# EFFECT OF DEBT FINANCING ON VALUE OF LISTED MANUFACTURING FIRMS IN NIGERIA

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**Abstract**
The study examined the effect of debt financing on the value of listed manufacturing firms in Nigeria between (2015-2024). It employed an ex post facto research design, using secondary data from the published annual reports of manufacturing firms listed on the Nigerian Exchange Group. The population consisted of 34 manufacturing firms as of 31st December 2024, from which a sample of 20 firms was drawn through purposive sampling based on the completeness of their financial records, consistency in annual reporting, and uninterrupted listing throughout the study window. Generalized least squares regression was used for the analysis, supported by descriptive statistics and diagnostic checks covering heteroskedasticity and multicollinearity. The results show that the debt ratio has a negative and significant effect on firm value ($\beta = -0.1458$, $p = 0.005$), indicating that high leverage reduces market performance. In contrast, the debt-to-equity ratio has a positive and significant influence ($\beta = 0.2576$, $p < 0.001$), suggesting that a balanced mix of debt and equity enhances value. The debt-to-capital ratio is positive but statistically insignificant ($\beta = 0.0777$, $p = 0.315$). Firm size has a strong positive effect on value ($\beta = 0.1322$, $p < 0.001$). The study concluded that maintaining a moderate debt structure enhances firm value, while excessive borrowing diminishes it. It is recommended that Nigerian manufacturing firms should adopt prudent capital structure strategies, strengthen financial management systems, and leverage firm size advantages to enhance competitiveness and sustain long-term growth.

**Keywords:** Debt financing, firm value, manufacturing firms, capital structure.

## 1.0 Introduction

Capital structure remains a central theme in corporate finance because firms must determine a suitable balance between debt and equity to protect value and maintain financial stability (Uwuigbe et al., 2020; Akinyomi and Olagunju, 2021). Debt plays an important role in supporting growth and providing resources for investment without diluting ownership (Olaniyi and Okonkwo, 2022). Yet the benefits of leverage decline when borrowing becomes excessive, exposing firms to financial pressure and weakening shareholder value (Onyekwelu et al., 2023). For Nigeria's manufacturing industry, this concern is heightened by high borrowing costs, limited access to long-term credit, and persistent macroeconomic pressures that raise financing and operating expenses (Central Bank of Nigeria, 2023; Okoye et al., 2021).

Despite a growing body of empirical work, evidence on the effect of debt financing on firm value within Nigeria's manufacturing sector remains mixed (Umar and Aliyu, 2021; Ezenwafor and Nwude, 2023). Differences in firm size, operational structure, and financial policies have produced varied conclusions, leaving uncertainty about how leverage influences market performance in this segment of the economy. Although manufacturing firms rely on debt to support production, expansion, and liquidity, the high cost of borrowing and unstable credit conditions raise concerns about whether leverage enhances or reduces value in this sector. Existing findings remain inconsistent, making it important to determine how different forms of debt relate to firm value in Nigeria's manufacturing industry over time. Therefore, this study

aims to bridge this gap by analysing the effect of debt financing on the value of listed manufacturing firms in Nigeria. Other specific objectives of the study are to:

i. Examine the effect of debt ratio on the firm value of listed manufacturing firms in Nigeria.
ii. Determine the effect of debt-to-equity ratio on the firm value of listed manufacturing firms in Nigeria.
iii. Evaluate the effect of debt-to-capital ratio on the firm value of listed manufacturing firms in Nigeria.

## 2.0 Literature Review

Firm value reflects the market's assessment of a company's ability to generate sustainable earnings and maintain long-term viability (Yuko, 2016). It is commonly measured through Tobin's Q, which compares the market value of a firm to the replacement cost of its assets. Other measures in the literature include the market-to-book value ratio, which captures the gap between a firm's market valuation and its accounting worth, and earnings per share, which indicates the portion of profit attributable to each outstanding share. These indicators combine internal performance outcomes with external market expectations, making firm value a broad measure of corporate strength and competitiveness (Onyema, 2022).

### Concept of Debt Financing

Debt financing involves obtaining funds from external creditors to support operations, investment, and expansion. It provides access to capital without diluting ownership and may offer tax benefits through interest deductibility (Aliyu, 2019). Its effectiveness, however, depends on the firm's ability to maintain adequate cash flows to meet interest and principal obligations (Bamgboye, 2024). In periods of economic instability, debt can restrict financial flexibility and expose firms to higher risk. The impact of debt on firm value, therefore, depends not only on the amount borrowed but also on its structure and alignment with the firm's operating conditions.

