

BOARD ATTRIBUTES AND CAPITAL STRUCTURE DECISIONS OF LISTED MANUFACTURING FIRMS IN NIGERIA

¹Muhammed Tahir Dahiru, ²Haruna Muhammed Musa & ³Aisha Oluwakemi OBA

¹ ABU Business School, Ahmadu Bello University, Zaria, Nigeria

¹mmtahir101@gmail.com, ²harunam.muhammed@gmail.com, ³obaaisha1@gmail.com

Abstract

This study looks at how board characteristics affect the capital structure choices of Nigerian-listed manufacturing firms using quantitative approach and a correlational research design in analyzing panel data from thirty-seven firms. The data was then analyzed using random effect robust regressions, and a statistical inverse linked between board size and capital structure was observed under the pooled data. A negative relationship was discovered between board meeting and capital structure for aggressive and pooled data. Conversely, board independence exhibits a substantially positive relationship with conservative firms' data, and board gender diversity was significant with a positive relationship for pooled data. Similarly, board expertise was positive and significant with the moderate firms. As a result of the findings, it is therefore recommended that the firms should carefully evaluate their specific needs, objectives, and governance structure to determine the optimal board composition that best serves the interests of the company and its stakeholders. In respect of board meeting having a well-defined agenda ensure that meetings stay focused and productive. It was also recommended that having a diverse boards in terms of backgrounds, expertise, and perspectives can promote independence by ensuring a range of viewpoints are considered. Similarly, a diverse range of qualified candidates, including women, should be considered when selecting a new board member.

Keywords: Capital structure, Board characteristics, Manufacturing firms, Aggressive, Moderate, Conservative

1. Introduction

Capital structure (CS) significantly impacts investment, with excessive debt leading to inadequate investment. The board's effectiveness and preferences influence agency problems and expenses, highlighting the contract problem between shareholders and managers (Li et al., 2023). Comparable to various emerging markets, Nigeria has a relatively underdeveloped capital market and limited access to external sources of funding, which puts pressure on firms to rely heavily on debt financing. The main issue with relying heavily on debt financing is that it increases a company's financial leverage, which can lead to higher interest payments and debt servicing costs. In addition, companies that rely solely on equity financing may face dilution of ownership and control and may also face funding constraints to meet their capital requirements. An organization needs to determine the optimal mix of debt and equity financing to maximize shareholder wealth while managing financial risk. According to Akinmurele (2021), as of 2021, the issuing of debt instruments has increasingly become a viable funding source for Nigerian manufacturing firms due to the low borrowing rates for debt issuance and corporate bonds in Nigeria.

The manufacturing sector combined debt to Nigerian banks rise from N4.09 trillion in December 2021 to N4.54 trillion in June 2022 according to the central bank of Nigeria's sectoral analysis of deposit money banks' credit (Tunji, 2022). Similarly, resource scarcity and funding constraints are obstacles within the Nigerian manufacturing firms due to the persistent rise in their debt levels, which has an effect on the firms' CS. The industry has been borrowing aggressively to fund its increasing market share (Bala, 2019). Manufacturing sectors in Nigeria are faced with growing debt ratios, with Dangote and BUA Cements being among the firms with the largest debt proportion in their CS as of 2021 (Omokolade, 2021). In addition, BUA Cement, which is categorised under the manufacturing sector in Nigeria, has issued the largest corporate bond within the context of Nigerian capital market. Moreover, Notore Chemical Industries Plc has struggled with significant indebtedness. The firm has a total debt stock of 122.17 billion naira in its balance sheet, which is 2.84 times its equity as of the fourth quarter of 2021, which implies that the firm is levered, although there are plans to raise more capital through a public offer or a right issue (Team, 2020). Firms such as Lafarge Africa Plc also adopted an aggressive approach to restructuring their capital (Olalekan, 2020).

Academic research has highlighted the importance of board attributes in enhancing shareholder value and managing CS. Enron and WorldCom scandals highlight the need for improved governance frameworks. Corporate leverage can self-regulate and reduce debt financing costs, influencing CS decisions (Jensen & Meckling, 1976). According to Adegbile (2015) a robust governance structure is crucial for developing economies like Nigeria, as it enhances financial position and social standing, aiding businesses in obtaining higher ratings and generating funds. Firms with robust governance can access capital markets more easily and obtain increased leverage. An erroneous selection of CS can lead to financial difficulties and insolvency for an organization, highlighting the importance of a well-designed structure in maximizing stakeholder interests and ensuring efficient competition (Adegbile, 2015).

The board's attributes, which include board size (BSZ), board meeting (BM), board independence (BIND), board gender diversity (BGD) and board expertise (BEXP), will be used to examine and report whether board characteristics will influence the CS decisions of listed manufacturing firms in Nigeria. The selection of these variables was driven by their prominent effect on the decisions made about how and how much capital should be raised. The aforementioned variables have been used in previous literature, such as the studies of (Adegbile, 2015; Ehikioya et al., 2021; Hordofa, 2023; Li et al., 2023; Mulwa & Ndede, 2021; Thakolwiroj & Sithipolvanichgul, 2021). According to Thakolwiroj and Sithipolvanichgul (2021) the board of directors, serves as the supreme governing body of a company, bears the responsibility of overseeing the corporate operations. The board's size and non-quantifiable attributes, such as BGD, can impact corporate governance (CG) effectiveness. Excessive BSZ can decrease directors' motivation to attend meetings and compromise independence. Research suggests that female directors contribute to improved CG, whereas male directors tend to exhibit greater caution (Li et al., 2023). According to Li et al (2023) female directors significantly influence a company's CS, as they excel in diligence, responsibility, and independence, enabling them to provide rigorous supervision and ensure timely goal achievement.

