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Article

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Does family ownership moderate the relationship between board gender and capital structure of Saudi-listed firms?

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ABSTRACT

This article examines how family ownership may influence the nexus between board gender and capital structure. The research data was gathered from the listed companies on the Saudi exchange market from 2013 to 2022 and analysed using the fixed effects framework. More importantly, additional analysis was provided using the generalised method of moments approach. The research findings suggest that board gender exerts an insignificant positive effect on capital structure. The moderation result shows that as family ownership rises, the effect of board gender on leverage may decrease. Thus, these findings remain consistent using diverse capital structure proxies. This outcome implies that gender diversity does not seem to be an important determinant of debt supply in Saudi Arabia. Perhaps, due to the country's unique institutional structure and culture. The result contradicts agency and resource dependency views, which emphasise that gender diversity may enhance firms' strategic choices and facilitate more access to debt capital. Conversely, the moderation analysis implies that family ownership may substitute the stringent monitoring and resource provision role of the board gender. The policy implication of this finding is that family ownership seems to be an important mechanism that may strengthen firms' internal governance and boost creditors' confidence.

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1. Introduction

Capital structure choice is among the contentious topics in corporate finance literature because of its direct link to organisational survival (Ardalan, 2017; Ezeani et al., 2023). It is a mixture or combination of diverse financing options that a business utilises to fund its assets (Myers, 2001; Sani et al., 2020). The initial contributions of Modigliani and Miller (1958) have sparked arguments on the capital structure determinants. One aspect of such determinants is the board composition. It is argued that a board of directors composed of diverse personalities is more likely to be robust in exercising its monitoring and resource provisions roles (Alves et al., 2015; Ozdemir, 2020; Tarus & Ayabei, 2016). This effectiveness may enhance the quality of information provided to the creditors and facilitating more access to debt capital (Hasan et al., 2022; Nadeem, 2019). Hence, on this note, the literature suggested a linkage between board gender and capital structure based on the agency and resource dependency perspectives.

However, empirical literature about the nexus between board gender and leverage shows inconsistent results. In particular, empirical evidence studies reported that female board members embrace high corporate disclosure for greater transparency in firms' governance (Abdullah, 2014; Nwude & Nwude, 2021). This high disclosure may mitigate agency costs of debt, and thus, there is a positive association between board gender and capital structure (Alves et al., 2015; Jaradat, 2015; Yakubu & Oumarou, 2023). On the contrary, it is emphasised that women generally have a lower risk appetite, and their risk aversion

attitude makes them not subscribe to any financing option associated with higher risk. Therefore, board gender and capital structure measured by total debt ratio are negatively associated (Adusei & Obeng, 2019; Ezeani et al., 2022, 2023).

Hence, the motivations for this study are twofold. First, empirical evidence documents inconclusive findings concerning the nexus between board gender and capital structure. Also, there is an ongoing debate that country-specific factors may weaken board functions (Abbas & Frihatni, 2023; Fiador et al., 2012; Gillan, 2006). In other words, the board of directors as an accountability mechanism may be less effective in a setting where the market for corporate controls is ineffective. Therefore, a more robust mechanism needs to be devised for greater efficiency and accountability in firms' governance to attract creditors.

Importantly, drawing from the agency framework, ownership structure monitoring may complement corporate boards' functions (Fama & Jensen, 1983; Gillan & Starks, 2000; Sulimany, 2023). It is stated that owners may compel management to design policies and adopt decisions that enhance their wealth. Specifically, studies reported family ownership monitoring style may shape firms' decisions. The major goal of these shareholders is to improve their investment value and preserve their family goodwill (Rajverma et al., 2019; Sulimany, 2023). They have the incentives to monitor management closely, have long-term investment horizons and a desire to generate more profitability to finance investment opportunities (Al-Duais et al., 2021; Bazhair & Hassan Alshareef, 2022; Subramaniam, 2018). Therefore, the main target of this article is to examine how family ownership may influence the nexus between board gender diversity and capital structure in the Saudi context.