### Debt Ratio

The debt ratio measures the proportion of total assets financed with debt. It is calculated as total liabilities divided by total assets. A moderate level of debt may enhance value by providing a tax shield and supporting investment in productive activities. When the ratio becomes too high, however, financial risk increases, and the firm may face pressure from fixed repayment requirements (Hayes et al., 2022). In sectors with unstable cash flows, such as manufacturing, high debt ratios reduce resilience and may weaken market valuation. This measure provides insight into the depth of leverage within the firm and its potential influence on value creation.

### Debt-to-Equity Ratio

The debt-to-equity ratio compares total debt with shareholders' equity, indicating the balance between creditor financing and owner financing. A stable ratio suggests a sound capital structure, whereas an excessively high ratio points to aggressive borrowing and heightened solvency risk (Richard et al., 2023). Evidence shows that a rising debt-to-equity ratio can raise firm value to a point by improving managerial discipline and increasing access to capital, after which the cost of additional debt becomes detrimental (Igwe, 2024). This ratio is widely used to assess how leverage decisions influence shareholder value.

**Debt-to-Capital Ratio**

The debt-to-capital ratio represents the share of total capital comprising both debt and equity that is financed through debt. It captures the firm's long-term financing structure and risk position. Lower values show reliance on equity, while higher values indicate greater dependence on borrowed funds. Studies suggest that an efficient mix of debt and equity within total capital can support performance when borrowing remains within sustainable limits (Arfazil et al., 2024). This measure helps evaluate how deeply debt is embedded in the firm's permanent financing base and how it may affect value.

**Empirical Review**

**Debt Ratio and Firm Value**

Etim et al., (2022) examined the influence of debt financing on the firm value of listed consumer goods firms in Nigeria. An ex-post facto research design was adopted in the study. The population of this study consisted of twenty-one (21) consumer goods firms listed on the floor of the Nigerian Stock Exchange as at 31 December 2019, while the sample size of the study was sixteen (16) listed consumer goods firms in Nigeria. The study covered the financial period of 2013-2019 year of assessment. Purposive sampling techniques was adopted in the study. Data were collected from the financial statements of the sample firms in Nigeria. The data collected were analysed using descriptive statistics and multiple linear regression analysis with the help of E-View version 10. Findings from the study showed that Debt Ratio and Long-Term Debt have positive and significant influence on the firm value of listed consumer goods firms in Nigeria. In conclusion, the paper posited that debt financing is a good source of financing for firms in the consumer goods industry. However, their work relied on descriptive statistics and multiple regression over a fairly small sample of sixteen firms.

Aamir et al. (2021) conducted a study on debt financing and firm performance of Pakistan Stock Exchange. The purpose of their study was to investigate the relationship between the listed firms' debt level and performance from the period of 2013 - 2017. The researchers used pooled ordinary least squares regression and fixed random effects models to analyse a cross-sectional sample of thirty (30) Pakistani companies operating on the Pakistan Stock Exchange (PSX). The result of their study indicated that, both short-term and long-term debt had negative and significant impacts on firm performance. This suggests that agency issues may lead to a high-debt policy, resulting in lower performance. However, both sales growth and firm size have positive effects on the profitability of non-financial sector companies. The researchers concluded that, company owners and managers should find a satisfactory debt level when debt financing significantly and negatively influences firm performance. They recommended that, the external source of financing should be the last option for management. However, their use of pooled OLS and fixed-effects models highlighted the possibility that agency costs and debt overhang reduce value when firms operate in uncertain environments.

Akaji et al. (2021) examined the effect of debt financing on performance of firms in Nigeria. The researchers measured debt financing using the variables of long-term debt financing (LTDF), short-term debt financing (STDF) and preferred stock financing (PSF). Three hypotheses were formulated to guide the study. The design used in the study was an ex-post facto research design, while data for the study were collected from the annual reports and the NSE fact book. The collected data were analysed using ordinary least squares (OLS) statistic. Findings showed that debt financing has a significant and positive effect on a firm's performance in Nigeria at 5% level of significance. The researchers concluded that, debt financing has improved firm's performance over the years. Based on this, it was recommended that, firms should try to finance their investment activities with debts and consider equity as a last option. They further stated that, firms should be debt-intensive in their financing decisions

as it influences performance. Although their reliance on OLS limits the ability to control for unobserved firm-level effects. Together, these findings show that the direction of the debt–value relationship depends heavily on sector characteristics, debt composition, and research design.

