justification. The study offers both theoretical and empirical contributions. Importantly, the findings offer practical value for stakeholders and policymakers in Malaysia. For corporate stakeholders, the study underscores the strategic advantage of integrating gender-inclusive leadership to enhance financial performance. In terms of policymakers, the evidence provides findings to inform the development of governance guidelines and diversity policies aimed at strengthening corporate performance and sustainability in Malaysia's economic landscape. The paper includes literature review, hypotheses, methodology, results with robustness checks, and concludes with key findings and implications.

2. Related literature and hypotheses development

The study uses multiple theories—upper echelons, agency, stakeholder, and female socialisation—and draws on international and Asian research to support its Malaysian context (Huotari and Rüland, 2014). However, the literature review sometimes relies on listing references rather than critically synthesising them to build a cohesive argument (Schryen, 2015; Trieu, 2017).

The study lacks clear positioning in academic debates and does not compare its findings with studies showing different results, especially from Western contexts where CEO-daughter effects may be weaker (Van Doorn *et al*., 2023; Wang *et al*., 2021). Some foundational studies in gender diversity and corporate governance are mentioned but not explored in depth, which could weaken the perceived rigour of the review. Strengthening the critical evaluation of prior literature and clarifying how this study's contributions contrast with or extend existing evidence would improve the overall quality and positioning of the review (Kraus *et al*., 2022; Lim *et al*., 2022).

These elements can influence managerial perspectives, especially in relation to inclusivity and governance. Studies undertaken recently highlight the values that women in top leadership roles offer. The studies focus on strategic thinking, stakeholder engagement, and improved organisational oversight. For example, previous studies have revealed that governance quality and market confidence in firms with boards that have participation of men and women are positively associated with female leadership. Nevertheless, studies that combine the highlighted factors in one single framework are limited, particularly in the Malaysian corporate environment context. The present study attempted to fill the gap by applying the upper echelons theory to understand the impact of different gender experiences among senior leaders on the financial performance of Malaysia's leading firms (Cambrea *et al*., 2023; Mahran and Elamer, 2024; Nguyen *et al*., 2020).

2.1 CEO daughter director and firm performance

Family environments shape behaviour. While parents influence children's values, children can also impact their parents' perspectives (Glynn and Sen, 2015). The study aimed to broaden the understanding of this hypothesis within the context of financial economics, specifically examining how the presence of daughters may impact Malaysian CEOs (Alshurafat *et al.*, 2025; Washington, 2008). The study is expected to offer an understanding of the influence of family structures and gender dynamics on decision-making and corporate leadership in Malaysia. The CEO-daughter effect can influence corporate governance through ethical decision-making and oversight. A utility-maximising CEO model with social preferences provides statistical support for this effect (Fernández *et al.*, 2004; Jaradat *et al.*, 2025; Jayachandran, 2015).

Second, the preferences of the children are internalised by their parents (Doepke *et al.*, 2012; Warner and Steel, 1999). CEOs raising daughters may adopt preferences aligned with women's values. While gender diversity has been studied, the impact of familial gender exposure—specifically daughters—remains underexplored. This study adds originality by linking this influence to established frameworks (Doruk, 2025; Endendijk *et al.*, 2018).

This change could result in improved awareness of diversity and inclusivity. Besides, employee relations and other critical aspects of corporate governance are prioritised. In their organisations, CEOs raising daughters may develop a decision-making environment that is transparent and fair by taking into consideration the concerns stated earlier (Flores *et al.*, 2025).

The hypotheses proposes that men with daughters are more open to gender equity and inclusive roles. In the corporate context, such CEOs are more likely to promote workplace practices that value inclusivity, improve stakeholder engagement, and emphasise approaches related to ethical leadership and sustainable growth (Ng and Sears, 2020). The changes in approach improve governance, reduce risk-taking and improve firm performance. Findings from recent studies support this explanation (Glynn and Sen, 2015; Homroy, 2023). The findings suggest that stronger social and environmental performance contributes to higher firm valuation. Prior research shows that female CEOs positively impact green innovation. These effects can be seen in larger industrial firms, where greater organisational capacity and sustainability initiatives are taken (Mansour *et al.*, 2024).

2.2 Family ownership and corporate governance

Family dynamics influence executive priorities and governance in family-owned firms, which are key drivers of economic growth (Ho *et al.*, 2020). The importance of family businesses to economies should not be overlooked. Family-owned businesses play a dominant role in the corporate environments within East Asian countries (Claessens *et al.*, 2000). Nearly two-thirds of publicly listed firms in the region are characterised by concentrated family ownership, with approximately 60% led by top executives who are related to major shareholders. These firms are often recognised for their stability and resilience, frequently outperforming non-family businesses in maintaining continuity and contributing substantially to Gross Domestic Product (GDP), as well as being key sources of employment globally (Marques *et al.*, 2014). Based on the above evidence, the first hypothesis can be posited as follows.

H1. Ceteris paribus, having a CEO daughter director positively influences firm performance.