Furthermore, BMs are crucial assemblies of directors convened to discuss organizational matters, impacting an organization's success and facilitating efficient decision-making. They deliberate on past, present, and future matters, and resolutions are enacted during these meetings. Increased frequency of BMs is characterized by enhanced prospect of deliberating on various decisions (Kakanda et al., 2016). Also, the board of directors comprises of three categories which are insiders, outsiders, and affiliated directors. Insiders are firm employees with more information and influence, providing secret resources and recommendations. The outsiders are not organizationally tied to the organization, play a crucial role in oversight and represent shareholders they are often referred to as the independent directors. Affiliated directors represent various stakeholders, but may be influenced by management (Adegbile, 2015). BIND, as defined by agency theory, is the ability of a board to make decisions independently without management oversight, enhancing shareholder interests and mitigating risks like information asymmetry and conflicts of interest. Independent directors are more effective in overseeing managers (Li et al., 2023).

The following hypotheses, stated in null form are put forth for testing:

- Ho1: there is no significant relationship between BSZ and CS decisions for conservative, moderate and aggressive firms listed in the Nigerian Manufacturing sector.
- Ho2: there is no significant relationship between BM and CS decisions for conservative, moderate and aggressive firms listed in the Nigerian Manufacturing sector.
- Ho3: there is no significant relationship between BIND and CS decisions for conservative, moderate and aggressive firms listed in the Nigerian Manufacturing sector.
- Ho4: there is no significant relationship between BGD and CS decisions for conservative, moderate and aggressive firms listed in the Nigerian Manufacturing sector.
- Ho5: there is no significant relationship between board financial expertise and CS decisions for conservative, moderate and aggressive firms listed in the Nigerian Manufacturing sector.

This study is motivated by the uncertainty in the Nigerian economy, which has led to a persistent rise in debt levels and capital restructuring, which has been the trend in the manufacturing sector in Nigeria. This is quite alarming and gives drive for research to be conducted in this particular industry. The occurrence of the COVID-19 pandemic, which had an adverse effect on firms around the globe, also prompted the researcher to revisit this issue. Besides, there are very limited studies on the CS decisions of the manufacturing sector in Nigeria. Most of the studies are carried out in other industries, such as the insurance and banking industries focused on the CS with addressing the decisions. The scope of this study is limited to the board characteristics that have an effect on the CS decisions of listed manufacturing firms in Nigeria.

2. Literature Review and Theoretical Framework

Ehikioya et al (2021) assessed the consequences of board characteristics on the CS of firms listed between 2015 and 2019 on the Nigerian Exchange Group (NEG). Fixed effects regression outcomes were utilized in the study to evaluate panel data from ninety-three randomly selected quoted firms in Nigeria. The study made use of six board characteristics which includes BSZ, BGD, board composition, managerial ownership, board skills and CEO duality. The study's conclusions clearly show that, although BGD has a positive relationship with CS, BSZ has a negative but insignificant impact on it.

Ahmed et al (2023) conducted a study on the CG and CS using evidence from Europe. Panel data was used based on data extracted from yearly reports of 42 non-financial listed firms within the timeframe of 2017- 2021. Ordinary Least Square regression model was used in estimating the CS and CG. The independent variable used in the study includes BSZ, BM, board remuneration, CEO compensation, and CEO tenure and audit committee size. The findings showed that BSZ has statistical significant positive association with CS while BM has an inverse significant relationship with the CS. This outcomes align with the agency theory and pecking order theory which was used in underpinning the study.

Thakolwiroj and Sithipolvanichgul (2021) explored the interplay between board features and CS of listed Thailand firms. Data was collected from the annual reports, from 2015 to 2017, which totaled 1,264 firm-year observations. The research employed regression modelling to the relationship. The predictor variables utilized in the research includes BSZ, outside directors, frequency of BMs, BEXP and gender, managerial ownership and CEO duality while CS was used as the dependent variable. The results showed that outside director was negative substantial association with the CS while BSZ, frequency of meetings, board experience and gender were found to be insignificant. The period covered in the study has been overtaken by recent events.

Li et al (2023) conducted a study on the effect of board characteristics on CS using firms from the United Kingdom, France, Germany, and China. The study covered a period of 2009 to 2021, and regression modelling was utilized for the purpose of analysis. The results from the analysis shows that BGD, BSZ and BM has a significant but negative relationship with CS in all the four countries, while BIND was not significant in all four countries.

Syariati and Kadir (2019) carried out a study on board diversity, CS and firm value using the data from 75 service companies, listed on Indonesia Exchange. The inquiry deployed two regression analysis and sobel test to examine the relationship of the variables. The results showed that BGD negatively affect the CS. Interestingly, educational background exerts on significant influence on corporate value. In addition, this study also showed that the CS is not able to mediate the relationship between the diversity of gender, age and educational background of the value of the company.

Hordofa (2023) conducted a study on the influence of gender diversity on CS decisions among Ethiopian banks from 2010 to 2022. Data were sourced from annual reports of 15 banks, the variables used in the study includes leverage, gender diversity percentages, BSZ and other governance traits. Panel data techniques, including GMM regression were used for the purpose of analysis. It was discovered that gender diversity has a significant relationship with lower debt utilization.