Consequently, this article contributes to the literature in different ways. Specifically, the research evidence suggests that board gender exerts an insignificant positive effect on capital structure. First, the outcome adds to the literature on the current debates regarding the impact of board diversity on organisational efficiency. Also, it was found that Saudi companies with higher family shareholding may focus more on equity financing. Second, this result adds to the little empirical evidence on the linkage between leverage and family ownership. The moderation result shows that family ownership influences the connection between board gender and capital structure. Third, this outcome broadens the corporate governance and finance literature by accounting for the indeterminate association between board gender and leverage. Hence, the evidence offers new ideas to the corporate governance literature by unveiling a fresh perspective on the determinant of capital structure. Fourth, additional analysis was provided using generalised method of moments (GMM), which may enable control of time effects and endogeneity issues, thereby providing a more reliable finding. Lastly, the findings may enable firms to embrace family shareholding to monitor management effectively and ensure corporate governance compliance. This may boost creditors' confidence and lead to a greater supply of borrowings to enhance firm value. Overall, the findings support some segments of the agency literature that argue that family ownership may substitute the disciplinary role of leverage.

The next parts of the article are as follows: a brief description of the Saudi institutional structure was provided, followed by a literature review. The next sections describe the research method, followed by a discussion of empirical results and robustness tests. Finally, the last part provides a concluding remark.

2. Saudi institutional context

Saudi Arabia is a developing nation that is practising an Islamic governance structure. Its economy relies significantly on oil income, and the country is a massive exporter of crude oil (Farumi et al., 2023). The government and family largely control Saudi corporate ownership. Corporate governance codes (CGC) in the country were launched in 2006. Further, these rules were amended in 2017 to strengthen the country's capital market performance (Tawfik et al., 2022). However, many scholars indicated that formal accountability mechanisms in the country's CGC may not be complied with, basically because of the nation's institutional structure that significantly recognises informal relationships (Boshnak, 2021; Farumi et al., 2023). Therefore, the corporate boards' monitoring function may be weak, thereby affecting organisational outcomes.

Industry evidence shows that the Saudi stock market is primarily equity-based, has lesser debt capacity, and is associated with high information asymmetry due to lower disclosure (Bazhair, 2023; Habbash, 2016). Also, it is reported that there are crowding effects of corporate borrowings, which constrain the firms from employing the appropriate capital structure mix to enhance their value (Bazhair, 2023; Boshnak et al., 2023). Further, the country's CGC does not have explicit recommendations on board gender diversity. It is essential to test this emerging issue in the Saudi context, which has a unique institutional setup (Sulimany, 2023; Tawfik et al., 2022). Accordingly, a strand of the literature stated that gender diversity may enhance board decision quality due to superior monitoring (Adusei & Obeng, 2019; Alves et al., 2015). These directors emphasise corporate disclosure, and thus, they pressure firms to reduce information asymmetry between firms and investors (Bazhair, 2023; Yakubu & Oumarou, 2023). This enhancement of information may stimulate lenders to supply more borrowings due to sound corporate governance. Therefore, this article examines how family ownership may shape the nexus between board gender and capital structure choices.

3. Theoretical literature review

The study views the link between capital structure and board gender from an agency theory and resource dependency perspective.

3.1. Agency theory

The agency perspective believes that because of the separation between corporate ownership and the firm's daily management, managers may pursue decisions that may be detrimental to shareholders' wealth maximisation (Fama & Jensen, 1983; Garcia-Meca & Palaco, 2018; Ghardallou, 2022). This framework emphasises that corporate boards are constituted to monitor managers' actions and policies (Boshnak et al., 2023; Jensen & Meckling, 1976). Importantly, it is stated that how a corporate board is composed determines its monitoring capacity. Within the purview of this framework, studies have argued that gender-diversified boards are associated with some benefits that can influence capital structure composition (Adusei & Obeng, 2019; Sani, 2021). It is reported that women board members may be careful monitors because they are relatively more willing to attend board meetings regularly (Adams & Ferreira, 2009). Their peculiar attributes may bring fresh perspectives and knowledge, making more effective board decisions (Alves et al., 2015; Ezeani et al., 2022). Based on agency theory, studies stated that board gender might be positively associated with debt ratio (Abbas & Frihatni, 2023; Minguez-Vera & Martin, 2011; Yakubu & Oumarou, 2023). Therefore, this framework believes that stringent monitoring associated with board gender diversity may encourage debt usage to enhance firm value.