2.3 Gender capital directors and firm performance

Gender capital refers to the strategic value of women in key roles with domain-specific expertise (e.g. law, finance), leadership experience, and decision-making power. Unlike tokenism or numeric diversity, it emphasizes qualified, active participation in governance (Moghadam and Haghighatjoo, 2016). *Gender capital* strengthens internal controls, reduces information gaps, and aligns with upper echelons and agency theories. Southeast Asia, especially Malaysia, offers a distinct institutional and cultural context for studying gender, governance, and family firms (Kang *et al.*, 2007; Terjesen *et al.*, 2009). In addition, universities continue to emphasise promoting academic diversity (Khan *et al.*, 2019). Advancement towards gender parity remains sluggish, with disparities at the professor level persisting across academia in various countries, including the United Kingdom (UK) (Fagan and Teasdale, 2021).

Women's underrepresentation in higher academic roles is often linked to personal choices prioritising work-life balance and family responsibilities (Pyke, 2013). Possible barriers preventing women from meeting these promotion criteria may potentially include limited flexibility in work hours (Bourdieu, 1985). Other potential challenges include restricted opportunities for travelling and networking at professional events, career interruptions due to childbirth, and a lack of role models and mentors (Chapple, 2022; Najaf *et al.*, 2024).

Agency theory emphasises information asymmetry and conflicts between executives (agents) and shareholders (principals) (Reddy and Jadhav, 2019). Consequently, diverse boards include a sufficient number of independent directors to monitor and supervise the activities of the board effectively (Aggarwal *et al.*, 2019; Hamilton, n.d.). Only 16% of financial faculty at top 100 U.S. business schools were women, and they were less likely to become full professors. (Sherman and Tookes, 2022). Governments promote gender equality by encouraging women in leadership roles, especially in SOEs, to set an example for other sectors and improve governance through diversity (Butt *et al.*, 2024).

The study used Bourdieu's framework to examine how women's social, cultural, and economic capital affect their advancement to professorship (Barrett and Barrett, 2011). Recent studies from Asia and other underrepresented regions have been included, focusing on gender diversity, sustainability, governance, and corporate performance (Khalaf *et al.*, 2024; Saleh and Maigoshi, 2024). Research helps understand gender diversity in Malaysian corporate settings. According to resource dependency theory, companies with women leaders manage external dependencies better and access broader networks. As a result, the study put forward the following hypothesis.

H2. Ceteris paribus, gender capital positively influences firm performance.

2.4 Gender capital directors moderating role between pandemic and firm performance

Around the world, companies are restructuring their boards of directors to promote greater diversity and build more varied and inclusive decision-making bodies (Kumar and Zattoni, 2016). The growing adoption of board diversity is increasingly linked to improved firm performance (Farrell and Hersch, 2005). The inclusion of diverse perspectives in decision-making processes within firms increases the likelihood of women attaining top leadership positions (Cook and Glass, 2014). Gender diversity on boards enhances strategic adaptability and is linked to better financial performance and firm value, especially when firms aren't under performance pressure (Triana *et al.*, 2014).

Limited cross-country studies suggest a positive association between a greater number of female board directors and improvements in firms' financial performance and overall value (Gordini and Rancati, 2017; Terjesen *et al.*, 2016). Research on European firms cross-listed in the U.S. shows that strong internal audit quality and effective board oversight each help reduce earnings management. However, when both mechanisms operate together, their interaction may unexpectedly lead to higher earnings manipulation (Bajra and Čadež, 2020; Halkos and Nomikos, 2021).

Literature on gender in governance lacks clarity, often merging CEO-daughter exposure, gender capital, and female board presence (Patterson *et al.*, 2025). This limit understanding of their distinct effects on performance, expertise, and governance. This conceptual blending diminishes the ability to assess how individual dimensions influence organisational outcomes and whether they build upon, diverge from, or fill gaps in prior research. As a measure to address this shortcoming, the current study adopts a disaggregated approach by explicitly treating CEO raising daughters, institutional gender capital, and female board membership as separate analytical constructs (Beloskar *et al.*, 2024). This structure enables a clearer assessment of how each factor independently and collectively impacts firm performance, while also aligning with theoretical frameworks such as upper echelons theory, agency theory, and stakeholder theory. The link between gender capital and performance during crises is complex. While diversity can enhance decisions, its impact depends on firm structure and crisis type. Inclusive leadership is especially vital in tough times. Therefore, the study hypothesises as follows.

H3. The COVID-19 pandemic negatively moderates the relationship between gender capital in corporate leadership and firm performance.

2.5 Female directors and firm performance

Countries without strong gender equality histories, like Kenya, have adopted gender quotas. Kenya's 33% quota for state-owned enterprises raised female board representation to nearly 20% by 2015—above the global 15% average (Kumar and Singh, 2020). Board diversity, especially gender diversity, is gaining attention in governance. Women on Fortune 100 boards rose from 16.9% to 25% (Deloitte, 2019).

The study examines family ownership as a moderating factor in corporate governance and performance, based on family share percentage (Ghaleb *et al.*, 2020). As an approach to explain the positive impact of board governance on firm performance, agency theory is often applied (Othuon *et al.*, 2023). Stakeholders value sustainability initiatives for long-term success and improved financial performance (Chininga *et al.*, 2023).