A study was conducted by Sarwar et al (2019) who examined board financial expertise and debt policy among listed non-financial firms in Pakistan using panel data from 2010 to 2015. The study population comprises of a total of 396 firms. The findings showed that board financial expertise has a significant and positive effect on the financial leverage of these firms.

The theoretical perspective of agency paradigm reveals that when ownership and control are separated, the interest of principal and agent conflict arises. This theory posits that the agent's motivation to optimize shareholders' profit decreases which is attributable to insufficient salary (Jensen & Meckling, 1976). Meanwhile, the tradeoff theory of CS theory curb the expenditure related to financial distress and agency costs. The cost of agency, tax, and bankruptcy drives firms making high profits to higher levels of book leverage. The trade-off theory suggests that an organization's performance remains unaffected by its CS. A company's value increases proportionally to the extent it uses debt financing, and incorporating cost and benefit analysis into CS optimization is crucial. The pecking theory addresses the type of financing a firm will prefer when additional resources are needed, which can be sourced either internally or externally. The firm prefers raising its funds internally by putting back its profits and trading its short-term securities. Whenever finances cannot be generated internally, the firm will issue debt and preferential shares. The last solution for raising funds is for the firm to issue common stock (Aljamaan, 2018).

3. Methodology

A quantitative approach was adopted in this investigation and a correlational study design was implemented in examining the board attributes that exert an influence on the decisions of listed manufacturing firms in Nigeria. The study population consists of all forty eight (48) listed manufacturing firms. This study adopted the census approach; filtration was applied to derive the adjusted population of thirty seven (37) listed manufacturing firms in Nigeria. The source of data utilised in the study is secondary data and was extracted and collected from the audited and published annual financial reports of the listed manufacturing firms on the Nigeria Exchange Group from 2013–2022 which is ten (10) years. This period covers when the economic shocks occurred that threatened the existence of these firms, which were not captured in other studies conducted in the manufacturing sector. Panel data, random effect regression (VCE) robust was the technique used because this reduces the bias that might occur.

Model Specification

The models of this study are:

$$ACSD_{it} = \beta_0 + \beta_1 BSZ_{it} + \beta_2 BM_{it} + \beta_3 BIND_{it} + \beta_4 BGD_{it} + \beta_5 BEXP_{it} + \beta_6 FSZ_{it} + E_{it} \dots \dots \dots (1)$$

$$MCSD_{it} = \beta_0 + \beta_1 BSZ_{it} + \beta_2 BM_{it} + \beta_3 BIND_{it} + \beta_4 BGD_{it} + \beta_5 BEXP_{it} + \beta_6 FSZ_{it} + E_{it} \dots \dots \dots (2)$$

$$CCSD_{it} = \beta_0 + \beta_1 BSZ_{it} + \beta_2 BM_{it} + \beta_3 BIND_{it} + \beta_4 BGD_{it} + \beta_5 BEXP_{it} + \beta_6 FSZ_{it} + E_{it} \dots \dots \dots (3)$$

Where; β_0 = Constant, β_1 to β_5 = Coefficient of the independent variables, ACSD = Aggressive CS decisions, MCSD = Moderate CS decisions, CCSD = Conservative CS decisions, BSZ = BSZ, BM = BM, BIND = BIND, BGD = BGD, BEXP = Board financial expertise, FSZE = Firm size and it = Panel indicator.

Variable Measurements

Dependent variable: CS = Ratio of total debts to total assets (Bashir, 2019, Do et al., 2020)

*Where aggressive decisions are characterized by a high ratio, ranging from 61% - and above

*Where moderate decisions are characterized by moderate ratio, ranging from 41% - 60%

*Where conservative decisions are characterized by a low ratio, ranging from 0% - 40%

Independent Variables

BSZ = Total number of directors on the board (Thakolwiroj and Sithipolvanichgul, 2021)

BMs = Number of BMs per year (Ahmed et al., 2023).

BIND = Ratio of independent directors to the cumulative total directors on the board (Thakolwiroj and Sithipolvanichgul, 2021)

BGD = Number of women in a board (Li et al, 2023)

Board financial expertise = Member of the board that have academic backgrounds in financial specialities, having experience in accounting and finance operations (Sarwar et al, 2019)

4. Results and Discussions

This section presented and analyzed the statistical results derived from the data. The results of the descriptive statistics of the variables used are shown and discussed below:

Table 4.1: Descriptive Statistics for Pooled Data

Variables	Obs	Mean	Std. Dev	Min	Max
CS	370	0.9318	2.3588	0.0323	19.557
BSZ	370	9.0913	2.7078	4.0000	18.000
BM	370	5.0347	1.1999	3.0000	10.000
BIND	370	0.1319	0.1723	0.0000	0.6923
BGD	370	0.1835	0.1443	0.0000	0.6666
BEXP	370	0.1684	0.1617	0.0000	0.5714
FSZ	370	9.2522	1.6996	6.0309	11.690

