Female Directors' Role on Capital Structure and Firm Performance Nexus: New Evidence from an Emerging Market - Nigeria

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Abstract

This study investigates the moderating role of female board directors on the relationship between capital structure and firm performance in Nigerian non-financial firms. The study builds on previous research that highlights the importance of gender diversity in corporate governance and its potential to enhance firm outcomes. Using data from 70 non-financial firms listed on the Nigerian Exchange Group from 2012 to 2021, the study applies the two-step system GMM approach to mitigate endogeneity issues. It focuses on various capital structure measures, such as debt-to-asset and debt-to-equity ratios, and examines their relationship with firm performance, with the presence of female directors as a moderating variable. The study finds that female directors moderate the relationship between capital structure and firm performance, improving the impact of debt levels on profitability while reducing market performance. This study contributes to literature by providing new evidence from an emerging market context on how board gender diversity influences financial decision-making and firm outcomes in Nigeria.

Keywords: Capital Structure, Firm Performance, Female Board Directors, Corporate Governance, Nigeria

*We acknowledge the use of Artificial Intelligence (AI) to assist in improving the clarity and enhance grammatical structure. While AI was used as a tool to refine the parts of the content, we take full responsibility for the final version of the study, including any interpretations, errors or conclusions presented.

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I. Introduction

Over the past few decades, the study of capital structure and its impact on firm performance has remained central to corporate finance, particularly in emerging markets where institutional frameworks and governance structures are continuously evolving. Traditional theories, such as the Modigliani-Miller theorem, emphasize the irrelevance of capital structure under certain market conditions (Abdullah and Tursoy, 2021; Dao and Le, 2023). However, market imperfections, such as taxes, bankruptcy costs, and information asymmetries, suggest a significant relationship between capital structure decisions and firm performance (Dinh, Nguyen & Hosseini 2019; Wojewodzki, Boateng & Brahma 2020b). While much research has focused on this direct relationship (Rani, Yadav and Tripathy, 2020; Zhang et al., 2022), recent studies suggest that corporate governance factors, particularly gender diversity on boards, can also influence the capital structure-performance relationship (Le and Phan, 2017; Mavruk and Sjögren, 2021). The increasing presence of female directors on corporate boards has introduced new dynamics in governance practices, challenging conventional views and prompting scholars to explore how gender diversity interacts with financial strategies, including capital structure decisions, to affect firm performance (Almaqtari et al., 2021; Detthamrong, Chancharat and Vithessonthi, 2017). Despite the growing literature on board diversity and corporate performance, limited attention has been given to the moderating role of female board directors in the relationship between capital structure and firm performance, particularly in emerging markets like Nigeria. We seek to address this gap by examining how female board director presence moderates the relationship between capital structure and firm performance in non-financial firms in Nigeria.

Our study is motivated by the need to understand whether the observed benefits of board gender diversity, such as reduced information asymmetry and improved risk management, extend to moderating the effects of capital structure on firm performance. Specifically, we focus on the interaction between female board presence and multiple measures of capital structure, such as the equity-to-asset ratio, debt-to-asset ratio, and debt-to-equity ratio, to determine whether these dynamics result in better market value and profitability outcomes for firms. Given the unique socio-economic and regulatory context of Nigeria, this study provides an opportunity to explore whether the findings from developed markets hold true in an emerging market setting, thereby contributing to the broader discourse on corporate governance and capital structure dynamics. Hence, our objectives are twofold: First, to examine the direct impact of capital structure on firm performance using market value (Tobin's Q) and profitability (return on assets) as performance measures; and second, to investigate the moderating effect of female board director presence on these relationships. These objectives are grounded in the premise that governance mechanisms, particularly board diversity, could influence financial decision-making and outcomes (Almaqtari et al., 2021; Anh, Duong and Yoon, 2018). Prior studies in developed markets have shown that female directors can enhance firm performance by bringing diverse perspectives and reducing agency conflicts performance (Almaqtari et al., 2021; Detthamrong, Chancharat and Vithessonthi, 2017), but this study seeks to test these findings in the context of Nigerian non-financial firms, where institutional and cultural factors may alter the effectiveness of gender diversity as a governance tool.

Nigeria's corporate environment presents distinct challenges, including less stringent regulations, lower investor protections, and concentrated ownership, which differentiate it from the developed markets previously examined in the literature (Cappa, Cetrini and Oriani, 2020; Owusu Adusei and Amoa Gyarteng, 2023). These conditions suggest that the impact of female board director presence on firm performance could manifest differently, providing a distinct contribution to the understanding of capital structure dynamics in emerging markets. Furthermore, recent regulatory initiatives by the Securities and Exchange Commission (SEC) aimed at increasing gender diversity on corporate boards in Nigeria present an opportunity to assess whether these policies are achieving their intended outcomes of enhancing governance and firm performance. Drawing from feminist theory, trade-off theory, and agency theory, we provide comprehensive insights into how board diversity interacts with capital structure decisions to influence firm performance. Feminist theory suggests that female representation in leadership contributes to more balanced decision-making processes, reducing managerial bias and promoting ethical governance (Grosvold, Rayton and Brammer, 2016). Trade-off theory posits that firms seek to balance the costs and benefits of debt and equity to optimize their capital structure, and female directors may influence this balance by providing diverse perspectives on risk management (Kumar, Sureka and Colombage, 2020). Agency theory supports the moderating role of female directors by suggesting that gender diversity can mitigate agency conflicts between managers and shareholders, thereby enhancing firm performance (Abdullah, 2014).

Thus, we contribute to the literature by providing new evidence on the moderating role of female board presence in the relationship between capital structure and firm performance in an emerging market

context. We add to the understanding of how gender diversity impacts financial outcomes by examining previously underexplored settings and combinations of variables, such as the equity to asset ratio, debt to asset ratio, and debt to equity ratio. Particularly, we find that female board directors' presence significantly alters or moderates the relationship between capital structure and firm performance. Our findings show that female board presence enhances profitability by positively moderating the mixed effects results of equity to asset as well as debt to equity ratios and performance nexus, suggesting that gender diversity contributes to improved governance practices and operational efficiency. Furthermore, to ensure the robustness of our findings, we employed alternative measures of firm performance, such as market value added, which consistently supported our results, confirming that the effects of capital structure on performance hold across different performance indicators in the presence of a female board directors. The remainder of the paper is structured as follows: The next section discusses the theoretical framework and hypotheses development, followed by a description of the sample and the variables used in the econometric model. Subsequently, the analysis and empirical results are presented, and finally, the study concludes with implications for practice and policy.

II. Theory and Hypotheses Development

Capital Structure and Firm Performance

Capital structure refers to how a firm finances its overall operations and growth through different sources of funds (Zhang et al., 2022). The capital structure decisions directly influence a firm's risk and return profile, thereby affecting its financial performance. Performance metrics like Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q are often used as proxies of firm performance to measure the impact of capital structure on firm performance (Kumar, Sureka and Colombage, 2020; Mehzabin et al., 2023). The implications of capital structure are crucial as higher debt levels may provide tax benefits but increase financial risk, while lower leverage can signal a conservative approach but limit growth potential. On one hand, the trade-off theory is central to understanding the relationship between capital structure and firm performance. According to this theory, firms balance the costs and benefits of debt to achieve an optimal capital structure (Kraus and Litzenberger, 1973). Debt provides a tax shield on interest payments, but excessive reliance on debt increases bankruptcy risk (Bajaj, Kashiramka and Singh, 2018). Firms are expected to increase debt to capitalize on the tax shield until the marginal benefit of debt equals the marginal cost of potential financial distress. This balancing act has a direct impact on firm performance, as evidenced by empirical studies in various industries (Abdullah and Tursoy, 2021). The trade-off theory also suggests that the decision to utilize debt depends on a firm's financial stability and the risk profile of its industry. Firms in capital-intensive industries tend to have higher leverage because they benefit more from tax shields (Mehzabin et al., 2023). Therefore, applying this theory in the context of firms in Nigeria implies that companies will optimize their capital structure to balance between tax benefits and financial risk, ultimately enhancing performance.