Many firms appointed female relatives to boards rather than merit-based candidates. To address this, SEBI introduced a 2018 mandate requiring at least one independent female director on company boards (Bhattacharyya, 2019; Kim and Starks, 2016). Boards with both men and women show better earnings quality due to stronger oversight and governance from female directors (Beloskar *et al.*, 2024; Gul *et al.*, 2011; Srinidhi *et al.*, 2011). The 2008 crisis, rising corruption, and demand for transparency increased female leadership, as women are seen as less tolerant of corruption (Gras-Gil *et al.*, 2020). Previous studies often blur distinctions between CEO family ties, female leadership, and board diversity, merging concepts like CEO daughters, gender capital, and board diversity without clarifying their unique theoretical roles or effects. This study addresses that gap by categorising these factors as follows.

(1) Familial gender exposure through CEO daughters

(2) Institutional gender capital through field-specific female executives

(3) Female representation on corporate boards

This approach provides a refined framework for understanding the numerous roles of gender in corporate governance and firm performance.

Contingency theory explains board effectiveness as dependent on external and contextual factors, suggesting no universally optimal board structure (Stalker, 1961). Female board representation strengthens monitoring and governance, lowering agency costs. Research also shows gender-diverse boards improve ESG performance and firm outcomes (Saleh and Maigoshi, 2024). Prior studies indicate that ESG practices can reduce a company's risk by improving decision-making and risk management. Gender diversity on board also reduces firm risk (Saleh *et al.*, 2025). Thus, the following hypothesis is suggested.

H4. Ceteris paribus, female directors positively influence firm performance.

2.6 Theoretical framework

Organisations are significantly influenced by personal experiences and characteristics of top executives, as the upper echelons theory suggests (Hambrick and Mason, 1984). In addition, the agency theory (Jensen and Meckling, 2019) and stakeholder theory (Freeman, 2010) were added to understand how corporate governance is affected by gender diversity in leadership roles and how it raises the value of the firm by making sure the goals of executives are in line with the interests of different stakeholders.

Figure 1 shows a distinctive socialisation mechanism shaping executive attitudes and behaviours, particularly the influence of CEOs with daughters, the conceptual framework is improved by highlighting familial gender exposure (Patterson *et al.*, 2025). The framework introduces gender capital—expertise from qualified female executives—and shows how personal and professional gender diversity influences firm performance, especially during crises like COVID-19 (Flores *et al.*, 2025).

2.7 Data and summary statistics

The study uses a quantitative design with fixed effects panel regression (2018–2021) to examine how board gender diversity affects corporate outcomes. It controls for firm performance, governance, and sector, applying strict econometric assumptions and robustness checks for causal interpretation (Guizani and Abdalkrim, 2023).

The primary explanatory variables are CEO daughter, gender capital, and female directors. CEO daughter is a binary indicator that identifies whether the CEO has a daughter serving in a leadership position. Gender Capital is defined by the presence of women in executive or board positions with specialised knowledge in finance, accounting, or economics. Female directors reflects the proportion of women on a firm's board (Firew, 2024). These variables reflect both familial and institutional gender diversity. Studies show female directors are linked to conservative financial strategies, better governance, and, in Malaysia, improved sustainability reporting and CSR—especially in regulated industries (Almaqtari *et al.*, 2024)

The study uses "CEO daughter" as a proxy for the CEO's personal exposure to female perspectives, suggesting such experiences may influence leadership style (Maseda *et al.*, 2022; Nekhili *et al.*, 2018). "Gender capital" is measured by the presence of female executives with

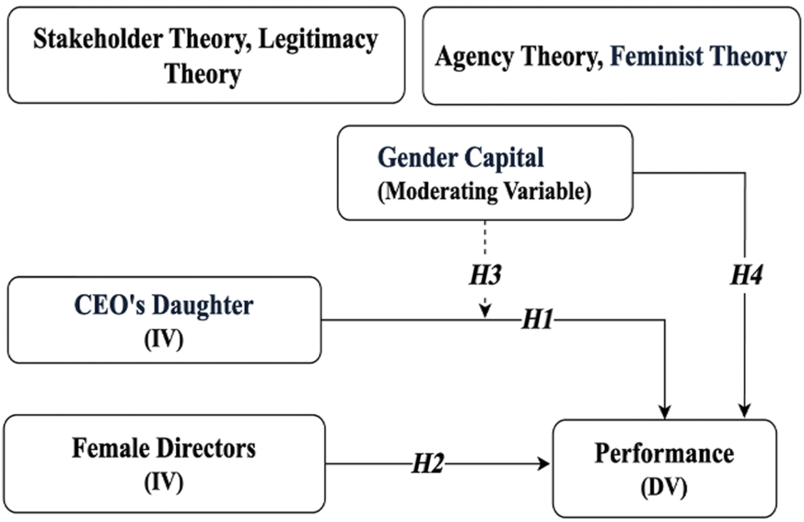

Figure 1. Theoretical framework

advanced qualifications, highlighting professional expertise over basic gender representation. (Kahn, 1995). Female board presence is clearly defined as formal participation in governance, ensuring theoretical alignment and consistent data analysis (Jackson *et al.*, 2003).