Table 4.2: Descriptive Statistics for Conservative, Moderate and Aggressive Data

Var	Mean	STD	Min	Max	Mean	STD	Min	Max	Mean	STD	Min	Max
CS	0.287	0.972	0.032	0.404	0.526	0.558	0.410	0.6044	1.794	3.710	0.610	19.557
BSZ	9.798	2.746	6.000	17.00	9.289	2.398	4.000	18.000	8.993	1.958	4.000	13.000
BM	5.154	1.213	4.000	10.00	5.078	1.106	4.000	9.0000	4.928	1.144	3.000	9.0000
BIND	0.115	0.143	0.000	0.636	0.144	0.178	0.000	0.6363	0.144	0.192	0.000	0.6923
BGD	0.144	0.136	0.000	0.455	0.176	0.146	0.000	0.6666	0.203	0.148	0.000	0.6000
BEXP	0.150	0.117	0.000	0.571	0.194	0.115	0.000	0.5714	0.167	0.118	0.000	0.5714
FSZ	8.737	1.835	6.050	11.54	9.516	1.799	6.031	11.580	9.398	1.401	6.265	11.688

Table 4.1 reveals that manufacturing firms have an average CS of 93.1% and a standard deviation of 2.3588. This indicate a significant variability among the firms. The statistical summary reveals that the minimum level of leverage utilised in the CS of manufacturing firms was 3.2%, while the maximum level of leverage utilised was 1900%. Furthermore, it was noted that the BSZ shows an average value of 9.09 with a standard deviation of 2.7078. This evident a relatively high variation among the firms operating in the manufacturing industry in Nigeria. The range of BSZ values observed within the indicated period ranged from 4.00 to 18.00. In addition, the BM indicator has an average value of 5.03 and a standard deviation of 1.1999, suggesting a significant variability across the manufacturing firms in Nigeria. The range spans from 3.00 to a maximum of 10.00, signifying that some companies held more BMs than other companies. Furthermore, the BIND indicator has an average of 13.19% and a standard deviation of 0.1723, suggesting a low level of fluctuation between the mean and the standard deviation, with 0.00% as the minimum and 69.23% as the maximum. Also, the average value and standard deviation of BGD in the manufacturing sector are 18.35% and 0.1443, respectively. The BGD varies between a minimum of 0.00% and a maximum of 66.66%. In addition, BEXP has a mean value of 16.84% and a standard deviation of 0.1617, with a minimum of 0.00% and a maximum of 57.14%. The average firm size in the manufacturing industry is 9.2522, with a standard deviation of 1.6996, a minimum of 6.0309, and a maximum value of 11.69.

Table 4.2 reveals that conservative firms in Nigeria manufacturing sector have an average CS of 28.67% and a standard deviation of 0.0971. This suggests a low level of variation among the firms. The descriptive analysis show that the minimum level of leverage utilised in the CS of conservative firms was 3.23%, while the maximum level of leverage utilised was 40.4%. Furthermore, analysis reveals that the BSZ shows an average value of 9.79 with a standard deviation of 2.7461. This study indicates that there is relatively high variation among the conservative firms operating in the manufacturing industry in Nigeria. The range of BSZ values observed within the indicated period ranged from 6.00 to 17.00. In addition, the BM indicator has an average value of 5.15 and a standard deviation of 1.2129, suggesting that there is variation across the conservative firms in the manufacturing sector. The range spans from 4.00 to a maximum of 10.00, signifying that some companies had BMs than others. Furthermore, the BIND indicator has an average of 11.50% and a standard deviation of 0.1427, suggesting a low level of fluctuation between the mean and the standard deviation, with 0.00% as the minimum and 63.63% as the maximum. Also, the average value and standard deviation of BGD in the conservative manufacturing sector are 14.39% and 0.1364, respectively. The BGD varies between a minimum of 0.00% and a maximum of 45.45%. In addition, BEXP has an average and variability of 15.01% and 0.1166 respectively, and a minimum and maximum of 0.00% and 57.14%. The average firm size in the conservative manufacturing industry is 8.7373, with a standard deviation of 1.835, a minimum of 6.0500, and a maximum value of 11.540.

Table 4.2 reveals that moderate firms in the manufacturing sector in Nigeria have an average CS of 52.6% and a standard deviation of 0.0558. This suggests a low level of variation among the firms. The outcome indicate that the minimum level of leverage utilised in the CS of moderate firms was 41%, while the maximum level of leverage utilised was 60%. Furthermore, it is noted that the BSZ shows an average value of 9.28 with a standard deviation of 2.3980. This study indicates that there is relatively high variation among the conservative firms operating in the manufacturing industry in Nigeria. The range of BSZ values observed within the indicated period ranged from 4.00 to 18.00. In addition, the BM indicator has an average value of 5.07 and a standard deviation of 1.1055, suggesting that there is variation across the moderate firms in the manufacturing sector. The range spans from 4.00 to a maximum of 9.00, signifying that some companies had BMs than others. Furthermore, the BIND indicator has an average of 14.41% and a standard deviation of 0.1776, suggesting a low level of fluctuation between the mean and the standard deviation, with 0.00% as the minimum and 63.63% as the maximum. Also, the average value and standard deviation of BGD in the moderate manufacturing sector are 17.59% and 0.1464, respectively. The BGD varies between a minimum of 0.00% and a maximum of 66.66%. In addition, BEXP has an average and standard deviation of 19.42% and 0.1152 respectively, and a minimum and maximum of 0.00% and 57.14%. The average firm size in the moderate manufacturing industry is 9.5164, with a standard deviation of 1.7995, a minimum of 6.0309, and a maximum value of 11.580.