On the other hand, research on the relationship between capital structure and firm performance in various contexts has yielded mixed results. For instance, Mangudhla, Dodoo and Kumi (2023) examined non-financial firms in Ghana and found that higher levels of debt negatively impacted ROA, supporting the trade-off theory. Similarly, (Ayalew, 2021) reported positive findings in the banking sector in Ethiopia, where the debt ratio positively affected profitability, indicating that optimal capital structure improves firm performance. On the contrary, Le and Phan (2017b) observed a negative relationship in Vietnam's non-financial firms, where higher debt led to lower performance due to underdeveloped financial markets and weak governance structures. Further evidence comes from Rani, Yadav and Tripathy (2020), who explored the speed of capital structure adjustment in India. They found that Indian firms slowly adjust their capital structures toward optimal levels, which affects their financial outcomes. Likewise, Zhang et al. (2022) in China's e-commerce sector reported that short-term debt positively affects performance, while long-term debt has a minimal or negative impact. These variations suggest that the capital structure-performance relationship is influenced by industry characteristics, governance, and financial market maturity. However, in Nigeria's non-financial sectors, the relationship between capital structure and firm performance is compelling due to several factors. Firms in these sectors face high operational costs, largely driven by infrastructure deficits and economic volatility, requiring effective capital structure management to maintain competitiveness and profitability. Furthermore, those with optimal capital structures benefit from lower financial distress and better access to finance under more favorable terms, improving overall performance. Hence, managing debt and equity efficiently is crucial to enhancing the performance of these firms. On the bases of the foregoing, we formulate our first hypotheses as:

H1: Capital structure significantly drives the performance of listed non-financial firms in Nigeria.

Female Board Directors' Presence and Firm Performance

Female board directors' presence refers to the representation of women on corporate boards, typically measured as the percentage of women or a binary variable indicating the presence of at least one female director. In recent years, the importance of gender diversity on boards has been emphasized due to its potential to improve decision-making, risk management, and financial performance (Saeed et al., 2022). The inclusion of women in governance roles is argued to lead to better corporate governance and improved firm outcomes (Ngatno, Apriatni and Youlianto, 2021). The feminist theory underpins the argument that gender diversity can positively influence corporate governance and firm performance. This theory posits that women bring unique perspectives and leadership styles that foster inclusiveness, accountability, and a broader consideration of stakeholders (Grosvold, Rayton and Brammer, 2016). Feminist theory suggests that firms with female directors may be better positioned to make ethical decisions, reduce risks, and improve financial outcomes (Abdullah and Tursoy, 2021). The presence of women on boards also challenges traditional male-dominated governance

structures, promoting fairness and equity in decision-making. In the Nigerian context, the presence of female board directors may lead to improved governance and performance especially for non-financial firms. As these firms operate in capital-intensive industries, the inclusion of women on boards may provide a more balanced approach to risk-taking and strategy development, enhancing overall performance (Saeed et al., 2022).

Studies investigating the relationship between female board directors and firm performance have produced diverse findings. For example, Saeed et al. (2022) found a positive impact of female directors on profitability in manufacturing firms in Pakistan, indicating that gender diversity enhances decision-making and governance. Similarly, Abdullah (2014) reported that female representation improved governance and financial performance among Malaysian firms. In contrast, Almaqtari et al. (2021) found no significant effect of female directors on firm performance suggesting that the relationship may vary based on governance structures and cultural factors. Further evidence from Ngatno, Apriatni and Youlianto (2021) shows that in Indonesia, female directors positively moderated the relationship between governance practices and firm performance in rural banks. Likewise, in Ethiopia, Ayalew (2021) found that gender diversity on boards improved governance but had a limited effect on financial outcomes. These findings suggest that while gender diversity is generally viewed as beneficial for governance, its impact on firm performance is context dependent. In Nigeria's non-financial sector, the presence of female board directors holds the potential to significantly impact firm performance due to several context-specific issues. Nigerian firms often operate in a complex socio-economic environment where gender inequality remains a persistent challenge, with women historically underrepresented in leadership positions. Female board members may offer unique perspectives and approaches, especially in navigating regulatory and compliance issues that are prevalent in Nigeria, such as the enforcement of corporate governance codes. Their presence can also influence corporate culture by fostering inclusivity and improving the firm's reputation in the eyes of global investors who increasingly favor gender-diverse leadership teams. Based on the foregoing, we state our second hypothesis as:

H2: Female board directors' presence significantly improves the performance of listed non-financial firms in Nigeria.

Capital Structure and Firm Performance: The moderating Role of Female Board Directors' Presence

From the preceding sections, we noted that the trade-off theory suggests firms balance debt and equity to optimize financial performance, while feminist theory argues that female directors contribute to better governance and risk management (Abdullah, 2014). We extend these two theories to include the agency theory which posits that gender diversity can reduce agency conflicts between managers and shareholders, leading to improved financial outcomes (Grosvold, Rayton and Brammer, 2016). The combination of these theories suggests that female directors may enhance the capital structure-performance relationship by promoting transparency, reducing risk, and improving governance practices (Ayalew, 2021). In the Nigerian settings, these theories also implies that gender diversity on boards may moderate the relationship between capital structure and firm performance, helping firms optimize their financial strategies while minimizing risks (Abdullah and Tursoy, 2021). Female directors may also provide a more balanced approach to financial decision-making, enhancing the benefits of debt while mitigating potential risks. In the literature, there is a notable lack of studies that examine the moderating role of female board directors on the relationship between capital structure and firm performance, particularly in the Nigerian context.

However, few studies have examined the moderating role of corporate governance factors on the capital structure-performance relationship. In Indonesia, we identify the study of Ngatno, Apriatni and Youlianto (2021) who found that only the size of the board of commissioners significantly moderates the relationship between capital structure and firm performance in rural banks. Similarly, Sdiq and Abdullah (2022) reported agency cost significantly moderates the relationship between capital structure and financial performance. Specifically, while the direct effect of capital structure on ROA was negative, the interaction between debt ratio and operating expense ratio had a positive impact on ROA, suggesting that higher debt levels may reduce agency costs and thus improve financial performance in Iraqi firms. Further research by Saeed et al. (2022) in Pakistan revealed a U-shaped relationship between debt and Tobin's Q, suggesting that initially, higher debt levels reduce firm value, but when mediated by GDP per capita in manufacturing firms. In the Nigerian settings, where firms often face volatile market conditions, inadequate access to capital, and regulatory uncertainties, female directors may play a crucial moderating role. The unique perspective they bring could temper the often-aggressive risk-taking behaviors linked with higher debt levels, thus creating a more balanced capital structure that promotes long-term firm stability and performance. Because of the foregoing, we state our third and final hypothesis as:

H3: Female board directors' presence significantly moderates the relationship between capital structure and the performance of listed non-financial firms in Nigeria.