3.2. Resource dependency theory

The resource dependency framework predicts the link between board gender and capital structure choices. This perspective argues that the board of directors may facilitate access to resources from the external environment for organisational development (Hillman et al., 2009; Sani, 2021). This framework emphasises the resource provision function of the corporate board through directors' networking and expertise (Hillman et al., 2000; Pfeffer & Salancik, 2003). The proponents of this school of thought assume that each board member has a unique attribute, and thus, board composition matters a lot in gaining recognition, resources and network to firms (Chijoke-Mgbame et al., 2019; Pfeffer, 1973). Besides, these directors are relatively more accommodating and possess multiple viewpoints in organisational settings (Duppati et al., 2020). These peculiar features of women may enable firms with gender-diversified boards to draw finances to fund investment opportunities (Bhatt & Bhattacharya, 2015). According to this theory, a positive relationship exists between board gender and capital structure (Bazhair, 2023; Sani, 2021). This perspective argued that gender diversity may allow firms to design a more leveraged capital structure because of the greater access to diverse resources from the external environment.

4. Empirical literature review

4.1. Board gender and capital structure

It is argued that a corporate board is gender diversified if it comprises at least one female member (Sani, 2021; Terjesen et al., 2016). Studies regarding how board gender impacts firms' capital structure show inconsistent results. Based on the agency perspective, women board members may be careful monitors because they are relatively more willing to attend board meetings regularly (Adams & Ferreira, 2009). Further, studies reported that these directors emphasised high corporate disclosure for greater transparency in firms' governance (Abdullah, 2014; Nwude & Nwude, 2021). These peculiar attributes of female directors in governance may help minimise agency costs and information asymmetry associated with external funding. Lesser agency conflict and information asymmetry may boost creditors' confidence and encourage debt access to enhance firm value. Moreover, the resource dependency view argues that the networking ability of female directors may serve as a robust mechanism for drawing external funding due to their ability to quickly develop ties with the external environment (Hillman et al., 2009; Sani, 2021). Thus, prior studies suggest a positive association between board gender and capital structure (Alves et al., 2015; Jaradat, 2015; Yakubu & Oumarou, 2023).

In contrast, it is claimed that females are generally less confident in decision-making and have lower risk appetites. Their risk aversion attitude makes it unlikely for them to subscribe to any financing option associated with higher risk. Therefore, some studies maintained that board gender and total debt as a proxy for capital structure are negatively associated (Adusei & Obeng, 2019; Ezeani et al., 2022, 2023). However, a Saudi study indicated an insignificant relationship between board gender and leverage (Bazhair, 2023). Besides, the Saudi corporate governance code appears silent regarding board gender requirements (Bazhair, 2023; Boshnak et al., 2023). This provides an avenue for empirical studies to stress on how gender may influence organisational outcomes in the Saudi context. Based on these divergent views, the study states the following hypothesis:

H1: Board gender is associated with total debt.

4.2. Family ownership and capital structure

This ownership structure is predominant across nations, particularly in developing economies. The primary goal of these shareholders is to enhance their investment value and preserve their family goodwill (Rajverma et al., 2019; Sulimany, 2023). They have the incentives to monitor management closely to maintain the continuity of their firms (Bazhair & Hassan Alshareef, 2022). Also, it is stated that family shareholding may be associated with a long-term investment horizon and a desire to generate more profitability to finance investment opportunities (Al-Duais et al., 2021; Subramaniam, 2018). This desire for high firm value may lessen agency conflict between creditors and family shareholders. Lower agency costs may reduce the cost of debt, thus encouraging debt usage in family-controlled firms (Baek et al., 2016; ElBannan, 2017). Similarly, the literature stressed that the primary motive of family ownership is to gain control of their businesses. Therefore, family-controlled companies may be associated with higher debt to avoid diluting their voting strength and control (Rajverma et al., 2019). In contrast, some studies argued that family companies may prefer internal financing when they require additional funding. They may focus on equity financing to avoid the adverse effects of debt, such as bankruptcy and liquidation (Farooq, 2015; Tawfik et al., 2022). Given that, leverage may decrease as family shareholding rises.

Prior studies indicate that family shareholding in Saudi may be regarded as a strong internal government tool that can shape organisational efficiency (Bazhair & Hassan Alshareef, 2022; Sulimany, 2023). In addition, it is emphasised that family-owned firms may be associated with a higher firm value that can attract lenders to supply their funds due to enhanced monitoring (Boshnak et al., 2023). Given these arguments, the following prediction is made:

H2: family ownership is positively connected to the total debt ratio.