Table 4.2 reveals that aggressive firms in the manufacturing sector in Nigeria have an average CS of 179% and a standard deviation of 3.7096. This suggests a substantial among the firms. The summary statistics indicate that the minimum level of leverage utilised in the CS of aggressive firms in the Nigerian manufacturing sector was 61%, while the maximum level of leverage utilised was 1900%. Furthermore, it is noted that the BSZ shows an average value of 8.99 with a standard deviation of 1.9575. Findings reveals that there is relatively high variation among the aggressive firms operating in the manufacturing industry in Nigeria. The range of BSZ values observed within the indicated period ranged from 4.00 to 13.00. In addition, the BM indicator has an average value of 4.92 and a standard deviation of 1.1439, suggesting that there is a low variation across the aggressive firms in the manufacturing sector. The range spans from 3.00 to a maximum of 9.00, signifying that some companies had BMs than others. Furthermore, the BIND indicator has an average of 14.42% and a standard deviation of 0.1921, suggesting a low level of fluctuation between the mean and the standard deviation, with 0.00% as the minimum and 69.23% as the maximum. Also, the average value and standard deviation of BGD in the aggressive manufacturing sector are 20.27% and 0.1477, respectively. The gender equity on the board varies between a minimum of 0.00% and a maximum of 60.00%. In addition, BEXP has mean and standard deviation of 16.65% and 0.1180 respectively, and a minimum and maximum of 0.00% and

57.14%. The average firm size in the aggressive manufacturing industry is 9.3981, with a variability of 1.4012, a minimum of 6.2646, and a maximum value of 11.69.

Correlation Matrix

The correlation matrix depicts the association of predictor and predicting variables among themselves. According to Gujarati (2004), the association measures between two independent variables above 0.80 is considered excessive. From the tables below, it can be observed that all correlation coefficients among the predictor variables are all below 0.80, which shows the absence of multicollinearity. However, to further test for collinearity issues, this study employed the variance inflation factor (VIF) test to measure its magnitude in our model, where variance factors for each variable are estimated. The result of the VIF test for conservative's ranges from a minimum of 1.17 to a maximum of 1.91 which are all less than 10. To further substantiate this claim, the mean VIF is 1.54, also confirming the absence of multicollinearity among all the independent variables (Hair, J. J. et al., 2014). In addition, the result of the VIF tests for moderate ranges from a minimum of 1.04 to a maximum of 1.35 which are all less than 10. To corroborate further proof for this assertion, the mean VIF is 1.20, also confirming the absence of multicollinearity among all the independent variables. Furthermore, the result of the VIF test for aggressive firms ranges from a minimum of 1.04 to a maximum of 1.32, which are all less than 10. To further substantiate this claim, the mean VIF is 1.18, also confirming the absence of multicollinearity among all the independent variables. The result of the VIF test for the manufacturing firms ranges from a minimum of 1.06 to a maximum of 1.34 which is all less than 10. To further substantiate this claim, the mean VIF is 1.24, also confirming the absence of multicollinearity among all the independent variables.

Table 4.3: Matrix of correlations for Pooled Data

Variables	CS	BSZE	BM	BIND	BGD	BEXP	FSZ
CS	1.0000						
BSZ	-0.2197	1.0000					
BM	-0.1680	0.3874	1.0000				
BIND	-0.0236	0.2753	0.2869	1.0000			
BGD	0.1575	-0.0139	0.2199	0.3702	1.0000		
BEXP	0.0442	-0.0291	0.1665	0.0738	0.0312	1.0000	
FSZ	0.1445	0.2031	0.1291	-0.1652	-0.1564	0.1330	1.0000

Table 4.4: Matrix of correlation for Conservative Data

Variables	CS	BSZE	BM	BIND	BGD	BEXP	FSZ
CS	1.0000						
BSZ	0.3187	1.0000					
BM	0.0453	0.5020	1.0000				
BIND	0.3949	0.2911	0.2885	1.0000			
BGD	0.0663	-0.0284	0.1699	0.4548	1.0000		
BEXP	0.2706	0.0286	0.2472	-0.0320	-0.1881	1.0000	
FSZ	0.1338	0.5744	0.2774	0.3547	0.0054	-0.0647	1.0000

Table 4.5: Matrix of correlation for Moderate Data

Variables	CS	BSZE	BM	BIND	BGD	BEXP	FSZ
CS	1.0000						
BSZ	-0.0458	1.0000					
BM	0.0491	0.1072	1.0000				
BIND	0.0145	0.0744	0.1904	1.0000			
BGD	0.0978	-0.1640	0.2681	0.3496	1.0000		
BEXP	0.1396	-0.1616	0.0113	0.0574	0.0008	1.0000	
FSZ	-0.1209	0.4258	0.0427	0.0978	-0.0015	-0.0097	1.0000

Table 4.6: Matrix of correlation for Aggressive Data

Variables	CS	BSZE	BM	BIND	BGD	BEXP	FSZ
CS	1.0000						
BSZ	0.1945	1.0000					
BM	0.0111	0.2866	1.0000				
BIND	-0.1209	0.3464	0.2693	1.0000			
BGD	-0.2549	0.0731	0.3045	0.3229	1.0000		
BEXP	0.1033	0.1005	0.1128	0.0761	0.0693	1.0000	
FSZ	-0.1502	0.0978	0.0613	0.2165	0.1347	-0.1081	1.0000

As indicated by the correlation coefficients in Table 4.3, it can be observed that the CS of manufacturing firms displays a direct association with BGD, BEXP and firm size. The data exhibits a concurrent movement. However, CS has an inverse relationship with BSZ, BM and BIND. Also, from the correlation matrix in Table 4.4, it can be observed that the CS of conservative firms in the manufacturing sector has a positive relationship with BSZ, BM, BIND, BGD, BEXP and firm size. This implies that these variables move in the same direction as CS.