Conceptual Framework

Following the approach outlined by Baron and Kenny (1986), we construct our conceptual framework to include three causal pathways leading to firm performance: The direct effect of capital structure as a predictor (Path a), the moderating effect of female board directors' presence (Path b), and the combined interaction between these two variables (Path c).

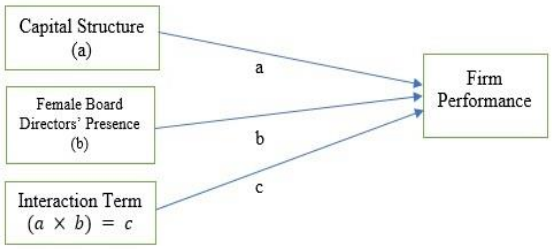

Figure 1. Conceptual Framework

Source: Authors' computation based on Baron and Kenny (1986)

In Figure 1, where the coefficient of the interaction term (c) is significant, then the moderation hypothesis as highlighted by Baron and Kenny (1986) is supported, indicating that female board directors' presence (b) moderate or alter the relationship between capital structure (a) and firm performance. According to Baron and Kenny (1986), "There also may be significant effects for the predictor and the moderator (Paths a and b), but these are not directly relevant conceptually to testing the moderator hypothesis". Thus, we are only conclusive on the significance of the integration term between capital structure and female board directors' presence. Furthermore, to isolate the observed correlation between the moderator variable, predictor variable, and their interaction, we require two models: One to test paths "a" and "b", and the other to test path "c".

III. Data and Variables

We begin by manually gathering data from the annual reports of the sample firms since information from the annual report is audited and thus, normally used by firms to communicate with the public about their operations and performances. Our population consists of 109 listed non-finance firms on the floor of the Nigerian Exchange Group from 2012 to 2021 (NGX Factbook, 2021). Specifically, a homogenous sample was obtained through a purposive or filtering sampling technique since firms were selected based on meeting certain assumptions. This implies that from a population of 109 listed non-finance firms in Nigeria, we expunge all non-finance firms that joined the exchange after year 2012. Furthermore, we deselected firms that did not reveal all the information required for carrying out the analysis hence the final sample consists of 70 listed non-finance firms in Nigeria leading to 700 observations as shown in Table 1 below.

Table 1: Sample Selection

Criteria	**Number**
Number of Listed Firms	156
Financial Firms	(49)
Firms that joined after 2012	(28)
Firms without information for the study	(9)
Final Sample	**70**

Source: Authors' compilation

Dependent Variable

We express firm performance in terms of accounting performance and market performance. We also check for the robustness of our result to other dimensions of firm performance such as value added. Particularly, we proxied our accounting performance with return on asset (RETA) following the studies of Mangudhla, Dodoo and Kumi (2023b). We employed return on asset since it is a direct test of the efficiency of management on the use of asset to generate economic benefits (International Accounting Standards - IAS 1). Furthermore, we measure the market performance using Tobin Q (TOBQ) following the studies of Yang and Gan (2021). Tobin Q is used to proxy market performance since it considers the replacement value of the firm's net worth. Our multiple dimensions of firm performance represent a more comprehensive overview of firm performance in relation to capital structure. Table 2 shows the measurement of each of the variables.

Independent Variable

The independent variable of this study is capital structure. Capital structure involves the combination of debt and equity that a company employs to fund its business activities (Abdullah and Tursoy, 2021). Debt ratio measured by debt to asset has often been used as a metric to indicate the capital structure of a firm. However, extant literature has proposed alternative formulas for assessing the debt ratio, including total liabilities over total assets (Zhang et al., 2022) and long-term debt over total assets (Mavruk and Sjögren, 2021). However, we opined that relying on a single metric or characteristic to evaluate the capital structure of a firm is inadequate. One dimension measure of capital structure has the potential to result in erroneous inferences regarding a firm's capital structure (Kumar, Sureka and Colombage, 2020). Hence, in this study, we measure capital structure in terms of equity to asset ratio (EQTA), debt to asset ratio (DETA), and debt to equity ratio (DETE) following the studies of Kumar, Sureka and Colombage, (2020); Rani, Yadav and Tripathy, (2020b); Ayalew, (2021).

Furthermore, as an extension of prior studies on capital structure and profitability nexus, we introduce female board director presence (FBDP) as an interaction term. We asserted that if women's representation on corporate boards is impactful and genuine behavioral differences between genders exist, these elements should affect financial decisions and, ultimately, organizational performance. Specifically, we measure female board directors' presence as a dichotomous variable of "1" if there is a female director on the board of directors of the firms under study and "0" for otherwise following the studies of Abdullah, (2014), Grosvold, Rayton and Brammer (2016) and Saeed et al (2022).

Control Variables

Based on earlier literature on capital structure and performance nexus, we employed various macroeconomic and firm-level attributes as control variables (Almaqtari et al., 2021; Dinh, Nguyen and Hosseini, 2019; Mangudhla, Dodoo and Kumi, 2023; Mehzabin et al., 2023; Sdiq and Abdullah, 2022). Specifically, to stabilize the goodness of fit of our regression estimates and to isolate the effect of capital

structure on firm performance, we control our model with asset growth (ASGT), asset tangibility (ASTA), GDP growth (GDPG), credit to private sector (CRPS), firm size (FSIZ), family ownership (FOWN), and market capitalization (MCAP). Finally, we controlled for a year and industry fixed effects. These control variables are used to isolate the effects of other factors that have a predictable influence on the different dimensions of firm performance employed in this study.

Table 2: Variable Measurement

Variables	Measurements	Source
Tobin Q	Tobin Q in numbers is computed as Market Capitalization + Total Liabilities - Cash flow divided by Total asset	Annual Report
Return on Asset	Return on asset in percentage is computed as profit after tax divided Total asset	Annual Report
Market Value Added	Market Value Added is measured as the difference between market capitalization and total equity divided by total asset	Annual Report
Equity to Asset Ratio	Equity to Total Asset in percentage is computed as Total Equity divided by Total Asset	Annual Report
Debt to Asset Ratio	Debt to Total Asset in percentage is computed as Total Liabilities divided by Total Asset	Annual Report
Debt to Equity Ratio	Debt to equity in percentage is computed as Total Liabilities divided by Total Equity	Annual Report
Female Board Directors' Presence	Board female director presence is measured as a dichotomous variable of "1" if there is a female director on the board of directors of the firms under study and "0" for otherwise	Annual Report
Asset Growth	Total asset growth in percentage is computed as current year total asset minus previous year total asset divided by previous total asset.	Annual Report
Asset Tangibility	Asset Tangibility in percentage is computed as fixed asset or PPE divided by Total assets	Annual Report
GDP Growth	GDP growth is computed as current year GDP minus previous year GDP divided by previous GDP	CBN Bulletin (2022)
Credit to Private Sector		CBN Bulletin (2022)
Firm Size	Firm size is measured as the natural logarithm of total asset	Annual Report
Family Ownership	Foreign institutional ownership in dummy is measured as "1" when the shares ownership concentration of all the block foreign institutional shareholders is 5% and above controlling interest and "0" otherwise	Annual Report
Market Capitalization	Market Capitalization is measured as the natural logarithm of the multiplication of share price and outstanding shares.	Annual Report