Anshu and Narendra (2015) conducted a study on financial leverage and firm value of listed manufacturing sector firms in Mahila, India. The objective of the study was to examine the impact of capital structure on the selected Manufacturing sector firms and its effect on the value of the firm. The researchers stated that, capital structure decision is crucial for understanding the dynamics of business growth for any business organization because organizations are oriented towards maximizing output, as it has a greater impact on a firm's ability to deal with its competitive environment. This study synthesized the capital structure determinants theory and empirically examined both determinants and suggested firm behaviour patterns in relation to financing decisions of 145 Manufacturing Sector Firms for the period of 2001-2009. The analysis was carried out using a relatively new and innovative factor-analytic structural equation modelling (SEM) methodology. Findings revealed that non-debt tax shield is considered an important determinant of financial leverage and it was verified that Manufacturing Sector Firms with high non-debt tax shield use more debt as compared to other Manufacturing Sector Firms. The return on capital employed was highest in MSFCS Sector among all Manufacturing Sector Firms resulting into higher profitability, maximizing the shareholders' return and impacting the firm value. The research concluded that the Manufacturing Sector Firms Capital Structure is too rigid to offer any scope for adjustment. Across these studies, the key gap is the inconsistent evidence driven by sectoral differences, limited samples, and static models that do not fully address endogeneity. These gaps justify a fresh investigation within Nigeria’s manufacturing sector using a more robust estimation approach.

**Debt-to-Equity Ratio and Firm Value**

Aniefor and Onatuyeh (2019) examined the effect of debt financing on the corporate performance of listed consumer goods firms in Nigeria. The researchers stated that, the concept of debt financing has assumed considerable importance in recent years given the fundamental role debts play in forming the financial structure of corporate firms. Data for the study were collected from the audited annual reports of fifteen (15) consumer goods firms listed in the Nigerian Stock Exchange (NSE) from of 2006-2017. The data were analysed using descriptive statistics and panel regression technique. Findings showed that, total debt, long-term debt and short-term debt to asset ratio positively influenced the performance of consumer goods firms in Nigeria. The researchers recommended that there is need for the Nigerian firms to rely less on short-term debts, which form the major part of their leverage, and focus more on developing internal strategies that can help improve their performance. Their reliance on panel regression strengthened the results but did not fully address dynamic relationships.

Gayan (2016) investigated the impact of financial leverage on firms' value. The main objective was to compare the value of the firms of the listed manufacturing companies in Sri Lanka by using the financial leverage for estimations. Data were collected from secondary source. A sample of ten listed manufacturing companies was considered with 50 observations for the period of 2011-2015. Financial ratios were calculated and Pearson's correlation, descriptive analysis of variance and regression analysis were utilized in testing the hypotheses and to measure the differences and similarities between the manufacturing companies according to their different characteristics.The results indicated that, there is a significant relationship between DE ratio and ROA According to Pearson correlation, there is a weak negative relationship between DE ratio and ROA. Also that there was no significant relationship

between DE ratio and ROA. The researcher recommended that, empirical studies should be undertaken in the same field to find out how financial leverage could affect firms' value of manufacturing companies in Sri Lanka.The small sample of ten firms and the reliance on simple correlation reduce the generalisability of these findings.

Igwe (2024) examined the effect of debt financing on the firm value of listed ICT companies in Nigeria between 2016 and 2022. The findings showed a mixed relationship between debt-to-equity ratio and firm value, depending on the inclusion of control variables. The author concluded that the influence of leverage on firm value varies across firms and advised managers to evaluate capital structure decisions within their specific operational contexts. Although the study was sector-focused and recent, its conclusions are less generalizable to heavy manufacturing firms.