Furthermore, the correlation matrix in Table 4.5, it is evident that CS of moderate firms in the manufacturing sector has a direct linked with BM, BIND, BGD and BEXP. This indicates a covariation in the same direction as the CS. However, CS has an inverse association with BSZ and firm size. The implication of this is that the variables move in the opposite direction with CS. In addition, the correlation matrix in Table 4.6, it can be observed that the CS of aggressive firms in the manufacturing sector has a positive relationship with BSZ, BM and BEXP. This implies that this variable moves in the same direction as the CS. However, CS has a negative relationship with BIND, BGD and firm size. The implication of this is that the variables move in the opposite direction with CS.

Diagnostic Test

Diagnostic analyses were conducted to maintain the unbiasedness of the parameters, as contended by Wooldridge (2012). Hausman test was conducted in addition to the multicollinearity test to select between random and fixed effect models. The p-value of 0.5441 for conservative firms in the Nigerian manufacturing sector, 0.3769 for moderate firms in the manufacturing sector, 0.5245 for aggressive firms in the manufacturing sector in Nigeria, and 0.5697 for manufacturing firms shows that the Hausman test is statistically insignificant, and the random effect model is therefore appropriate. Breusch and Pagan Lagrangian multiplier test for random effects were conducted in other for us to be able to choose between the ordinary least square and random effect. The p-value of 0.0377 for conservative firms in the Nigerian manufacturing sector, 0.0000 for moderate firms in the manufacturing sector, 0.0000 for aggressive firms in the manufacturing sector in Nigeria, and 0.0000 for pooled manufacturing firms are all significant and shows that the random effect should be tested and reported. Tests for normality of the residual were also conducted using Sharpiro-Wilk. The result of the Shapiro-Wilk test reveals that the p-value is significant at 1%. Therefore, the null hypothesis that the residuals are normally distributed across the model is rejected. However, according to the Gauss-Markov theorem, normality of data and residual distribution are not necessary for obtaining the Best Linear Unbias Estimate (BLUE) for as long as the sample size is greater than 15 observations.

Furthermore, the heteroskedasticity test for conservative, moderate, aggressive conducted using Modified Group Wise proved significant with a p-value of 0.000, which therefore signifies the absence of homoscedasticity. The presence of heteroscedasticity violates the homoscedasticity assumption, which may lead to a wrong inference. This study therefore conducted a random-effect (VCE) robust model to overcome heteroscedasticity. Below are the regression results.

Table 4.7: Random Effect Robust (VCE) Result for Pooled Data

CS	Coef.	St.Err.	z-value	p-value
BSZ	-0.0160	0.0062	-2.59	0.010
BM	-0.0344	0.0141	-2.44	0.016
BIND	-0.0849	0.0992	-0.86	0.393
BGD	0.4203	0.1162	3.62	0.000
BEXP	0.0653	0.1333	0.49	0.625
FSZ	0.0342	0.0090	3.79	0.000
Constant	0.4253	0.1001	4.25	0.000
No of obs	370.00	Wald chi		
Hausman	0.5697	Adjusted R²		
Hetest	0.0000	Prob>F		

Table 4.8: Random Effect (VCE) Robust Regression Results for Conservative, Moderate and Aggressive Data

Conservative					Moderate				Aggressive			
CS	Coef.	St.Err.	z-value	p-value	Coef.	St.Err.	z-value	p-value	Coef.	St.Err.	z-value	p-value
BSZ	0.003	0.005	0.58	0.560	0.0015	0.0037	0.41	0.685	0.0620	0.0964	0.64	0.520
BM	-0.013	0.009	-1.36	0.175	-0.0021	0.0101	-0.21	0.832	-0.1759	0.0795	-2.21	0.027
BIND	0.157	0.052	3.04	0.002	-0.0004	0.0081	-0.05	0.961	0.3964	1.1812	0.34	0.737
BGD	0.044	0.045	0.97	0.332	-0.0053	0.0133	-0.41	0.685	-0.7450	0.9482	-0.79	0.432
BEXP	0.178	0.046	3.87	0.000	0.1642	0.0942	1.74	0.081	-0.1364	0.8458	-0.16	0.872
FSZ	0.001	0.009	-0.12	0.910	0.0165	0.0171	0.96	0.000	-0.1273	0.1698	-0.90	0.368
Constant	0.288	0.059	4.85	0.000	0.4917	0.0884	5.56	0.000	1.8064	0.6105	2.96	0.003
Hausman	0.5441				0.3769				0.5245			
Hetest	0.0000				0.0377				0.0000			
Adjusted R²	0.2777				0.3553				0.1488			
Prob>F	0.0000				0.0000				0.0000			

The details from the tables above show the results obtained from the robust random-effect. The coefficient of determination of R-squared for conservative firms was 0.2777, which indicates about 27.77% of variation in conservative CS caused by variations in independent variables, as shown by the model in Table 4.7; the remaining 72.73% is accounted for by the error term. The R-squared of moderate firms was 0.3553, which shows that 35.53% of the variations in the moderate CS are caused by the independent variables; the remaining 64.47% are accounted for by the error term. The aggressive firm's CS has an R-squared of 0.1488, which implies that the predicting variables account for about 14.88% of changes in the CS of these firms; the outstanding 85.12 were accounted for by the error term. An R-squared of 0.1479 was attributed to the pooled data of manufacturing firms in Nigeria; this shows that about 14.79% of variations were caused by the independent variables used in this study; the remaining 85.21% are represented by the error term, which includes factors that were not captured in this study.