Source: Authors' compilation

Econometric Models

We construct a sample that contains all the 70 non-financial firms in our sample size that are listed in Nigeria over a 10-year period from 2012 to 2021, thus yielding a balance panel of 700 observations. Based on the foregoing, we formulate the following econometric models in line with theoretical expositions.

$$TOBQ_{it} = \beta_0 + \beta_1 EQTA_{it} + \beta_2 DETA_{it} + \beta_3 DETE_{it} + \beta_4 FBDP_{it} + \beta_5 ASGT_{it} + \beta_6 ASTA_{it} + \beta_7 GDPG_{it} + \beta_8 CRPS_{it} + \beta_9 FSIZ_{it} + \beta_{10} FOWN_{it} + \beta_{11} MCAP_{it} + \mu_{it} \ldots\ldots (3.1)$$

$$RETA_{it} = \beta_0 + \beta_1 EQTA_{it} + \beta_2 DETA_{it} + \beta_3 DETE_{it} + \beta_4 FBDP_{it} + \beta_5 ASGT_{it} + \beta_6 ASTA_{it} + \beta_7 GDPG_{it} + \beta_8 CRPS_{it} + \beta_9 FSIZ_{it} + \beta_{10} FOWN_{it} + \beta_{11} MCAP_{it} + \mu_{it} \ldots\ldots (3.2)$$

Equations 3.1 and 3.2 above express firm performance as a function of capital structure, female board directors' presence and several control variables employed in this study.

$$TOBQ_{it} = \beta_0 + \beta_1(EQTA \times FBDP)_{it} + \beta_2(DETA \times FBDP)_{it} + \beta_3(DETE \times FBDP)_{it} + \beta_4 ASGT_{it} + \beta_5 ASTA_{it} + \beta_6 GDPG_{it} + \beta_7 CRPS_{it} + \beta_8 FSIZ_{it} + \beta_9 FOWN_{it} + \beta_{10} MCAP_{it} + \mu_{it} \dots \dots (3.3)$$

$$RETA_{it} = \beta_0 + \beta_1(EQTA \times FBDP)_{it} + \beta_2(DETA \times FBDP)_{it} + \beta_3(DETE \times FBDP)_{it} + \beta_4 ASGT_{it} + \beta_5 ASTA_{it} + \beta_6 GDPG_{it} + \beta_7 CRPS_{it} + \beta_8 FSIZ_{it} + \beta_9 FOWN_{it} + \beta_{10} MCAP_{it} + \mu_{it} \dots \dots (3.4)$$

Equations 3.3 and 3.4 express firm performance as a function of the interaction effect of female board director presence and capital structure measures employed in this study. These models are an attempt to test our assumption that if the presence of women on boards is effective and behavioral differences between women and men truly exist, then these factors should influence capital structure financial decisions and ultimately firm performance following the feminist theory.

Estimation Method

Studies have shown that capital structure and performance measures are endogenous (Dao and Ta, 2020; Sadiq *et al*., 2023). Usually, this problem is ignored or corrected using fixed effects or instrumental variables. In lieu of conventional methodologies, we implemented a sophisticated technique of panel data estimation by means of the two-step system GMM with robust standard errors. The methodology employed in this study addresses various statistical concerns, including the temporal correlation of errors, heteroscedasticity across firms, simultaneity, and measurement errors. To mitigate the risk of producing significantly biased estimates, orthogonal conditions were imposed on the variance-covariance matrix, as recommended by (Arellano and Bond, 1991). In order to assess the validity of our instrumental variables and the accuracy of our model specification, we employed the AR (1) and AR (2) tests to detect first- and second-order serial correlation. As per the GMM approach, it is expected that primary correlation (first order) would be present while secondary correlation (second order) would not be observed. Furthermore, it is imperative that the number of instruments is less than the number of groups. Subsequently, the Hansen test was performed to evaluate the over-identification restrictions. We followed the recommendations of Roodman (2009) by requiring the result of the Hansen test to be in the range $0.05 \leq P < 0.8$, with the optimal value lying in the range $0.1 \leq P < 0.25$.

IV. Empirical Results and Discussions

Descriptive Statistics

The results from Table 3 reveal that the mean of Tobin Q (TOBQ) is 1.39, with a standard deviation of 1.34. This suggests that, on average, the firms included in the study had a market value that slightly exceeded their replacement cost, indicating reasonable market expectations regarding future growth and profitability. Similarly, the mean return on assets (RETA) is reported at 1.90 with a standard deviation of 17.23, implying that while the firms were generally profitable during the period under investigation, there was significant variability in their returns, potentially reflecting differences in management efficiency or industry conditions. The market value added (MVAD) has a mean of 0.48 and a standard deviation of 1.35, which suggests that, on average, the firms added to their market value over the period, although there was considerable variability across the sample. For the independent variables, the equity to asset ratio (EQTA) has a mean of 38.36 with a standard deviation of 37.27, indicating that, on average, equity constituted about 38% of the total assets, but with wide dispersion, suggesting differing capital structures among the firms. The debt to asset ratio (DETA) is also noted to have a mean of 63.70 with a similar standard deviation of 63.70, emphasizing significant variation in the use of debt financing among the firms. The debt-to-equity ratio (DETE) has a mean of 2.83 with a standard deviation of 18.62, indicating that debt represented about 2% of equity on average, but this measure also varies greatly across the sample, reflecting diverse financial leverage strategies.

The descriptive statistics for the foreign board member presence (FBMP) show a mean of 0.47 and a standard deviation of 0.67, implying that about 47% of the firms, on average, had at least one female board member during the period studied. This reflects a moderate level of gender diversity in the boards of these firms. Regarding the control variables, the mean asset growth (ASGT) is 10.26, with a standard deviation of 35.25, indicating substantial growth variability in firm assets over the period. Asset tangibility (ASTA) has a mean of 41.15 and a standard deviation of 23.90, suggesting that, on average, about 41% of firm assets were tangible, but with significant variation across firms. The gross domestic product growth (GDPG) displays a mean of 2.50 with a standard deviation of 2.74, showing an average GDP increase of about 2.5% during the period, which reflects a moderate economic growth environment. Credit to the private sector (CRPS) has a mean of 4.18 with a low standard deviation of 0.10, indicating a stable supply of credit to the private sector during the period under study. Firm size (FSIZ) shows a mean of 7.14 with a standard deviation of 0.82, reflecting the average size of firms included in the study and relatively little variation in size. Family ownership (FOWN) has a mean of 7.22 with a standard deviation of 14.98, suggesting a moderate presence of family ownership among the firms, but with a high degree of variability. Finally, market capitalization (MCAP) has a mean of 6.77 with a standard deviation of 1.00, indicating that the firms in the sample were generally medium sized in terms of market value, with relatively little variation across the sample.

Test for Data Normality

In order to ascertain if our data follow a normal distribution, we employed the Shapiro Wilk test for data normality in STATA. Particularly, we failed to use the Kurtosis and Skewness test for normality since our observation is relatively lower than 2000. The null hypothesis of the Shapiro-Wilkson test for normality (z-

statistics) is that the data are normally distributed. An acceptance of the null hypothesis implies an insignificant p-value of the z-statistics, and rejection of the null hypothesis implies a significant p-value of the z-statistics. The results in Table 3 indicate that the firm performance measures, including TOBQ, RETA, and MVAD, are not normally distributed. Similarly, the independent variables EQTA, DETA, and DETE do not follow a normal distribution. However, FBMP shows a normal distribution. Among the control variables, ASGT, ASTA, GDPG, CRPS, FSIZ, FOWN and MCAP also do not exhibit normal distribution, as shown in Table 3. Hence, we employed the Spearman Rank Correlation to examine the relationship between the variables under study.