In addition to these main variables, the model includes several firm-specific controls: environmental, social, and governance scores; the number of analysts following the firm; leverage (debt-to-equity ratio); firm loss status; firm size (measured by total assets); board size; and board independence (the percentage of independent directors). Industry and year fixed effects are also incorporated into the analysis to account for structural differences and year-to-year variations (Najaf *et al.*, 2021, 2024; Najaf and Najaf, 1988). This framework allows for a comprehensive understanding of how gender diversity influences corporate outcomes within the evolving Malaysian governance landscape.

2.8 Empirical methods for multivariate tests

The models presented examine the influence of gender-related board characteristics on firm performance. Model 1 incorporates multiple key variables, including the presence of a CEO's daughter on the board, Gender Capital directors, female directors, and an interaction term between Gender Capital and the pandemic, to assess their combined effect on performance. Model 2 isolates the effect of CEO daughter directors while controlling for other firm-level variables and fixed effects. Model 3 focuses specifically on the impact of Gender Capital directors on performance outcomes. Model 4 extends this by introducing an interaction between Gender Capital directors and the pandemic to evaluate whether the crisis moderated this relationship. Each model includes control variables and industry and year fixed effects to enhance the robustness of the results.

$$\begin{aligned} Performance = f\,(&CEO\ daughter, Gender\ capital\ directors, Female\ directors,\\ &Gender\ capital\ directors * Pandemic) \end{aligned} \tag{1}$$

$$Performance_{it} = \beta_0 + \beta_1 \text{CEO daughter}_{it} + +\beta_7 CONTROL_{it} + +\delta 1\text{IND} + \delta 2 YE_{it} + \varepsilon_{it} \tag{2}$$

$$Performance_{it} = \beta_0 + \beta_1 \text{Gender Capital directors}_{it} + +\beta_7 CONTROL_{it} + +\delta 1\text{IND} + \delta 2 YE_{it} + \varepsilon_{it} \tag{3}$$

$$\begin{aligned} Performance_{it} = \beta_0 + \beta_1 &\text{Gender Capital directors} {*} \text{pandemic}_{it} + +\beta_7 CONTROL_{it}\\ &+ +\delta 1\text{IND} + \delta 2 YE_{it} + \varepsilon_{it} \end{aligned} \tag{4}$$

All variables used in this study are defined in Appendix A.

3. Empirical results

3.1 Descriptive statistics

Table 1 includes 397 observations, covering both financial performance and governance indicators. Tobin's Q, ROA, and ROE show considerable variation, indicating differing firm performance levels. About 47% of firms have at least one CEO daughter on the board, while the average number of female directors is approximately 2.4. The Gender Capital director's variable appears to be binary with low prevalence. Control variables like leverage and firm size also vary significantly, reflecting heterogeneity across firms (Tonoyan and Boudreaux, 2023).

3.2 Correlation

Table 2 indicators (Tobin's Q, ROA, ROE) are strongly correlated, reflecting consistent measures of financial health. A high correlation (r = 0.889) between CEO daughter and female directors suggests multicollinearity, supporting the behavioural agency view on familial

Table 1. Descriptive statistics (n/397)

Variables	Variable type	Mean	Std. dev	Min	Max	p1	p99	Skew	Kurt
Tobin's Q	Continuous	2.019	2.343	0.593	13.891	0.593	13.891	3.323	14.703
ROA	Continuous	5.628	8.494	−9.034	43.673	−9.034	43.673	2.217	9.389
ROE	Continuous	14.458	24.243	−29.316	118.405	−29.316	118.405	2.562	10.32
Panel B: independent variables of interest									
CEO daughter directors	Dichotomous	0.469	0.5	0	1	0	1	0.126	1.016
Female directors	Dichotomous	2.423	1.286	0	11	0	6	1.073	7.325
Gender capital directors	Dichotomous	0.131	0.337	0	1	0	1	2.192	5.804
Panel C: firm attributes – control variables									
Analyst	Continuous	10.936	7.134	−5.041	24	0	24	−0.008	1.911
E score	Continuous	30.56	37.039	0.664	657.17	0.906	93.453	13.002	219.268
S score	Continuous	31.629	11.838	5.048	76.995	7.83	60.55	0.311	2.921
G Score	Continuous	78.306	14.145	11.096	99.855	29.855	96.117	−1.764	6.605
leverage	Continuous	3.271	2.698	1.117	12.844	1.117	12.844	2.008	6.07
loss	Dichotomous	0.118	0.323	0	1	0	1	2.362	6.581
Firm size	Continuous	7.879	1.591	3.065	12.272	4.463	12.182	0.356	3.238
Board size	Continuous	9.227	2.226	0	16	5	15	0.111	3.285
Big 4	Dichotomous	0.678	0.468	0	1	0	1	−0.76	1.577