4.3. Moderating effect of family ownership

Ownership structure as a control mechanism originated from the agency theory argument. This viewpoint advocates that monitoring from diverse corporate governance mechanisms may promote organisational efficiency (Shleifer & Vishny, 1986; Sulimany, 2023). Also, this theory regards debt as a control device that can discipline managers and mitigate investment inefficiencies (Bazhair, 2023; Sani et al., 2020). Thus, high debt may subject managers to performance pressure and reduce free cash flow. Also, family shareholding may be an essential monitoring mechanism. These shareholders have long-term investment horizons and a strong desire for greater firm value to maximise performance (Baek et al., 2016; Farooq, 2015).

Additionally, empirical evidence suggests that the exceptional motive and stringent monitoring from these investors may shape firms' internal governance (Waris & Haji Din, 2023). Hence, it is argued that family-owned companies may have lesser agency conflicts, leading to the alignment of diverse interests. A substantial number of studies emphasised that companies with a higher percentage of family shareholding may have a lower debt ratio because this ownership may substitute the desire for leverage as a control tool (Rajverma et al., 2019; Tawfik et al., 2022; Wang & Shailer, 2018). Given these assertions, the following hypothesis is designed:

H3: family ownership may moderate the nexus between board gender and capital structure.

5. Research design

5.1. Data and sampling

The research data was gathered from the listed companies on the Saudi exchange market from 2013 to 2022. The population was 221 companies, and the sampling procedure applied is demonstrated in Table 1.

First, 52 companies in the insurance, banks and utilities organisations were removed from the sample. These firms were not considered because studies argued that they have peculiar regulatory standards that may influence their leverage compositions (Sani et al., 2020; Sulimany, 2023). Also, 49 firms with incomplete corporate governance and financial information were removed from the selection process. In addition, 28 newly admitted firms into the stock market and those with no borrowings in their capital structure were set aside. The sample coverage description is presented in Table 2. Overall, the sample size contains 92 non-financial companies from 12 units.

Table 1. Sampling procedure.

Description	No. of companies
Total population	221
Less: firms in the financial sector	52
-Companies with substantial incomplete data	49
-Newly admitted firms into the stock market and those with no borrowings in their capital structure	28
Final sample	92

Table 2. Sample coverage.

Sector/unit	No. of companies	(%)
Capital goods	7	7.61
Consumer durable	3	3.26
Consumer services	4	4.35
Foods retailing	4	4.35
Foods and beverages	10	10.87
Health	5	5.43
Materials	37	40.22
Media	2	2.17
Real estate	8	8.70
Retailing	3	3.26
Telecommunications	4	4.35
Transport	5	5.43
Total	92	100

Additionally, the data for the study was generated from the following sources. In particular, the corporate governance indicators were gathered manually from the companies' yearly financial statements. Also, the study utilised the Saudi stock exchange (Tadawul) and Eikon websites to collect firm-level data to achieve the research objective.

5.2. Study variables

5.2.1. Dependent variable

Following prior studies, this research uses two standard leverage measures to represent firms' capital structure. The book value of leverage (TDBV) and the market leverage ratio (TDMV). These measures may accommodate divergent views regarding leverage measurement (Fitzgerald & Ryan, 2019; Öztekin & Flannery, 2012). Thus, employing different proxies may provide more consistent and reliable empirical evidence.

5.2.2. Independent variable

Board gender stands as the primary independent variable. This is computed as the ratio of female directors on the companies' board of directors (Alves et al., 2015; Nguyen et al., 2021). This measurement tests the predictions of corporate governance theories that board gender may influence organisational outcomes (Bazhair, 2023; Ezeani et al., 2022). Thus, as the proportion of these directors rises, organisational efficiency may increase.

5.2.3. Moderator variable

Family ownership represents the moderator variable. This variable is determined as the proportion of shares held by families (Al-Duais et al., 2021; Wang & Shailer, 2018). Following the agency perspective, the ownership structure is an important mechanism that can render efficient supervision, which can signal firm quality, thereby enhancing the chances of securing credit from investors (Farooq, 2015; Ibrahim & Zulkafli, 2023).