Oranefo and Egbunike, (2022) examined the effect of debt financing on the firm valuation of quoted non-financial firms on the Nigerian Stock Exchange (NSE). The study specifically evaluated the effect of short-term debt to equity, long-term debt to equity, and total debt to assets on Tobin's Q for the period 2011 to 2019. The study adopts ex post facto research design. The sampling technique utilized in the study was non-probability sampling. The final sample comprised seventy-five non-financial firms quoted on the Nigerian Stock Exchange (NSE). The secondary data obtained from Machine ratios were analyzed using panel regression techniques. Unlike prior studies, the study also employs the Arellano Bond Dynamic Panel-data Estimation Model for robustness analysis. There is a negative effect of short-term debt to equity on Tobin's Q. The effect of long-term debt to equity and total debt to assets was positive and significant. The main limitation is the unbalanced nature of some sectors due to data unavailability.This dynamic approach captured firm-level adjustments better than earlier studies but revealed the challenge of data imbalance across sectors. These contrasting outcomes indicate that the effect of debt-to-equity depends on the maturity structure of debt and the economic conditions in which firms operate.

**Debt-to-Capital Ratio and Firm Value**

Mensah (2024) analysed the influence of capital structure on business growth and market value in emerging economies using data from 2016 to 2022. The study observed that moderate levels of debt-to-capital ratio positively affected growth and firm value, while excessive leverage had diminishing returns. The author advised firms in developing markets to maintain moderate gearing levels to preserve value. However, the study occasionally conflated growth with firm value and did not fully explore firm-level heterogeneity. The study combined firm growth and market value, which limits clarity on the precise effect on firm valuation.

Enekwe et al. (2019) investigated the effect of financial leverage on firm performance in Nigeria's pharmaceutical sector using panel data from 2013 to 2018. Their results showed that higher debt-to-capital ratios reduced both profitability and market-based measures of value. The authors recommended limiting short-term borrowing in favour of long-term financing to strengthen value creation. Although insightful, the study was conducted before recent economic shocks such as inflation and foreign-exchange volatility, which may have altered leverage–value dynamics in Nigeria. Their work predates major macroeconomic shocks, which raises questions about whether the patterns still hold. Furthermore, Ibrahim and Isiaka (2021) investigated leverage and firm value for 62 listed Nigerian firms using a dynamic generalized method of moments (GMM). Their results indicated a positive long-term relationship between leverage and firm value, consistent with the Trade-Off Theory. They concluded that firms could enhance value through efficient debt utilization.Across this body of work, methodological weaknesses are common. Many rely on simple OLS or small cross-sections that do not account

for unobserved heterogeneity or dynamic adjustment. Few studies focus specifically on manufacturing firms, despite their unique financing pressures. These limitations underscore the need for a sector-specific study using a more robust estimation strategy such as GLS, which controls heteroscedasticity and serial correlation common in panel data.

## Theoretical Framework

### Modigliani and Miller Theory (1963)

The foundation of contemporary capital-structure analysis rests on the work of Modigliani and Miller. Their 1958 proposition states that, in a setting free of taxes, transaction costs, and information gaps, a firm's value does not depend on the mix of debt and equity. The 1963 revision introduced the effect of corporate taxation and showed that interest payments create a tax shield. This adjustment means that leverage can raise firm value until the expected cost of financial distress begins to outweigh the tax benefit. For Nigerian manufacturing firms, the tax advantage is real, yet the environment is marked by sharp movements in input prices, unstable interest rates, and weak protection against default. As a result, the theory explains only part of the financing behaviour observed in the sector.

### Trade-Off Theory

This theory argues that firms weigh the benefit of the tax shield against the cost of potential distress. The result is an optimal leverage point where additional borrowing no longer improves value. The relationship between debt and firm value is therefore expected to rise at first and later decline. The conditions facing Nigerian manufacturers often complicate this balancing act. Fluctuating borrowing costs, exposure to foreign-exchange swings, and uneven revenue cycles reduce the accuracy of these cost-benefit calculations. Still, the idea of an optimal range of leverage remains useful for interpreting how firms approach debt.

### Pecking Order Theory

Pecking Order Theory highlights the role of information differences between managers and outside investors. Firms first use retained earnings, then debt, and turn to new equity only when necessary. In settings where internal funds are limited, managers rely more on borrowing than the theory ideally suggests. This situation is common among Nigerian manufacturers, where rising production costs and tight margins constrain retained earnings. Leverage may therefore reflect a shortage of internal financing rather than a strategic attempt to enhance value.

### Agency Theory

Agency Theory examines the conflicts that arise when the interests of managers, owners, and creditors diverge. Debt can reduce managerial discretion by committing the firm to fixed repayments, which limits spending that does not benefit shareholders. At the same time, high leverage increases the possibility of conflict with creditors, especially when the firm operates in a volatile environment. Manufacturing firms in Nigeria often face governance challenges, and these can magnify agency costs. Even so, moderate borrowing can strengthen oversight and improve value-enhancing discipline.