Correlation Analyses

We test for the association between the variables employed by adopting the Spearman Rank correlation module in STATA. Specifically, the Spearman rank correction is our choice since our data do not follow a normal distribution and our observation is less than 2000. Based on the foregoing, our result shows that the independent variables of equity to asset ratio (-0.2143), female board directors' presence (-0.0225), and the control variable of credit to private sector (-0.2133) as well as family ownership (-0.1078) are negatively associated with the dependent variable of firm performance when measured in terms of Tobin Q.

However, the result shows that debt to asset ratio (0.2815), debt to equity ratio (0.1229), and the control variables of asset growth (0.0661), asset tangibility (0.2063), GDP growth (0.1853), firm size (0.0716), and market capitalization (0.3926) are positively associated with the dependent variable of firm performance when measured in terms of Tobin Q. On the other hand, the result shows that debt to asset ratio (-0.3745), debt to equity ratio (-0.2342), as well as the control variables of asset tangibility (-0.1035), credit to private sector (-0.1601) and family ownership (-0.0965) are negatively associated with the dependent variable of firm performance when measured in terms of return on asset. But, we find that equity to asset ratio (0.3436), female board director presence (0.0940), as well as the control variable of asset growth (0.3546), GDP growth (0.1409), firm size (0.1387), and market capitalization 0.3627) are positively associated with the dependent variable of firm performance when measured in terms of return on asset.

Finally, we find that equity to asset ratio (-0.2641), female board presence (-0.0238), and the control variables of credit to private sector (-0.1962), and family ownership (-0.1924) are negatively associated with the dependent variable of firm performance when measured in terms of market value added. On the opposite side, debt to asset ratio (0.1781), debt to equity ratio (0.0748), as well as the control variables of asset growth (0.1341), asset tangibility (0.0877), GDP growth (0.1573), and the control variable of firm size (0.1267) are positively associated with the dependent variable of firm performance when measured in terms of market value added. But, all associations are seen to be weak and thus we fail to suspect the presence of multicollinearity.

Table 3: Descriptive, Correlations and Tests for Data Normality Results

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1.	TOBQ	1.0000														
2.	RETA	0.2179	1.0000													
3.	ΔVAD	0.8931	0.2842	1.0000												
4.	EQTA	-0.2143	0.3436	-0.2641	1.0000											
5.	DETA	0.2815	-0.3745	0.1781	-0.9301	1.0000										
6.	DETE	0.1229	-0.2342	0.0748	-0.7581	0.7723	1.0000									
7.	FBDP	-0.0225	0.0940	-0.0238	-0.0107	0.0400	0.0193	1.0000								
8.	ASGT	0.0661	0.3546	0.1341	0.0222	-0.0620	0.0630	-0.0127	1.0000							
9.	ASTA	0.2063	-0.1035	0.0877	0.0000	0.0424	-0.0450	0.0372	-0.0965	1.0000						
10.	GDPG	0.1853	0.1409	0.1573	0.0478	-0.0365	0.0611	-0.1027	0.1008	0.0474	1.0000					
11.	CRPS	-0.2133	-0.1601	-0.1962	-0.0534	0.0708	0.0491	0.1772	-0.0452	-0.0652	-0.0346	1.0000				
12.	FSIZ	0.0716	0.1387	0.1267	-0.1621	0.1118	0.2644	0.2535	0.2177	0.0786	-0.0435	0.0746	1.0000			
13.	FOWN	-0.1078	-0.0965	-0.1924	0.0740	-0.0375	-0.1018	0.1001	-0.1312	0.0922	0.0074	-0.0079	-0.4622	1.0000		
14.	MCAP	0.3926	0.3627	0.4747	-0.0950	-0.0549	-0.0453	0.2320	0.2512	0.1177	0.0590	-0.0370	0.8448	-0.4595	1.0000	
	Mean	1.39	1.90	0.48	38.36	63.70	2.83	0.07	10.26	41.15	2.50	4.18	7.14	7.22	6.77	
	Stand. Dev.	1.34	17.25	1.35	37.27	39.06	18.62	0.47	35.25	23.90	2.74	0.10	0.82	14.98	1.00	
	Shapiro	12.342	12.418	12.399	11.939	11.980	14.481	-0.830	12.026	6.068	7.048	4.927	4.182	10.772	5.786	
	Wilkson Test	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.79128)	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00001)	(0.00000)	(0.00000)	

Source: STATA software output

Multivariate Regression Analyses

We first examine the cause effect of capital structure as well as female board directors' presence on firm performance and proceed to examine the interaction effect of female board directors' presence on the causal relationship between capital structure and the different dimensions of firm performance. Specifically, we start by estimating the pool OLS regression and test for the basic assumptions of the pool OLS regression. The diagnostic test includes multicollinearity, homoscedasticity, and endogeneity. Table 4 shows that the F-statistics for the pooled OLS regression models, with TOBQ and RETA as measures of firm performance, are 96.12 and 16.67, respectively, both with p-values of 0.0000. This indicates that the models are statistically significant at the 1% level, suitable for inference. The R-squared values for the TOBQ model (0.6065) and the RETA model (0.2110) suggest that approximately 61% and 21% of the variation in firm performance, respectively, are explained by the capital structure proxies and control variables used in the study. The TOBQ model explains a greater proportion of performance variation, indicating that the capital structure proxies better capture changes in market value. Post-diagnostic tests confirm the reliability of these models. The Variance Inflation Factor (VIF) for all models averages 2.17, well below the benchmark of 10, suggesting no multicollinearity issues. However, the Breusch-Pagan test reveals a p-value of 0.0000, indicating a violation of the homoscedasticity assumption in the pooled OLS models. The GMM employed in this study addresses various statistical concerns, including the temporal correlation of errors, heteroscedasticity across firms, simultaneity, and measurement errors. To mitigate the risk of producing significantly biased estimates, orthogonal conditions were imposed on the variance-covariance matrix, as recommended by (Arellano and Bond, 1991).

In Table 4, we find that EQTA has a positive significant effect on firm performance when measured in terms of TOBQ (coeff.: 0.002; p-value: 0.0000) and RETA (coeff.: 0.073; p-value: 0.0000) for the GMM step II model. This indicates that the equity-to-total-assets ratio (EQTA) has a significant positive impact on firm performance, both in terms of market value (measured by Tobin's Q) and profitability (measured by return on assets - RETA). These results suggest that a higher equity ratio improves performance by reducing the risk of mismanagement, aligning with studies by (Wojewodzki,

Boateng and Brahma, 2020; Mavruk and Sjögren, 2021). Our findings support the trade-off theory suggesting that Nigerian firms prioritize financial stability over leveraging tax benefits through debt. This approach mitigates risks associated with volatile economic conditions and poor infrastructure, prevalent in Nigeria, which can exacerbate financial distress when relying heavily on debt financing. Furthermore, Table 4 shows that DETA has a positive significant effect on TOBQ (coeff.: 0.013; p-value: 0.0000) but has a negative significant effect on RETA (coeff.: -0.208; p-value: 0.0000). Our findings indicate that while debt-to-asset ratio (DETA) significantly enhances firm performance in terms of market value (measured by Tobin's Q), it has a detrimental effect on profitability (measured by return on assets - ROA). This result aligns with (Zhang *et al.*, 2022), who noted that excessive debt can place strain on a firm's profitability, even though it may signal growth potential reflected in market value. In the Nigerian context, where firms face high operational costs and economic volatility, this dual effect is particularly relevant. High debt levels can be used to capitalize on growth opportunities and benefit from tax shields, as suggested by the trade-off theory. However, the financial strain of servicing debt, especially in an environment with fluctuating economic conditions, can erode profitability.