5.2.4. Control variables

Furthermore, the study controls some variables impacting firms' capital structure decisions. These variables are profitability (ROA), tangibility (TAN), growth (GRW), firm size (SIZE), board size (BS) and board independence (BI). The article expects an adverse relationship between ROA and leverage. This stand is consistent with the argument that the high information cost attached to external funding may discourage borrowing (Bazhair, 2023; Buvanendra et al., 2017; Ghose & Kabra, 2019). Furthermore, it is argued that higher tangibility (TAN) may empower firms to secure substantial borrowing because of the ability to provide collaterals (Öztekin & Flannery, 2012; Rajan & Zingales, 1995). So, leverage may rise as tangibility increases. Also, growth (GRW) may influence capital structure (Appiah et al., 2020; Bazhair, 2023). The literature suggests that high-growth options may push companies to secure more debt capital to fund their investments (Chipeta & Deressa, 2016; Handoo & Sharma, 2014). Moreover, firm size (SIZE) may influence the debt/equity ratio because larger firms may have stable earnings, which may facilitate repayment. Therefore, bigger companies may have a higher debt ratio. Regarding board size (BS), prior studies suggest that smaller boards may enable access to greater borrowing due to entrenched monitoring (Bazhair, 2023; Ezeani et al., 2022). Hence, firms with larger boards may have lower debt because of high agency costs. Lastly, concerning board independence (BI), studies argue that companies should constitute their board of directors with a higher ratio of independent directors (Feng et al., 2020; Raheja, 2005). These directors may shape firms' internal governance due to their stringent monitoring and expertise advice (Buvanendra et al., 2017; He & Kyaw, 2018). Thus, BI and leverage are positively related. Table 3 displays the measurement of the study variables.

Table 3. Measurement of the study variables.

	ACRONYM	Measurement	Expected sign
Dependent variable:			
Book value of leverage	TDBV	Book value of total debt over total assets.	
Market leverage	TDMV	The market value of common stock plus the book value of total debt.	
Independent variable:			
Board gender	BG	The number of female directors over the total number of directors.	+
Moderator variable:			
Family ownership	FO	The number of family shares over total common stock.	+
Control variables:			
Profitability	ROA	Net profit before interest and taxes to total assets.	–
Tangibility	TAN	The total fixed assets over total assets.	+
Growth	GRW	capital expenditure over total assets.	+
Firm size	SIZE	The logarithms of the sampled firms' total assets.	+
Board size	BS	number of directors on the boards of the sampled companies.	–
Board independence	BI	the number of independent board members divided by the total board size.	+

5.3. Analytical framework

Given the nature of the generated data, which comprises the time series and cross-sectional units, the panel data method seems more desirable for the study. The panel data approach is efficient because it is associated with some benefits of reducing multicollinearity and gives more data points (Bond, 2002; Hsiao, 1985; Pesaran, 2015). This enhanced efficiency may produce more consistent and reliable estimates. Further, the study used the Hausman test to determine the most suitable framework between random and fixed effects. The test outcome suggested that the fixed effects framework is more suited for this study. The baseline model of the fixed effects is given as:

$$\gamma_{it} = \theta + \beta X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

γ_{it} is the total debt ratio for a company i at time t , θ is the intercept, βX_{it} is the vector of the variables set, including control variables, μ_i is the firm fixed effect and ε_{it} is the stochastic error.

Importantly, this research employs family ownership as the intervening factor in the nexus between board gender and capital structure. A moderator is a third variable that influences the direction or strength of the link between a criterion variable and a predictor variable (Baron & Kenny, 1986). The criteria of this analysis is that moderation sets in when the interactive term (path c) is statistically significant (Aguinis et al., 2017; Fairchild & Mackinnon, 2009). Thus, following prior studies, the research adopts the moderation model shown in Eq. (2):

$$\gamma_{it} = \delta + \beta_1 X_{it} + \beta_2 \theta_{it} + \beta_3 X \theta_{it} + \varepsilon_{it} \quad (2)$$

γ_{it} is the dependent variable for firm i at time t , δ the intercept, X_{it} is the vector of the variables set, including control variables, θ_{it} is the moderator variable, $X\theta$ is the interaction term and ε_{it} is the stochastic error.

6. Empirical results

6.1. Descriptive analysis

Table 4 illustrates the summary statistics of the variables in the specified model. The mean ratio for the book value of total debt (TDBV) and market value of total debt (TDMV) are 22% and 24%, respectively. This finding implies that most of the sampled companies are underleveraged. Thus, they rely significantly

on equity capital to finance their operations. This evidence further signifies that Saudi firms face difficulty accessing debt capital due to the country's underdeveloped debt capital market.

Moreover, according to the descriptive results, the average board gender (BG) of 0.09 suggests that female directors represent 9% of the board members. Return on assets (ROA) registers an average ratio of only 5%, while tangibility (TAN) indicates that most of the sampled firms invested about 51% in fixed assets within the period under review. The firms' average growth rate (GRW) is approximately 25%. Firm size (SIZE) demonstrates a minimum and maximum of 5.8 and 14.03, respectively. The number of directors on the board (BS) ranges from 3 to 13. The average proportion of independent board members (BI) across the sampled firms denotes about 44% of the total board members. At the same time, the family ownership (FO) displays an average of 13% of the firms' common stock.