### Synthesis and Relevance to the Study

Each theory offers a different lens on the link between leverage and firm value. The Trade-Off and Agency perspectives appear most relevant to the Nigerian manufacturing context. Both acknowledge the role of risk, taxation, governance, and financial discipline, which align closely with the sector's realities. The Pecking Order view helps explain why some firms rely heavily on debt even when profitability is modest. The Modigliani–Miller framework serves mainly as the conceptual starting point from which later theories depart.

The current study builds on these perspectives by examining whether debt levels observed among Nigerian manufacturing firms correspond more closely to the predictions of the Trade-Off model, the behavioural patterns highlighted in Agency Theory, or the financing constraints described in Pecking Order Theory.

## 3.0 Methodology

The study employed an ex-post facto research design, appropriate for analyzing relationships among variables using existing data without manipulation. It examined manufacturing firms listed on the Nigerian Exchange Group (NGX) as of 31$^{st}$December 2024, covering the industrial goods, consumer goods, and conglomerates subsectors. From a population of 34 firms, twenty were purposively selected based on consistent listing and availability of complete financial records from 2015 to 2024, ensuring reliable panel data representation. Secondary data were sourced from published audited annual reports of those firms. Analysis was conducted using the Generalized Least Squares (GLS) technique on STATA 15.0.

Diagnostic tests revealed serial correlation and heteroskedasticity in the residuals, making ordinary least squares inefficient. GLS was therefore preferred because it adjusts for cross-sectional heteroskedasticity and autocorrelation, yielding more reliable coefficient estimates under these conditions. The method assumes correct specification of the variance structure and consistent measurement of the regressors across firms and time. Additional diagnostics included tests for multicollinearity, using variance inflation factors, and tests for model stability. These procedures ensured that the estimation technique was appropriate for the data and that the results were not driven by specification errors.

### Model Specification

$$TQit=\beta0+\beta1DR_{it}+\beta2DER_{it}+\beta3DCR_{it}+\beta4FSIZE_{it}+\epsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where:

$TQ_{it}$= Tobin's Q (firm value) for firm *i* at time *t*
$DR_{it}$ = Debt Ratio
$DER_{it}$ = Debt-to-Equity Ratio
$DCR_{it}$ = Debt-to-Capital Ratio
$FSIZE_{it}$ = Firm Size (control variable)
$\beta0$ = Intercept
$\beta1-\beta4$= Coefficients of explanatory variables
$\epsilon_{it}$= Random error term

**Table 1:**
***Variables and Measurement***

| Variable | Type | Measurement | Source |
|---|---|---|---|
| Tobin's Q | Dependent | (Market Value of Equity + Book Value of Debt) / Book Value of Total Assets | Sharma (2013), Ibrahim & Isiaka (2021) |
| Debt Ratio (DR) | Independent | Total Liabilities / Total Assets | Igwe (2024) Yakubu, (2023) |
| Debt-to-Equity Ratio (DER) | Independent | Total Debt / Shareholders' Equity | Bamgboye (2024), Akeju & Olaniyi (2020) |
| Debt-to-Capital Ratio (DCR) | Independent | Total Debt / (Total Debt + Equity) | Hayes et al. (2022), Mensah, (2024) |
| Firm Size (FSIZE) | Control | Natural Logarithm of Total Assets | Igwe (2024) Akpan & Nse (2022) |

**Source**: Authors' Compilation, 2025.

## 4.0 Results and Discussion

**Table 2:**

***Descriptive Statistics***

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| TOBINQ | 200 | 2.043 | .22 | 1.417 | 2.661 |
| DR | 200 | .514 | .146 | .217 | .9 |
| DER | 200 | 1.238 | .391 | .2 | 2.229 |
| DCR | 200 | .452 | .099 | .188 | .706 |
| FSIZE | 200 | 7.471 | .388 | 6.421 | 8.732 |

**Source:** STATA Version 15.0 Output.

The descriptive statistics show that the sampled manufacturing firms have an average Tobin's Q of 2.04, indicating that market value is about twice book value, reflecting investor confidence and growth expectations. Even the lowest Tobin's Q (1.42) exceeds unity, meaning all firms traded above replacement cost, while the maximum value (2.66) points to outstanding market performance. The low standard deviation (0.22) suggests limited variation in firm value across the sector.