Table 2. Correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Tobin's Q	1.000															
ROA	0.737	1.000														
ROE	0.739	0.873	1.000													
CEO daughter directors	0.124	0.052	0.104	1.000												
E score	0.060	0.146	0.052	0.070	1.000											
S score	−0.124	−0.095	−0.042	0.124	0.399	1.000										
G score	0.038	−0.015	0.017	0.136	0.153	0.180	1.000									
Gender capital directors	0.047	−0.011	−0.001	0.079	−0.013	−0.036	0.059	1.000								
Female directors	0.157	0.120	0.147	0.889	0.130	0.164	0.122	0.088	1.000							
Gender capital*pandemic	−0.059	−0.062	−0.045	0.081	−0.023	0.006	0.093	0.705	0.092	1.000						
Analyst	0.272	0.137	0.184	0.247	0.160	0.113	0.405	0.065	0.207	0.094	1.000					
Leverage	−0.126	−0.330	0.038	0.191	−0.131	0.128	0.105	0.099	0.154	0.035	0.125	1.000				
Loss	−0.325	−0.540	−0.521	−0.115	0.020	0.096	−0.038	0.009	−0.172	−0.000	−0.209	0.027	1.000			
Firm size	−0.456	−0.520	−0.350	0.130	−0.109	0.137	0.291	0.061	0.060	0.111	0.321	0.451	0.039	1.000		
Board size	0.067	0.020	0.008	0.477	0.076	0.223	0.184	0.040	0.506	0.080	0.280	0.084	−0.129	0.185	1.000	
Big 4	−0.029	−0.114	−0.131	0.125	−0.004	0.019	0.180	0.055	0.140	0.014	0.033	−0.045	0.126	0.042	0.080	1.000

Note(s): Spearman rho = 0.080

influence. Gender capital and its interaction with the pandemic show moderate correlations but weak direct links to performance, aligning with contingency theory. Analyst coverage and firm size correlate positively with performance, highlighting the need to control for firm characteristics (Mejía-Amaya and Pombo, 2025).

3.3 Regression analysis impact of CEO daughter on firm performance

The results Table 3 show that firms with a CEO daughter tend to perform better, with significant positive effects on Tobin's Q and ROE, indicating enhanced market value and shareholder returns. Environmental performance (E score) consistently contributes positively across all models, while social and governance scores show weaker and less consistent effects. Analyst coverage and firm leverage strongly improve performance, whereas loss-making firms and larger firms exhibit lower profitability and valuation. Overall, the findings suggest that familial female presence in leadership is associated with stronger firm outcomes, supported by robust controls and fixed effects (Al-Okaily, 2024).

3.4 Regression analysis impact gender capital directors on firm performance

The results Table 4 indicate that gender capital on the board is positively associated with firm performance, significantly improving market valuation (Tobin's Q) and shareholder returns (ROE), though the effect on profitability (ROA) is not statistically strong. Environmental scores consistently enhance all performance measures, while social and governance scores show weaker or mixed effects. Analyst coverage and leverage continue to show strong positive contributions, whereas loss-making and larger firms exhibit lower performance. Overall, firms

Table 3. Regression analysis impact of CEO daughter on the firm performance

Variables	Tobin's Q Model 1	ROA Model 2	ROE Model 3
CEO daughter directors	*0.587**** *[0.213]*	1.080 [0.803]	*4.699*** *[2.337]*
E score	0.007*** [0.003]	0.017* [0.010]	0.065** [0.028]
S score	0.005 [0.008]	0.011 [0.030]	0.150* [0.089]
G score	0.000 [0.007]	0.026 [0.027]	0.066 [0.080]
Total analyst	0.095*** [0.015]	0.300*** [0.057]	0.825*** [0.166]
Leverage	0.270*** [0.044]	0.568*** [0.165]	4.353*** [0.480]
Lose	−0.209 [0.294]	−7.739*** [1.108]	−16.897*** [3.227]
Firm size	−1.062*** [0.084]	−3.727*** [0.317]	−12.323*** [0.922]
Board size	−0.027 [0.048]	−0.071 [0.183]	−0.585 [0.533]
Big 4	0.190 [0.195]	−0.282 [0.736]	0.391 [2.144]
Constant	7.892*** [0.739]	28.318*** [2.792]	81.970*** [8.128]
IND, Y.E. fixed effect	Yes	Yes	Yes
Cluster	Firm	Firm	Firm
Observations	397	397	397
R^2	0.387	0.438	0.436

Table 4. Regression analysis impact of gender capital directors on the firm's performance

Variables	Tobin's Q Model 1	ROA Model 2	ROE Model 3
Gender capital directors	*0.626***	1.486	*5.228**
	[0.273]	[1.026]	*[2.991]*
E score	0.007***	0.018*	0.070**
	[0.003]	[0.009]	[0.028]
S score	0.007	0.014	0.160*
	[0.008]	[0.030]	[0.089]
G score	−0.001	0.023	0.053
	[0.007]	[0.027]	[0.080]
Total analyst	0.100***	0.307***	0.860***
	[0.015]	[0.056]	[0.165]
Leverage	0.284***	0.591***	4.465***
	[0.043]	[0.163]	[0.474]
Lose	−0.260	−7.843***	−17.314***
	[0.294]	[1.107]	[3.229]
Firm size	−1.071***	−3.743***	−12.396***
	[0.084]	[0.316]	[0.923]
Board size	0.026	0.024	−0.163
	[0.044]	[0.166]	[0.483]
Big 4	0.241	−0.202	0.785
	[0.194]	[0.730]	[2.130]
Constant	7.611***	27.790***	79.712***
	[0.736]	[2.768]	[8.074]
IND, Y.E. fixed effect	Yes	Yes	Yes
Cluster	Firm	Firm	Firm
Observations	366	366	366
R^2	0.383	0.439	0.434

with greater gender-related experience and networks at the leadership level tend to perform better, supporting the value of gender-based strategic capital in corporate governance.