Furthermore, results from Table 3 indicate that DETE has a negative insignificant effect on Tobin Q (coeff.: -0.000; p-value: 0.089) but a positive significant effect on RETA (coeff.: 0.029; p-value: 0.000). Specifically, we show that while DETE appears to insignificantly reduce the market performance of firms in Nigeria, DETE significantly improves firm profitability. Our results support the trade-off theory indicating that while debt enhances profitability through tax shields, excessive debt increases the risk of financial distress, which can reduce market performance. This is consistent with Myers' (1977) "underinvestment" or "debt overhang" problem, where firms with high debt may underinvest in growth opportunities, leading to diminished market confidence. Furthermore, agency theory highlights conflicts between debt and equity investors, particularly under default risks, as noted by (Le and Phan, 2017) and (Farhan *et al.*, 2020), which can exacerbate these negative effects on market performance. This aligns with the findings of (Dinh, Nguyen and Hosseini, 2019), who noted that agency costs can arise from conflicts between debt and equity investors.

Table 4: Regression Analyses of Capital Structure and Firm Performance Nexus

	Tobin Q Model					Return on Asset Model				
	Pool OLS	FE	RE	GMMI	GMMII	Pool OLS	FE	RE	GMMI	GMMII
CONS.	0.892	0.772	0.472	-0.649	0.206	11.095	60.838	12.369	208.886	155.437
	(0.626)	(0.658)	(0.748)	(0.779)	(0.804)	(0.740)	(0.140)	(0.707)	(0.002)**	(0.000)***
L1				0.283	0.278				0.043	0.048
				(0.000)***	(0.000)***				(0.335)	(0.000)***
EQTA	0.001	0.000	0.000	0.002	0.002	0.051	0.058	0.053	0.076	0.073
	(0.602)	(0.839)	(0.697)	(0.090)	(0.000)***	(0.066)	(0.049)**	(0.055)	(0.028)**	(0.000)***
DETA	0.013	0.012	0.013	0.013	0.013	-0.096	-0.097	-0.094	-0.213	-0.208
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.006)**	(0.001)**	(0.000)***	(0.000)***
DETE	-0.000	-0.001	-0.001	-0.001	-0.000	0.026	0.017	0.024	0.037	0.029
	(0.806)	(0.676)	(0.656)	(0.622)	(0.089)	(0.413)	(0.620)	(0.447)	(0.325)	(0.000)***
FBDP	0.029	0.008	0.011	-0.017	-0.032	3.230	2.804	3.134	5.021	3.010
	(0.686)	(0.931)	(0.901)	(0.873)	(0.103)	(0.015)**	(0.202)	(0.033)**	(0.141)	(0.000)***
ASGT	-0.000	-0.000	-0.00	-0.002	-0.002	0.068	0.072	0.067	0.083	0.085
	(0.716)	(0.933)	(0.703)	(0.005)**	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
ASTA	-0.001	0.004	0.002	-0.000	-0.001	-0.079	-0.167	-0.089	-0.182	-0.176
	(0.596)	(0.074)	(0.197)	(0.908)	(0.197)	(0.002)**	(0.001)**	(0.002)**	(0.032)**	(0.000)***
GDPG	0.018	0.017	0.017	0.017	0.014	0.208	0.294	0.213	0.310	0.370
	(0.218)	(0.128)	(0.122)	(0.043)**	(0.000)***	(0.441)	(0.271)	(0.420)	(0.301)	(0.000)***
CRPS	-0.102	0.180	0.055	-0.837	-0.736	-3.169	-2.435	-3.412	-15.708	-7.938
	(0.815)	(0.625)	(0.875)	(0.044)**	(0.000)***	(0.690)	(0.780)	(0.663)	(0.287)	(0.020)**
FSIZ	-1.813	-2.021	-1.898	-1.555	-1.612	-4.107	-6.925	-3.866	-8.980	-9.912
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.007)**	(0.136)	(0.026)**	(0.260)	(0.000)***
FOWN	-0.003	-0.002	-0.003	-0.003	-0.002	-0.041	-0.097	-0.045	-0.164	-0.125
	(0.166)	(0.674)	(0.419)	(0.581)	(0.112)	(0.335)	(0.350)	(0.366)	(0.296)	(0.021)**
MCAP	1.915	1.966	1.963	2.279	2.143	5.563	1.298	5.313	-9.246	-5.211
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.649)	(0.000)***	(0.038)**	(0.002)**
F/Wald	96.12	48.96	678.20	968.56	6362.57	16.67 (0.0000)	6.23	147.38	100.56	10702.00
Statistics	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)		(0.0000)	(0.0000)	(0.0000)	(0.0000)
R2	0.6065	0.4661	0.4652			2110	0.1000	0.0903		
VIF	2.17					2.17				
Hettest.	777.05 (0.0000)					807.63 (0.0000)				
HAUSMAN			3.12 (0.9890)					10.22 (0.5107)		

Source: STATA Software Output

Note: (1) bracket {} are p-values: (2) **, ***, implies statistical significance at 5% and 1% levels respectively

However, Table 4 shows mixed effect of female board presence (FBDP) on the different measurement of firm performance. Specifically, we find that FBDP has a negative insignificant effect on TOBQ (coeff.: -0.032; p-value: 0.103), but a positive significant effect on RETA (coeff.: 3.010; p-value: 0.000). Our result indicates that the presence of female board member appears to significantly increase return on asset during the period under study. However, we show that the presence of a female board member insignificantly reduces the Tobin Q of the listed firms under study. The mixed result of the effect of female board presence on the different dimensions of firm performance recorded in our study mirrors the theoretical literature in which upper echelons (Hambrick, 2007), and agency theories (Jensen and Meckling, 1976) suggest that firms with gender diverse boards might perform better, whereas, role incongruity theory (Eagly and Karau, 2002) and gender stereotyping on the part of investors (Haslam *et al.*, 2010) suggest a negative relationship between women directors and market-based measures of firm performance. On the basis of this mixed findings, we consider the interaction between female board director presence capital structure in relation to firm performance. Furthermore, research has shown that gender diversity on boards enhances the variety of perspectives, which can lead to better and more balanced decision-making (Abdullah, 2014; Grosvold, Rayton and Brammer, 2016; Saeed *et al.*, 2022). This diversity could influence how firms decide on their capital structure, such as the mix of debt and equity financing. In turn, this may affect firm performance by enabling more informed and nuanced financial decisions, especially when dealing with complex capital structure issues (Bajaj, Kashiramka and Singh, 2018).