6.2. Correlation results

The correlation matrix in Table 5 aimed at ascertaining the correlations among the study variables to avoid multicollinearity in the specified model. The evidence signifies that the extent of the association among the explanatory variables is lower. In this context, the literature suggests that multicollinearity exists when the degree of association between explanatory variables is above 80% (Gujarati & Porter, 2010). Hence, this analysis reveals a lesser risk of multicollinearity across the explanatory variables specified in the model.

6.3. Regression analysis

Many tests were carried out before performing the regression analysis. Firstly, the existence of a multicollinearity problem using the Variance Inflation Factor (VIF) was determined. The VIF of the variables spanned from 1.01 to 1.21, suggesting that there is no multicollinearity problem. The White and Wooldridge Lagrange-Multiplier tests were also undertaken to detect if heteroscedasticity and serial correlation exist. The outcome of these tests appeared significant, indicating heteroscedasticity and serial correlation in the specified model (Drukker, 2003; White, 1980). A robust regression option was applied to address these issues in order to obtain more consistent and reliable estimates (Drukker, 2003; Hoechle, 2007).

Table 4. Descriptive statistics.

	TDBV	TDMV	BG	ROA	TAN	GRW	SIZE	BS	BI	FO
Mean	0.22	0.24	0.09	0.05	0.51	0.25	9.34	8.41	0.44	0.13
Max.	0.75	0.81	0.42	0.42	0.87	0.71	14.03	13.00	0.87	0.95
Min.	0.00	0.00	0.00	-0.64	0.06	0.07	5.68	3.00	0.00	0.00
Std. Dev.	0.11	0.16	0.76	0.09	0.27	0.87	0.79	1.51	0.21	0.18
Observ.	920	920	920	920	920	920	920	920	920	920

Note: TDBV: the book value of total debt; TDMV: the market value for debt; BG: board gender; ROA: return on assets; TAN: Tangibility; GRW: growth; SIZE: firm size; BS: board size; BI: board independence; FO: family ownership.

Table 5. Correlation analysis.

	TDBV	TDMV	BG	ROA	TAN	GRW	SIZE	BS	BI	FO
TDBV	1.00									
TDMV	0.98 ^a	1.00								
BG	0.12 ^a	0.17 ^a	1.00							
ROA	-0.16 ^a	0.14 ^a	-0.08 ^c	1.00						
TAN	0.24 ^a	0.23 ^a	0.14 ^a	-0.06 ^c	1.00					
GRW	0.18 ^a	0.18 ^a	-0.05 ^c	0.02	-0.04	1.00				
SIZE	-0.38 ^a	-0.28 ^a	0.01	0.04	0.05 ^c	0.23 ^a	1.00			
BS	0.06 ^c	0.09 ^c	-0.08 ^b	-0.06 ^b	-0.06	0.05 ^c	-0.32 ^a	1.00		
BI	0.03	0.04	-0.01	0.04	-0.12 ^a	0.23 ^a	0.03	-0.11 ^a	1.00	
FO	0.06 ^c	0.08 ^b	-0.06 ^c	0.03	-0.02	-0.01	0.05 ^c	0.03	-0.02	1.00

^{a, b, c} Demonstrate significance @ 1%, 5% and 10%, respectively.

Note: TDBV: the book value of total debt; TDMV: the market value for debt; BG: board gender; ROA: return on assets; TAN: Tangibility; GRW: growth; SIZE: firm size; BS: board size; BI: board independence; FO: family ownership.

The regression analysis is reported using the fixed effect framework, as the Hausman test suggested. The analysis is classified into model (1), which is the direct impact of board gender on the book value of total debt (BVTD). According to the evidence, board gender has a positive but insignificant relation with total debt and does not support **H1**. The results contradict agency and resource dependency views (Abdullah, 2014; Alves et al., 2015; Jaradat, 2015; Nwude & Nwude, 2021; Yakubu & Oumarou, 2023). These frameworks emphasise that gender diversity may enhance firms' strategic choices and facilitate more access to debt capital. This weak relationship may also be attributed to the smaller number of women directors on the Saudi board of directors. Thus, their influence on corporate decisions may not be that much. Hence, the finding implies that gender diversity may not be a strong determinant of capital structure in Saudi firms because of the country's peculiar culture and institutional setting.