3.5 Moderation effect of gender capital on firm performance during the pandemic

The interaction results Table 5 show that gender capital has a strong positive impact on firm performance in normal periods, but its effect reverses during the pandemic, with the interaction term significantly negative for market value (Tobin's Q) and shareholder returns (ROE). This suggests that while gender-based leadership capital generally strengthens firm outcomes, crisis conditions may limit its effectiveness or shift strategic priorities. Pandemic alone does not significantly influence performance, reinforcing that the shift arises from interaction dynamics rather than the crisis itself. Control variables behave consistently with prior models, confirming robustness.

3.6 Regression analysis impact of female directors on firm performance

The Table 6 shows that female directors have a significant and positive influence on firm performance across all three measures—Tobin's Q, ROA, and ROE—suggesting their valuable role in strategic leadership. Environmental scores also contribute positively, especially to ROE, while social and governance scores show limited effects. Analyst coverage and leverage continue to be strong performance enhancers, whereas firm size and loss-making status are negatively associated with outcomes. These results support the view that gender diversity on boards can enhance financial performance when controlling for key firm characteristics.

Table 5. Regression analysis impact of gender capital as interaction on the firm's performance

Variables	Tobin's Q Model 1	ROA Model 2	ROE Model 3
Gender capital directors*pandemic	−1.249**	−2.222	−13.163**
	[0.545]	[2.063]	[5.987]
pandemic	0.094	0.594	1.832
	[0.196]	[0.742]	[2.154]
Gender capital directors	1.285***	2.645*	12.153***
	[0.395]	[1.495]	[4.338]
E score	0.007***	0.018*	0.070**
	[0.003]	[0.010]	[0.028]
S score	0.007	0.013	0.160*
	[0.008]	[0.031]	[0.089]
G score	−0.001	0.021	0.049
	[0.007]	[0.028]	[0.080]
Total analyst	0.100***	0.309***	0.868***
	[0.015]	[0.057]	[0.164]
Leverage	0.278***	0.579***	4.394***
	[0.043]	[0.163]	[0.474]
Lose	−0.277	−7.941***	−17.620***
	[0.295]	[1.115]	[3.235]
Firm size	−1.052***	−3.704***	−12.185***
	[0.084]	[0.318]	[0.924]
Board size	0.029	0.023	−0.145
	[0.044]	[0.166]	[0.482]
Big 4	0.221	−0.221	0.607
	[0.193]	[0.732]	[2.125]
Constant	7.408***	27.393***	77.501***
	[0.738]	[2.793]	[8.106]
IND, Y.E. fixed effect	Yes	Yes	Yes
Cluster	Firm	Firm	Firm
Observations	397	397	397
R^2	0.392	0.441	0.442

3.7 Robustness check using generalized least squares

The GLS Table 7 results show that female directors significantly enhance Tobin's Q and ROA, while CEO daughters have a strong positive effect on ROE. Gender capital shows no significant impact across models. Environmental and governance scores contribute modestly, whereas analyst coverage and leverage consistently improve all performance indicators. Loss-making firms and larger firm size reduce firm outcomes, confirming patterns from prior models. Overall, gender diversity, particularly via female directors, appears beneficial under GLS estimation.

3.8 Instrumental variable analysis of board gender diversity and firm performance: 2SLS diagnostics

Table 8 reports 2SLS regression estimates using *CEO duality* and *sales growth* as instruments. The variable *E Score* significantly improves Tobin's Q, while *Lose* (a financial distress proxy) negatively affects it. The Hansen J statistic of 0.000 suggests the model may be *overidentified*, raising concerns about instrument validity. The *Cragg-Donald F statistics are very low*, indicating weak instrument problems, which may bias the 2SLS estimates. Overall, despite rich controls, the endogeneity tests and instrument weakness call for caution in causal interpretation.

Table 6. Regression analysis impact of female directors on the firm's performance

Variables	Tobin's Q Model 1	ROA Model 2	ROE Model 3
Female directors	*0.216**** *[0.079]*	*0.675*** *[0.295]*	*2.175*** *[0.861]*
E score	0.006** [0.003]	0.015 [0.010]	0.061** [0.028]
S Score	0.003 [0.008]	0.004 [0.031]	0.127 [0.089]
G score	0.002 [0.007]	0.034 [0.028]	0.088 [0.081]
Total analyst	0.097*** [0.015]	0.299*** [0.056]	0.835*** [0.164]
Leverage	0.280*** [0.043]	0.574*** [0.162]	4.413*** [0.473]
Lose	−0.135 [0.296]	−7.464*** [1.112]	−16.079*** [3.242]
Firm size	−1.065*** [0.084]	−3.721*** [0.315]	−12.326*** [0.919]
Board size	−0.014 [0.047]	−0.105 [0.176]	−0.576 [0.512]
Big 4	0.172 [0.196]	−0.433 [0.737]	0.054 [2.148]
Constant	7.421*** [0.737]	27.181*** [2.771]	77.764*** [8.080]
IND, Y.E. fixed effect	Yes	Yes	Yes
Cluster	Firm	Firm	Firm
Observations	366	366	366
R^2	0.387	0.443	0.439