In Table 5, our result shows that the interaction between FBDP and EQTA has a negative and significant effect on TOBQ (coeff.: -0.002; p-value: 0.000), but a positive and significant effect on RETA (coeff.: 0.078; p-value: 0.000). Furthermore, the interaction between FBDP and DETA has a positive and significant effect on TOBQ (coeff.: 0.003; p-value: 0.000), but a negative and significant effect on RETA (coeff.: -0.001; p-value: 0.000). Finally, our result shows that the interaction between FBDP and DETE has a negative and significant

effect TOBQ (coeff.: -0.001; p-value: 0.026), but a positive and significant effect on RETA (coeff.: 0.031; p-value: 0.000). According to the moderation framework proposed by (Baron and Kenny, 1986), a moderating effect is present if the interaction terms between the moderator and the independent variables significantly affect the dependent variable. Based on our results, the moderation hypothesis involving FBDP as the moderator variable appears to hold. Particularly, we show that a female director presence on the board of a highly levered firm will reduce the market value of listed firms in Nigeria even though it appears to increase profitability. We note that following the arguments of agency theory (Jensen and Meckling, 1976), greater board diversity leads to a reduction in information asymmetries. The lower information asymmetries associated with the participation of women directors on the board contribute to improving access to external financial resources and increase a firm's proportion of external equity in the capital structure, leading to lower leverage.

Table 5: Capital Structure and Firm Performance Nexus: The Role of Foreign Board Directors Presence

	Tobin Q Model					Return on Asset Model				
	Pool OLS	FE	RE	GMMI	GMMII	Pool OLS	FE	RE	GMMI	GMMII
CONS.	0.253	1.718	0.138	0.836	1.367	16.112	44.711	16.388	151.904	122.822
	{0.895}	{0.247}	{0.929}	{0.739}	{0.152}	{0.642}	{0.286}	{0.629}	{0.038}**	{0.000}***
L1				0.283	0.278				0.093	0.097
				{0.000}***	{0.000}***				{0.053}**	{0.000}***
FBDP × EQTA	-0.006	-0.004	-0.004	-0.001	-0.002	0.081	0.036	0.070	0.084	0.078
	{0.000}***	{0.003}**	{0.000}***	{0.300}	{0.000}***	{0.000}***	{0.190}	{0.000}***	{0.039}**	{0.000}***
FBDP × DETA	0.007	0.004	0.005	0.003	0.003	-0.029	-0.023	-0.027	-0.038	-0.044
	{0.000}***	{0.000}***	{0.000}***	{0.005}**	{0.000}***	{0.041}**	{0.274}	{0.085}	{0.249}	{0.000}***
FBDP × DETE	-0.002	-0.000	-0.000	-0.001	-0.001	0.045	0.022	0.038	0.041	0.031
	{0.484}	{0.913}	{0.844}	{0.671}	{0.026}**	{0.247}	{0.585}	{0.327}	{0.412}	{0.000}***
ASGT	-0.001	0.000	-0.000	-0.002	-0.002	0.073	0.066	0.071	0.085	0.089
	{0.330}	{0.765}	{0.575}	{0.003}**	{0.000}***	{0.000}***	{0.001}****	{0.000}***	{0.001}**	{0.000}***
ASTA	0.000	0.005	0.004	-0.001	-0.000	-0.094	-0.169	-0.106	-0.168	-0.137
	{0.796}	{0.028}**	{0.062}	{0.765}	{0.781}	{0.000}***	{0.001}**	{0.000}***	{0.072}	{0.000}***
GDPG	0.026	0.022	0.022	0.024	0.019	0.181	0.305	0.200	0.223	0.187
	{0.092}	{0.064}	{0.062}	{0.008}**	{0.000}***	{0.315}	{0.265}	{0.458}	{0.495}	{0.008}**
CRPS	0.233	0.677	0.402	-0.275	-0.088	-5.095	-3.955	-3.179	-24.981	-19.439
	{0.608}	{0.078}	{0.271}	{0.548}	{0.572}	{0.534}	{0.499}	{0.519}	{0.119}	{0.000}***
FSIZ	-1.750	-2.263	-1.901	-1.885	-1.968	-4.903	-3.718	-4.448	0.709	-1.619
	{0.000}***	{0.000}***	{0.000}***	{0.000}***	{0.000}***	{0.002}***	{0.426}	{0.017}***	{0.934}	{0.499}
FOWN	-0.002	-0.001	-0.002	-0.001	-0.001	-0.047	-0.076	-0.049	-0.110	-0.132
	{0.323}	{0.785}	{0.511}	{0.821}	{0.478}	{0.288}	{0.472}	{0.349}	{0.530}	{0.003}**
MCAP	1.841	1.867	1.898	2.169	2.057	6.534	2.181	6.169	-6.595	-3.321
	{0.000}***	{0.000}***	{0.000}****	{0.000}***	{0.000}***	{0.000}***	{0.452}	{0.000}***	{0.180}	{0.031}**
F/Wald Statistics	89.90	42.36	539.66	761.95	5900.25	12.34	3.70	88.47	41.76	10054.40
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0000)
R^2	0.5668	0.4067	0.4017			0.1523	0.0566	0.0479		

Source: STATA software output

Note: (1) bracket {} are p-values: (2) **, ***, implies statistical significance at 5% and 1% levels respectively

Robustness Check

As a robustness check, we test the sensitivity of our result to value added measure of firm performance; in this case, market value added. Our results in Table 6 indicate that EQTA has a negative significant effect on market value added (MVAD), suggesting that EQTA does not robustly support firm performance when measured through market value added. This finding shows that a higher equity to asset ratio tends to decrease firm performance in terms of MVAD during the study period. On the contrary, DETA shows a positive significant effect on MVAD, aligning with its positive impact on the market value (TOBQ) measure of firm performance found in the baseline model. Furthermore, DETE has a negative but insignificant effect on MVAD, which is consistent with its effect on the TOBQ measure of firm performance in the baseline model.

Table 6: Capital Structure Firm Performance Nexus - Market Value Added Dimension

	Market Value Added				
	Pool OLS	FE	RE	GMMI	GMMII
CONS.	0.331	0.120	-0.118	0.013	0.336
	{0.856}	{0.944}	{0.936}	{0.995}	{0.714}
L1				0.356	0.355
				{0.000}***	{0.000}***
EQTA	-0.009	-0.009	-0.009	-0.008	-0.008
	{0.000}***	{0.000}***	{0.000}***	{0.000}***	{0.000}***
DETA	0.003	0.002	0.003	0.003	0.003
	{0.030}**	{0.150}	{0.065}	{0.031}***	{0.000}***
DETE	-0.000	-0.001	-0.001	-0.000	-0.000
	{0.832}	{0.616}	{0.605}	{0.683}	{0.202}
FBDP	0.057	0.026	0.029	-0.078	-0.087
	{0.437}	{0.779}	{0.732}	{0.470}	{0.000}***
ASGT	-0.000	0.000	-0.000	-0.002	-0.002
	{0.791}	{0.983}	{0.822}	{0.002}**	{0.000}***
ASTA	-0.003	0.001	-0.000	-0.004	-0.004
	{0.034}**	{0.607}	{0.935}	{0.169}	{0.000}***
GDPG	0.018	0.016	0.017	0.011	0.011
	{0.232}	{0.144}	{0.134}	{0.234}	{0.000}***
CRPS	0.108	0.342	0.242	-1.113	-0.938
	{0.803}	{0.347}	{0.480}	{0.028}**	{0.000}***
FSIZ	-1.887	-2.049	-1.949	-1.608	-1.594
	{0.000}***	{0.000}***	{0.000}***	{0.000}***	{0.000}***
FOWN	-0.005	-0.002	-0.004	-0.003	-0.003
	{0.022}**	{0.670}	{0.306}	{0.519}	{0.013}**
MCAP	1.978	2.023	2.019	2.475	2.302
	{0.000}***	{0.000}***	{0.000}***	{0.000}***	{0.000}***
F/Wald Statistics	100.80 (0.0000)	52.29 (0.0000)	718.44 (0.0000)	1039.29 (0.0000)	9446.22 (0.0000)
R^2	0.6178	0.4825	0.4818		