The average Debt Ratio of 0.51 indicates that about half of total assets are financed through debt, consistent with the capital needs of manufacturing firms. The range (0.22–0.90) shows variation in leverage, with some firms operating conservatively and others approaching high-risk levels. The mean Debt-to-Equity Ratio (DER) of 1.24 implies a moderate reliance on debt relative to equity, aligning with the Trade-Off Theory. The widespread (0.20–2.23) and moderate standard deviation (0.39) indicate differing financial policies and risk preferences. Firms with moderate DERs tend to enjoy higher valuations due to efficient debt utilization. Similarly, the mean Debt-to-Capital Ratio (DCR) of 0.45 reveals a balanced capital structure across firms, with modest variability (standard deviation = 0.10). This suggests that most firms maintain an optimal mix of debt and equity while avoiding excessive borrowing.

Firm Size, with a mean log value of 7.47, shows that most firms are large, holding assets between roughly ₦1.7 billion and ₦2.5 billion. The small variation (standard deviation = 0.39) confirms the concentration of medium to large manufacturers. Larger firms appear to benefit from economies of scale, improved access to credit, and a stronger investor perception, reinforcing the positive relationship between size and firm value.

**Table 3:**

***Correlations Matrix***

| Variables | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| TOBINQ | 1.000 | | | | |
| DR | -0.129 | 1.000 | | | |
| DER | 0.496 | 0.021 | 1.000 | | |
| DCR | 0.123 | -0.021 | 0.049 | 1.000 | |
| FSIZE | 0.193 | -0.069 | 0.012 | -0.062 | 1.000 |

**Source:** STATA Version 15.0 Output.

The correlation analysis offers valuable insights into how debt structure affects firm value among listed manufacturing firms in Nigeria from 2015 to 2024. Tobin's Q shows a weak negative relationship with the Debt Ratio (r = –0.13), suggesting that higher leverage relative to total assets slightly reduces firm value due to increased financial risk and investor caution, consistent with the Trade-Off Theory. Conversely, the Debt-to-Equity Ratio (r = 0.50) exhibits a moderate positive correlation with Tobin's Q, indicating that firms maintaining a balanced mix of debt and equity tend to achieve higher market valuation through effective and

disciplined use of leverage. The Debt-to-Capital Ratio also shows a weak but positive association with Tobin's Q (r = 0.12), implying that moderate debt use contributes marginally to value creation when integrated prudently within the capital structure. Finally, Firm Size has a mild positive relationship with Tobin's Q (r = 0.19), suggesting that larger firms benefit from investor confidence, economies of scale, and stronger market perception, in line with Agency Theory. Overall, the results indicate that controlled and strategic debt usage enhances firm value, while excessive borrowing diminishes it.

**Table 4:**
***Variance inflation factor***

| | VIF | 1/VIF |
|---|---|---|
| FSIZE | 1.009 | .991 |
| DCR | 1.007 | .993 |
| DR | 1.006 | .994 |
| DER | 1.003 | .997 |
| Mean VIF | 1.006 | . |

**Source:** STATA Version 15.0 Output.

The Variance Inflation Factor (VIF) test assessed multicollinearity among Debt Ratio (DR), Debt-to-Equity Ratio (DER), Debt-to-Capital Ratio (DCR), and Firm Size (FSIZE). All variables recorded VIF values between 1.00 and 1.01, well below the acceptable limit of 5.0, indicating the absence of multicollinearity. DER showed the lowest VIF of 1.00, while DR, DCR, and FSIZE each recorded 1.01, confirming that the variables are statistically independent and represent distinct dimensions of debt structure and firm characteristics. This result implies that the regression model is free from multicollinearity bias, and the estimated coefficients are stable, reliable, and suitable for meaningful interpretation of the effects of debt structure and firm size on firm value.

**Breusch-Pagan / Cook-Weisberg test for heteroskedasticity**
Ho: Constant variance

| **Variables: fitted values of tobinq** |
|---|
| chi2(1) = 0.166 |
| Prob > chi2 = 0.04856 |

**Source:** STATA Version 15.0 Output.

The Breusch-Pagan / Cook-Weisberg test confirmed the presence of heteroskedasticity in the OLS residuals ($\chi^2 = 0.166$; $p = 0.04856$), indicating that the variance of the error terms was not constant across observations. This violates a key OLS assumption and could distort standard errors and hypothesis testing. To address this issue, the study applied the Generalized Least Squares (GLS) estimation technique, which corrects for heteroskedasticity by transforming the model to ensure constant error variance. GLS provides more efficient and unbiased coefficient estimates than OLS and is particularly suited for panel data, as it accounts for both cross-sectional heteroskedasticity and serial correlation across firms and over time.