3.9 Propensity score matching (PSM) covariate balance assessment between treated and control groups

The Table 9 evaluates covariate balance after applying PSM by comparing means and standardized bias between treated and control groups. All *t*-tests are statistically insignificant ($p > 0.05$), indicating *no major covariate imbalance* post-matching. Bias percentages for all variables remain below the common 20% threshold, supporting good matching quality. Variance ratios (V(T)/V(C)) are mostly close to 1, showing homogeneity in variance across groups. This suggests that the *matching procedure effectively balanced observed covariates*, enabling a more reliable estimation of treatment effects.

3.10 Yearly variation in CEO daughters on corporate boards (2018–2021)

The Figure 2 shows significant year-to-year fluctuations in the presence of CEO daughters on boards between 2018 and 2021, with no clear upward or downward trend. This indicates that such board appointments were inconsistent over time across firms.

3.11 Standardized bias of covariates before and after propensity score matching

This plot Figure 3 shows how matching reduced imbalance across key covariates. Points closer to zero indicate better balance between treated and control groups. Most covariates achieved substantial bias reduction, confirming improved comparability post-matching.

Table 7. GLS

Variables	Tobin's Q Model 1	ROA Model 2	ROE Model 3
CEO daughter directors	0.041	0.386	*2.925****
	[0.106]	[0.332]	*[1.014]*
Gender capital directors	0.123	−0.338	1.247
	[0.106]	[0.443]	[1.186]
Female directors	*0.114****	*0.500****	0.769
	[0.033]	*[0.185]*	[0.489]
E score	0.003	0.014*	0.054***
	[0.002]	[0.008]	[0.020]
S score	−0.005*	−0.009	0.036
	[0.003]	[0.013]	[0.032]
G score	0.002	0.020*	0.027
	[0.003]	[0.011]	[0.024]
Total analyst	0.074***	0.218***	0.616***
	[0.005]	[0.020]	[0.064]
Leverage	0.202***	0.409***	3.070***
	[0.016]	[0.075]	[0.208]
Lose	−0.099*	−7.207***	−14.247***
	[0.057]	[0.508]	[1.190]
Firm size	−0.755***	−2.879***	−8.444***
	[0.042]	[0.178]	[0.521]
Board size	0.028*	−0.009	−0.278*
	[0.015]	[0.066]	[0.168]
Big 4	−0.067	−0.408	−1.930***
	[0.061]	[0.268]	[0.707]
Constant	5.534***	22.652***	60.468***
	[0.297]	[1.269]	[3.007]
Observations	366	366	366
R^2	0.504	0.439	0.434
Wald $\chi^2(12)$	599.33	852.14	711.95
Number of groups	93	93	93
Prob > χ^2	0.0000	0.0000	0.0000

4. Conclusion

This study explores the impact of CEOs appointing their daughters to corporate boards on firm performance. Utilizing a 2SLS model to address endogeneity concerns and applying Propensity Score Matching (PSM) to ensure covariate balance, the research finds *no robust evidence* that CEO daughters on boards significantly enhance financial performance (Tobin's Q, ROA, ROE). While the presence of female directors and gender capital is acknowledged, their independent effects on firm value remain statistically limited. Furthermore, instrument diagnostics indicate potential weakness in IV strength, suggesting cautious interpretation.

4.1 Practical implementation

(1) *Board composition Policies:* Firms should *not assume automatic performance gains* by appointing family members (even daughters) without considering qualifications and governance impacts.

(2) *Governance standards:* Regulators and corporate governance bodies should *focus on transparency and board independence* rather than gender or familial affiliations alone.

Table 8. Durbin-Watson test

Variables	Tobin's Q Model 1	ROA Model 2	ROE Model 3
CEO duality (iv)	2.230	−257.582	−147.763
	[9.151]	[415.375]	[244.200]
CEO daughter directors	0.688	1.366	−2.559
	[0.659]	[47.009]	[27.405]
Gender capital directors	0.665	6.536	1.747
	[0.441]	[20.480]	[11.618]
Female directors	−0.181	28.963	16.742
	[1.042]	[51.081]	[29.995]
E score	0.007***	0.039	0.002
	[0.002]	[0.141]	[0.084]
S score	−0.004	1.425	0.730
	[0.048]	[2.109]	[1.243]
G score	0.011	−1.397	−0.793
	[0.052]	[2.382]	[1.398]
Total analyst	0.033	6.067	3.408
	[0.197]	[9.081]	[5.334]
Leverage	−0.593	6.368	6.893
	[0.777]	[47.122]	[27.438]
Lose	−0.789***	−1.942	−0.046
	[0.231]	[9.123]	[5.364]
Firm size	0.024	−13.796	−7.259
	[0.435]	[20.678]	[12.159]
Board size	−0.160	24.877	14.465
	[1.056]	[44.564]	[26.182]
Big 4	5.991*	171.231	85.419
	[3.558]	[184.483]	[108.085]
Constant	−39.336	58.973	41.581
	[198.761]	[328.477]	[51.555]
Observations	366	366	366
Chi-sq(1) *p*-val	0.7945	00.5368	0.7945
Cragg-Donald Wald *F* statistic)	0.074	0.0041	0.074
Root MSE	20.72	72.94	23.92
Hansen J statistic	0.000	0.000	0.000
Endogeneity tests	0.134	8.249	5.332