Source: **STATA software output**

Note: (1) bracket {} are p-values: (2) **, ***, implies statistical significance at 5% and 1% levels respectively

In Table 7, our results demonstrate that the interaction between FBDP and EQTA has a negative and significant effect on market value added (MVAD), which is consistent with the findings from the TOBQ model. This suggests that the presence of female board directors (FBDP) diminishes the positive impact of a higher equity to asset ratio (EQTA) on firm performance when considering both market value added and Tobin Q, indicating that the influence of EQTA is moderated negatively by FBDP in terms of the firm's market value performance. Furthermore, the interaction between FBDP and DETA reveals a positive and significant effect on MVAD, which aligns with the results from the Tobin Q model. This consistency suggests that the presence of female board directors strengthens the positive impact of the debt to asset ratio (DETA) on firm performance across both dimensions of market value. The finding implies that, under certain conditions, having female board directors may enhance the beneficial effects of leveraging debt on market value performance. Additionally, our results show that the interaction between FBDP and DETE has a negative and significant effect on MVAD. This negative interaction indicates that the presence of female board directors reduces the influence of the debt-to-equity ratio (DETE) on market value added. Overall, our findings demonstrate robustness in the sense that the moderating effects of FBDP on the relationships between the independent variables (EQTA, DETA, DETE) and firm performance are consistent across different dimensions of firm performance. This consistency across multiple models and measures strengthens the reliability of our results and supports the validity of the moderating role of FBDP in influencing firm performance outcomes.

Table 7: Capital Structure Firm Performance Nexus - Market Value Added Dimension: The Role of Female Director Board Presence

	Market Value Added				
	Pool OLS	PE	RE	GMMI	GMMII
CONS.	-0.318	-0.691	-1.025	-0.379	-0.242
	{0.866}	{0.698}	{0.500}	{0.883}	{0.799}
L1				0.379	0.376
				{0.000} ****	{0.000} ****
FBDP × EQTA	-0.007	-0.008	-0.008	-0.007	-0.007
	{0.000} ****	{0.000} ****	{0.000} ****	{0.000}	{0.000} ****
FBDP × DETA	0.005	0.003	0.004	0.001	0.001
	{0.000} ****	{0.000} ****	{0.000} ****	{0.196}	{0.000} ****
FBDP × DETE	-0.001	-0.001	-0.001	-0.001	-0.001
	{0.555}	{0.496}	{0.476}	{0.541}	{0.000} ****
ASGT	-0.001	-0.000	-0.000	-0.003	-0.002
	{0.529}	{0.901}	{0.629}	{0.001} **	{0.000} ****
ASTA	-0.003	0.000	-0.001	-0.006	-0.007
	{0.058}	{0.929}	{0.709}	{0.039} **	{0.000} ****
GDPG	0.015	0.012	0.013	0.011	0.011
	{0.326}	{0.292}	{0.269}	{0.304}	{0.000} ****
CRPS	0.167	0.525	0.376	-0.736	-0.441
	{0.708}	{0.162}	{0.291}	{0.181}	{0.010} ****
FSIZ	-1.821	-2.053	-1.904	-1.739	-1.743
	{0.000} ****	{0.000} ****	{0.000} ****	{0.000} ****	{0.000} ****
FOWN	-0.004	-0.001	-0.003	-0.003	-0.002
	{0.090}	{0.797}	{0.481}	{0.607}	{0.106}
MCAP	1.944	2.016	2.004	2.446	2.259
	{0.000}***	{0.000} ****	{0.000} ****	{0.000} ****	{0.000} ****
F/Wald Statistics	100.34 (0.0000)	47.83 (0.0000)	614.57 (0.0000)	821.65 (0.0000)	8965.13 (0.0000)
R^2	0.5936	0.4363	0.4353		

Source: STATA software output

Note: (1) bracket {} are p-values: (2) **, ***, implies statistical significance at 5% and 1% levels respectively

V. Conclusion and Recommendations

This study investigated the direct effect of capital structure on firm performance and extends this objective by examining the moderating effect of female board director presence on this relationship for non-finance firms in Nigeria from 2012 to 2021. The main aim of the study was to assess how different components of capital structure, such as equity to asset ratio, debt to asset ratio, and debt to equity ratio, affect firm performance, measured in terms of market value and profitability, and to determine how the presence of female board directors influences these relationships. The key findings revealed that the equity to asset ratio has a positive and significant effect on firm performance when measured by market value and profitability, suggesting that a higher equity ratio can enhance both market value and profitability. Conversely, the debt to asset ratio had a positive effect on market value but a negative effect on profitability, indicating that while debt can improve market value, it may constrain profitability. The debt-to-equity ratio had a negative effect on market value and a positive effect on profitability, suggesting a nuanced role of debt-to-equity ratio on different performance measures.

The study also found that the presence of female board directors significantly affects firm performance: It positively influences profitability but has an insignificant negative effect on market value. When considering the interaction effects, the results demonstrate that the presence of female board directors modifies the relationship between capital structure and firm performance in varying ways, which suggests a complex moderating role. The findings indicated that female board presence enhances profitability by positively moderating the impact of equity to asset and debt to equity ratios, suggesting improved governance and operational efficiency. However, this presence also showed a mixed influence on market value, where it negatively moderates the equity to asset and debt to equity ratios while positively moderating the debt to asset ratio, reflecting both potential market biases and perceived risk management benefits since investors may see gender-diverse boards as better equipped to handle financial risks and governance challenges, enhancing the firm's credibility and attractiveness.

Based on the findings, corporate managers and directors should recognize the dual impact of their capital structure decisions on different aspects of firm performance. Emphasizing a balanced capital structure that maintains an optimal level of equity while leveraging debt responsibly can help maximize both market value and profitability. Female representation on boards should be viewed as a strategic resource that can enhance profitability and contribute to more balanced decision-making, particularly in financial management and strategy formulation. For policymakers and regulators, it is essential to consider frameworks that encourage gender diversity on corporate boards, not only for its intrinsic value, but also for its impact on firm performance. Regulations or incentives that promote female representation on boards could help create a more equitable and competitive market environment. Additionally, ensuring transparency and adequate disclosure of firms' capital structures could aid in reducing information asymmetries and promote better investment decisions. For other stakeholders, including corporate governance advocates and human resource professionals, promoting a more inclusive corporate culture with diverse boards can contribute to long-term sustainable performance. These efforts should be aligned with broader strategic goals that balance both profitability and market growth. Future research could explore these relationships in other sectors or geographical contexts to enhance the generalizability of the findings. Additionally, examining other dimensions of board diversity, such as age, ethnicity, and educational background, could provide a more comprehensive understanding of how board composition affects firm performance. Further studies might also consider longitudinal analyses to capture the dynamic effects of capital structure and board diversity over more extended periods or employ alternative methodological approaches to address potential endogeneity and measurement biases.

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