Concerning the control variables, the result agrees that profitable companies might utilise lower debt, given the relative external financing costs. Thus, a higher profitability may lead to a lower leverage (Bazhair, 2023; Ghose & Kabra, 2019). Also, the results reveal that Saudi firms with more significant investments in tangible assets are better positioned to provide collateral to secure debt financing (Chakrabarti & Chakrabarti, 2019; Fitzgerald & Ryan, 2019; Rajan & Zingales, 1995). The evidence indicates that growth positively and significantly affects total debt. This finding suggests that high-growth options may push Saudi firms to issue more debt to fund their investments (Chipeta & Deressa, 2016; Handoo & Sharma, 2014). Also, the outcome lends credence to the conjecture that bigger firms tend to employ more leverage because they comparatively have steady earnings and are more diversified (Ibrahim & Zulkafli, 2023; Matemilola et al., 2018).

In contrast, board size is inversely associated with capital structure. This means that larger boards may have cognitive conflicts, which can signify poor corporate practices, leading to lower leverage (Bazhair, 2023; Ezeani et al., 2022). Regarding board independence, this evidence accords with the agency theory assumption that robust supervision from these board members may force managers to adopt capital structure decisions with more debt to promote firms' value (Buvanendra et al., 2017; He & Kyaw, 2018).

More importantly, model (2) regression results focus on the interaction model analysis. The moderator variable (FO) and the interaction term (BG*FO) were inserted in this model to examine their effects. The family ownership, which is the moderator variable, displays a negative coefficient, disagreeing with **H2**. This evidence shows that the total debt ratio may decrease as family ownership rises. The outcome is consistent with the argument that these shareholders may focus on equity financing to avoid the adverse effects of debt, such as bankruptcy and liquidation (Farooq, 2015; Tawfik et al., 2022). Therefore, Saudi firms with higher family ownership may have lower debt. Also, the interaction term (BG*FO) appears negative and significant, supporting **H3**. This evidence suggests that family ownership may influence the nexus between board gender and capital structure. Thus, it implies that as family ownership rises, the impact of board gender on capital structure may reduce. Hence, gender diversity may not be an essential determinant of debt supply in Saudi firms with higher family shareholding. Perhaps, due to the unique institutional structure and culture of the country. It suggests that the monitoring and resource provision of board gender may be substituted by careful monitoring from these shareholders (Rajverma et al., 2019; Tawfik et al., 2022; Wang & Shailer, 2018). The policy implication of this finding is that family ownership seems to be an important mechanism that can strengthen firms' internal governance in the Saudi context.

7. Additional evidence

This article applied a different measure of capital structure known as the market value of total debt (TDMV) to confirm the robustness of the research evidence. Using the MVTD will enable this study to accommodate the different views regarding capital structure measurement (Fitzgerald & Ryan, 2019; Matemilola et al., 2018). Like the earlier results in Table 6, this regression analysis in Table 7 is based on a fixed effects approach.

Model (3) in Table 7 reported the evidence of the direct effect of board gender on the market value of total debt (MVTD) as a proxy for capital structure. The model (4) analysis captures the interaction effect. Consistent with the evidence in Table 6, this additional analysis in model (3) shows that gender diversity maintains its insignificant impact on capital structure. In the moderation analysis, family

Table 6. Regression results using fixed effects (BVTD).

Variables	Model (1)	Model (2)
	Coefficient/standard error	Coefficient/standard error
Constant	0.4813 (0.0433)***	0.4817 (0.2758)*
BG	0.0008 (0.0035)	0.0009 (0.0029)
Moderator variable:		
FO	—	−0.1184(0.0476)**
Interaction term:		
(BG*FO)	—	−0.1645 (0.0690)**
Control variables:		
ROA	−0.2991 (0.0169)***	−0.2996 (0.0261)***
TAN	0.1376 (0.0065)***	0.1374 (0.0493)***
GRW	0.0239 (0.0112)**	0.0239 (0.0129)*
SIZE	0.0637 (0.0320)*	0.0639 (0.0297)**
BS	−0.0016 (0.0018)	−0.0016 (0.0027)
BI	0.1288 (0.0166)***	0.1289 (0.0124)***
R-squared	0.5335	0.6347
F-statistics	215.60	122.23
Prob > F	0.000	0.000
Time dummies	Yes	Yes
Industry effects	Yes	Yes

***, **, *Indicate significance at 1%, 5% and 10%, respectively.

BVTD: the book value of total debt; BG: board gender; ROA: return on assets; TAN: Tangibility; GRW: growth; SIZE: firm size; BS: board size; BI: board independence; FO: family ownership.