Table 9. Propensity score matching (PSM)

Variable	Mean Treated	Control	*t*-test %bias	*t*	V(T)/ *p* > *t*	V(C)
E score	33.360	28.655	12.300	1.130	0.258	14.54*
S score	33.278	33.710	−3.700	−0.330	0.740	1.090
G score	79.563	78.725	5.9	0.550	0.586	1.41*
Analyst	13.012	12.952	0.9	0.080	0.933	1.270
Loss	0.079	0.079	0	0.000	1.000	
Firm size	8.163	8.078	5.5	0.520	0.607	1.95*
Board size	10.430	10.303	6.4	0.590	0.558	1.58*
Big 4	0.721	0.733	−2.600	−0.250	0.805	

(3) *Investor guidance:* Investors should critically assess *family involvement in leadership*, as it may not translate into measurable financial advantages.

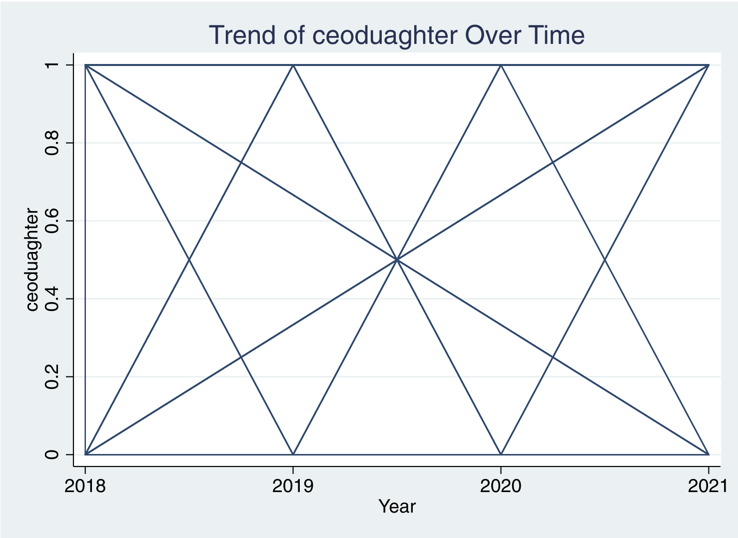

Figure 2. Fluctuation in the presence of CEOs with daughters over time

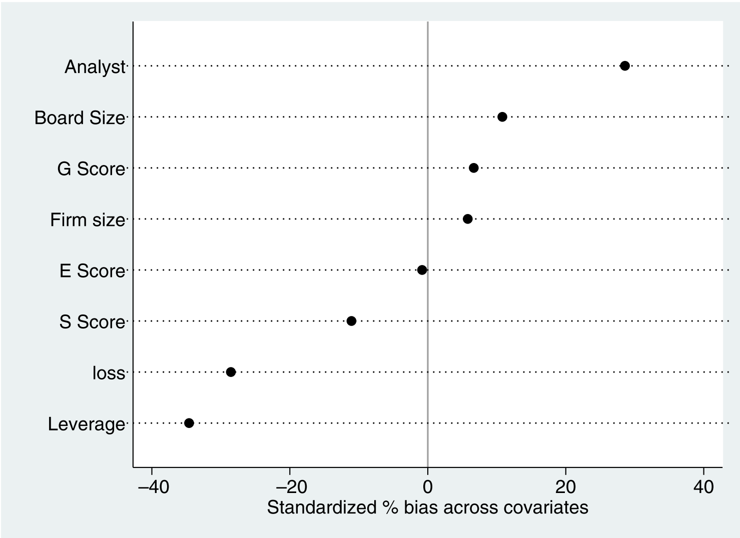

Figure 3. Standardized bias of covariates before and after propensity score matching

(4) *Human capital utilization:* Firms should *leverage female directors based on expertise and diversity value*, not merely relational proximity to executives.

(5) *Instrumental variable use in policy research:* The findings highlight the importance of *valid instruments and careful diagnostics* in causal corporate governance research.

4.2 Future research directions

(1) *Stronger instrumentation:* Future studies should *identify and employ stronger, theoretically grounded instruments* to address endogeneity in board composition.

(2) *Cross-country comparisons:* Comparative studies across different institutional and cultural settings could yield *more generalizable insights.*

(3) *Longitudinal impact:* Examining *long-term effects* of CEO daughters on board—beyond annual performance—may capture delayed governance impacts.

(4) *Qualitative dimensions:* Mixed-method research could explore *qualitative aspects of daughter-director involvement*, such as decision influence or ethical orientation.

(5) *Interaction with board dynamics:* Future work could *how daughter-directors interact with independent directors* or influence risk-taking, innovation, or ESG outcomes.

Supplementary material
The supplementary material for this article can be found online.

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