Board Size and Capital Structure

The first null hypothesis is supported for conservative, moderate and aggressive data but rejected for pooled data. The BSZ was not significant for conservative, moderate and aggressive firms, which is congruent with the findings of Ehikioya et al (2021); Thakolwiroj and Sithipolvanichgul (2021), who also discovered that the BSZ does not have a relationship with the CSs of firms. However, it was discovered that the BSZ has a significant but negative relationship with the CS of pooled firms in the Nigerian manufacturing sector. By implication, there is sufficient evidence to prove that a relationship exists between the BSZ and the CS of pooled firms in the Nigeria manufacturing sector. Hence, an increase in the BSZ by 1 person will lead to a corresponding decrease in their CS by 0.0160. This indicates that expanded boards can facilitate to more conservative financial decision making or increased monitoring, reducing the reliance on debt financing. The results of this study align with the conclusion drawn by Li et al., (2023). The discovery also aligns with the principles of agency theory, which states that larger boards may lead to increased monitoring and oversight of management by directors, which can reduce conflicts between shareholders and management. Subsequently, organizations with larger board composition may be less inclined to take excessive debt, as they have more effective monitoring mechanisms in place to ensure responsible financial decisions.

Board Meetings and Capital Structure

The second null hypothesis is supported by conservative and moderate data but rejected by aggressive and pooled data. BM was not significant for conservative and moderate firms, which is in conformity with the findings of Thakolwiroj and Sithipolvanichgul (2021) who also discovered that BM does not have a relationship with the CSs of firms. However, it was discovered that BM has a significant but negative relationship with the CS of aggressive and pooled manufacturing firms. By implication, there is sufficient evidence to prove that a relationship exists between BM and the CS of aggressive and pooled data of manufacturing firms. This finding provides evidence that an increase in the number of meetings by 1 is associated with a 0.1759 and 0.0344 drop in the CS of aggressive and pooled data of manufacturing firms in Nigeria. The negative relationship between BM and the CS of these firms may be attributed to the fact that excessive BMs may indicate managerial entrenchment, where managers influence to maintain control over the firm at the expense of shareholders. In such cases the managers may avoid taking on debt, which could potentially increase shareholder scrutiny and limit managerial discretion. The conclusions are in line with earlier investigations conducted by Ahmed et al (2023); Li et al (2023), who identified a substantial but negative correlation between BM and CS. The discovery also aligns with pecking order theory which explains how firms prioritise different sources of financing based on their internal hierarchy of preference and suggests that firms with higher profitability have greater internal funds to finance their activities, reducing their reliance on debt financing.

Board Independence and Capital Structure

The third null hypothesis is supported by moderate, aggressive and pooled data but rejected by the conservative data of manufacturing firms in Nigeria. BIND was not significant for moderate, aggressive and pooled firms, which is in harmony with the findings of Li et al (2023) who also discovered that BIND does not have a relationship with the CSs of firms. However, it was discovered that BIND has a significant but positive relationship with the CS of conservative data of manufacturing firms. This finding provides proof that an increase

in the number of independent directors by 1 is associated with a proportional increase of 0.1566 in the CS of conservative data of manufacturing firms in Nigeria. This means that when boards are more independent meaning they have fewer inside directors and more of outside or independent directors; they are better able to represent the interests of shareholders. The outcome concurs with earlier investigation of Ezeani et al (2022) who have identified a substantial link between BIND and CS. The finding aligns with the agency theory that suggests that independent boards may be more likely to approve debt financing as a means of aligning the interests of managers with those of the shareholders, as debt can impose financial discipline on management. Therefore, firms with more independent boards may exhibit a positive relationship between BIND and their use of debt in their CS.

Board Gender Diversity and Capital Structure

The fourth null hypothesis is supported by conservative, moderate and aggressive data of manufacturing firms in Nigeria but rejected by pooled data of manufacturing firms in Nigeria. BGD was not significant for conservative, moderate and aggressive data firms, which corroborate the findings of Thakolwiroj and Sithipolvanichgul, (2021), who also discovered that BGD does not have a relationship with the CSs of firms. However, it was discovered that BGD has a significant but positive relationship with the CS of pooled manufacturing firms. This implies that an increase in the female population on board of pooled firms would result in a rise in CS by 0.4203. This phenomenon may be attributed to the tendency that diverse perspectives and experiences brought by gender diverse boards can lead to better decision making and governance practices, including financial matters like CS. Also, the finding is congruent with the findings of (Hordofa, 2023).

Board financial expertise and Capital Structure

The fifth null hypothesis is supported by aggressive and pooled data of manufacturing firms in Nigeria but rejected by conservative and moderate data of manufacturing firms in Nigeria. BEXP was not significant for aggressive and pooled data firms, which is in congruent with the findings of Syariati and Kadir (2019); Thakolwiroj and Sithipolvanichgul (2021), who also discovered that BEXP does not have a relationship with the CSs of firms. However, it was discovered that BEXP has a significant but positive relationship with the CS of conservative and moderate data for manufacturing firms. This implies that an increase in the number of board members with professional accounting qualification by 1 will lead to an increase in the CS by 0.1780 and 0.1642 for conservative and moderate data in the listed manufacturing firms. This phenomenon may be attributed to the fact that boards with members possessing strong financial expertise can better assess and understand the financial implications of different CS decisions. Also, the finding is congruent with the findings of (Mulwa & Ndede, 2021). The findings also align with the agency theory as one of the main aim of CG mechanisms is to converge interests of managers with those of shareholders. When the board comprises members with strong financial expertise, they are better equipped to monitor managerial actions and make informed decisions regarding the firm's CS.