Note: Model (1) presents the regression estimates of the direct relationship between board gender and capital structure, while model (2) displays the interaction effect results.

The numbers in parentheses are standard errors robust to heteroscedasticity.

Table 7. Regression results for robustness check using MVTB (fixed effects).

Variables	Model (3)	Model (4)
	Coefficient/standard error	Coefficient/standard error
Constant	0.5072 (0.2639)*	0.5176 (0.1941)**
BG	0.0006 (0.0032)	0.0009 (0.0036)
Moderator variable:		
FO	—	−0.0129 (0.0047)***
Interaction term:		
(BG*FO)	—	−0.1689 (0.0501)***
Control variables:		
ROA	−0.2811 (0.02772)***	−0.2812 (0.0276)***
TAN	0.1348 (0.0087)***	0.1349 (0.0086)***
GRW	0.0257 (0.0119)*	0.0257 (0.0109)**
SIZE	0.0676 (0.0285)**	0.0677 (0.0286)**
BS	−0.0009 (0.0028)	−0.0009(1.7566)*
BI	0.1334 (0.0621)**	0.1335 (0.0426)***
R-squared	0.5229	0.6230
F-statistics	180.39	158.18
Prob > F	0.0000	0.0000
Time dummies	Yes	Yes
Industry effects	Yes	Yes

***, **, * Indicate significance at 1%, 5% and 10%, respectively.

MVTB: The market value of total debt; BG: board gender; ROA: return on assets; TAN: Tangibility; GRW: growth; SIZE: firm size; BS: board size; BI: board independence; FO: family ownership.

Note: Model (3) presents the regression estimates of the direct relationship between board gender and capital structure, while model (4) displays the interaction effect results.

The numbers in parentheses represent standard errors robust to heteroscedasticity.

ownership still appears negative and significant, while the interaction term maintained its negative impact, as found earlier. Consequently, the empirical results using the book and market value of debt appear consistent and robust.

8. Conclusion

A substantial number of studies reported that the Saudi stock market is primarily equity-based, has lesser debt capacity, and is associated with high information asymmetry. Also, it is argued that there are

crowding-out effects of corporate borrowings, which constrain the firms from employing the appropriate capital structure mix to enhance their value. Further, the country's corporate governance code has no specific recommendation on board gender diversity. Given its unique institutional setup, testing this emerging issue in the Saudi context is important. More specifically, the ownership structure has been reported to complement the board of directors' functions because of its incentive to promote organisational efficiency. Family ownership in Saudi Arabia is also prevalent, and prior studies have unveiled its monitoring capacity. Therefore, this article examines how family ownership may influence the nexus between board gender and capital structure. The research data was gathered from the listed companies on the Saudi exchange market from 2013 to 2022 and analysed using the fixed effects framework. More importantly, additional analysis was provided using the GMM approach.

The research findings suggest that board gender exerts an insignificant positive effect on capital structure. The policy implication of this result is that gender diversity does not seem to be an important determinant of debt supply in Saudi Arabia. Perhaps, due to the unique institutional structure and culture of the country. Further, it was found that family ownership may discourage debt supply. Saudi firms with higher family shareholding may focus more on equity financing. The moderation result reveals that family ownership may substitute the stringent monitoring and resource provision role of the board gender. This evidence implies that greater attention should be given to family ownership monitoring capacity. Overall, the findings support some segments of the Agency literature that argue that ownership structure may substitute the disciplinary role of leverage.

Finally, this article must acknowledge that its findings may be associated with a few shortcomings. In particular, the research centres on non-financial firms, so future works are expected to use financial companies to determine if the same evidence can be found. Further, the article used family ownership as an intervening variable. In this way, future research should employ government or institutional ownership as a moderator variable to explore their effects on the board gender-capital structure nexus. Likewise, this research focuses on Saudi-listed firms. Thus, the same study can be undertaken on other developing nations to validate the empirical results reported. Lastly, future research may focus on firms with concentrated family firms to verify or confirm the findings of this research.

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Data availability

The study data can be found at the Tadawul website: <https://www.saudiexchange.sa/wps/portal/tadawul/home>.

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