5. Conclusions and Recommendations

Based on the findings of this study, the study concludes that board characteristics strongly drive the CS of manufacturing firms in Nigeria. BSZ had negative and significant effect on the CS of pooled data firms in the Nigerian manufacturing sector during the period under review. This is in accordance with the position of the agency theory, which predicts a negative relationship between the BSZ and CS. Also, the study concludes that BM had a significant and negative relationship among aggressive and pooled data of the manufacturing firms; this aligns with the agency and pecking order theory. In addition, BIND had a significant and positive relationship with the CS of conservative firms, in the manufacturing sector within the investigation timeframe. Furthermore, the study concludes that BGD has a significant and positive relationship with the CS of pooled data of firms listed in the manufacturing sector in Nigeria. Lastly, it was determined that the board financial expertise has a significant but positive relationship with conservative and moderate data of firms listed in the manufacturing sector in Nigeria; this aligns with the agency theory.

Based on the outcomes of this study and consistent with the conclusions made, the following recommendations were put forth: firms should carefully evaluate their specific needs, objectives, and governance structure to

determine the optimal board composition that best serves the interests of the company and its stakeholders. In respect of BM having a well-defined agenda ensure that meetings stay focused and productive. It was also recommended that having a diverse boards in terms of backgrounds, expertise, and perspectives can promote independence by ensuring a range of viewpoints are considered. Similarly, a diverse range of qualified candidates, including women, should be considered when selecting a new board member.

References

- Adegbile, S. A. (2015). Corporate governance attributes and capital structure of listed firms in the Nigerian food and beverages industry. *International Journal of Public Administration and Management Research (IJPAMR)*, 3(1), 48–56. <http://www.rcmss.com>.
- Ahmed, A. M., Ali, M. N., & Hågen, I. (2023). Corporate governance and capital structure: Evidence from Europe. *International Journal of Professional Business Review*, 8(7), 1–22. <https://doi.org/10.26668/businessreview/2023.v8i7.1663>
- Akinmurele, L. (2021, May 20). After blockbuster 2020, Nigeria's corporate debt issuance to remain robust. *Business Day*.
- Bala, A. (2019, January 14). Cement makers to remain unwavering despite rise in debt to equity. *Business Day*.
- Ehikioya, B. I., Omankhanlen, A. E., Omodero, C. O., & Isibor, A. A. (2021). Corporate board and capital structure dynamics in Nigerian listed firms. *Academy of Accounting and Financial Studies Journal*, 25(1), 1–14.
- Ezeani, E., Kwabi, F., Salem, R., Usman, M., Alqatamin, R. M. H., & Kostov, P. (2022). Corporate board and dynamics of capital structure: Evidence from UK, France and Germany. *International Journal of Finance and Economics*, 28(3), 1–18. <https://doi.org/10.1002/ijfe.2593>
- Gujarati, D. N. (2004). *Basic econometrics* (4th editio). McGraw-Hill Companies.
- Hair, J. J., B., W., Babin, B., & Anderson, R. (2014). *Multivariate data analysis*. Pearson.
- Hordofa, D. F. (2023). The impact of board gender diversity on capital structure: Evidence from the Ethiopian banking sector. *Cogent Business and Management*, 10, 1–26. <https://doi.org/10.1080/23311975.2023.2253995>
- Jensen, M. C., & Meckling, W. . (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–600.
- Kakanda, M. M., Salim, B., & Chandren, S. (2016). Review of the relationship between board attributes and firm performance. *Asian Journal of Finance & Accounting*, 8(1), 168–181. <https://doi.org/10.5296/ajfa.v8i1.9319>
- https://doi.org/10.2991/978-94-6463-102-9_113
- Mulwa, H. M., & Ndede, F. (2021). Board characteristics and capital structure decisions of commercial banks in Kenya. *International Journal of Current Aspects in Finance, Banking and Accounting*, 3(2), 129–143. <https://doi.org/10.35942/ijcfa.v3i2.222>
- Olalekan, F. (2020). Lafarge Africa raises fresh capital to tackle rough patch. *Nairametrics*.
- Omokolade, A. (2021, June). Dangote cement considers debt funding options under 300 billion bond issuance programme. *Nairametrics*.
- Sarwar, B., Ming, X., Hassan, M., & Khan, S. (2019). Board financial expertise and debt policy. *South Asian Review of Business and Administrative Studies*, 2(1), 57–66.
- Syariati, N. E., & Kadir, N. (2019). Board diversity, capital structure and firm value in service companies listed in Indonesia stock exchange. *AICIEB Conference Proceeding*, 1, 235–246.
- Team, B. (2020). Notore chemicals is swimming in debts-company to access equity market in Q2 2021. *Nairametrics*.
- Thakolwiroj, C., & Sithipolvanichgul, J. (2021). Board characteristics and capital structure: Evidence from Thai listed companies. *Journal of Asian Finance, Economics and Business*, 8(2), 861–872. <https://doi.org/10.13106/jafeb.2021.vol8.no2.0861>
- Tunji, S. (2022). Manufacturers borrow N450bn frombanks amid rising rate. *Punch*.
- Wooldridge, J. M. (2012). *Introductory econometrics: A modern approach*. Mason, Ohio: South-Western Cengage Learning.