**Table 5:**
***Hausman (1978) specification test***

| | Coef. |
|---|---|
| Chi-square test value | 15.325 |
| P-value | .004 |

**Source:** STATA Version 15.0 Output.

The Hausman test decisively favours the fixed effects specification. The test statistic ($\chi^2$ = 15.33, p = 0.0041) is statistically significant at conventional levels, so we reject the null that the random effects estimator is consistent. In plain terms, the firm-specific effects are correlated with the regressors, and the random effects assumption is invalid. Use the fixed effects model for inference.

The fixed effects approach was selected based on the Hausman specification test ($\chi^2$ = 15.33; $p$ = 0.0041), which confirmed that the firm-specific effects were correlated with the explanatory variables, making the fixed effects estimator both consistent and appropriate for inference.

**Table: 6**
***GLS Regression Result***

| TOBINQ | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] | Sig |
|---|---|---|---|---|---|---|---|
| DR | -.146 | .051 | -2.84 | .005 | -.247 | -.044 | *** |
| DER | .258 | .019 | 13.55 | 0 | .22 | .295 | *** |
| DCR | .078 | .077 | 1.01 | .315 | -.074 | .23 | |
| FSIZE | .132 | .02 | 6.76 | 0 | .094 | .171 | *** |
| Constant | .776 | .158 | 4.91 | 0 | .464 | 1.089 | *** |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.043 | SD dependent var | 0.220 |
| R-squared | 0.586 | Number of obs | 200 |
| F-test | 62.260 | Prob > F | 0.000 |
| Akaike crit. (AIC) | -368.843 | Bayesian crit. (BIC) | -352.351 |

*** $p<.01$, ** $p<.05$, * $p<.1$

**Source:** STATA Version 15.0 Output.

The coefficient of –0.1458 (p = 0.005) shows a statistically significant and negative relationship between debt ratio and firm value. This implies that a one-unit increase in the proportion of total debt to total assets leads to an average 0.15 decrease in Tobin's Q, holding other factors constant. The result aligns with the pecking order theory and the trade-off theory, both of which argue that excessive debt raises financial risk and interest burden, thereby depressing firm value. In Nigeria's manufacturing sector, where interest rates and inflation are persistently high, this adverse effect is particularly pronounced, as debt servicing costs often outweigh the benefits of financial leverage.

The debt-to-equity ratio exhibits a strong and positive effect on firm value with a coefficient of 0.2576 (p < 0.001). This means that, on average, a one-unit increase in DER results in a 0.26 increase in Tobin's Q. The result suggests that moderate use of debt relative to equity enhances shareholder value, possibly because debt can serve as a tax shield and a discipline mechanism for management. It implies that Nigerian manufacturing firms that prudently combine equity financing with manageable levels of debt are perceived as more efficient and profitable by investors. The result is consistent with prior studies such as Tonuna (2022) and Ibrahim and Isiaka (2021), which found a positive and significant link between DER and firm value in emerging markets.

The coefficient of 0.0777 for DCR is positive but statistically insignificant (p = 0.315). This suggests that, although an increase in the share of debt in total capital might theoretically improve value through tax benefits, in practice, the effect is weak among Nigerian manufacturers. The result may reflect structural inefficiencies, unstable credit conditions, or the high cost of borrowing that limits the effective utilization of debt capital in this sector.

Thus, while the direction is positive, the magnitude and insignificance indicate that the debt-to-capital ratio is not a key determinant of firm value within the study period.

The coefficient of 0.1322 ($p < 0.001$) reveals a positive and highly significant effect of firm size on firm value. This indicates that larger firms, measured by the natural logarithm of total assets, tend to have higher Tobin's Q values. A one-unit increase in firm size leads to an estimated 0.13 rise in firm value. This finding confirms that firm growth and scale economies enhance investor confidence, improve access to credit, and promote operational efficiency. It aligns with the resource-based view (RBV), which emphasizes that large firms enjoy stronger market positions, superior technology, and greater bargaining power, all of which translate to higher market valuation.

## 5.0 Conclusion and Recommendations

This study assessed how debt financing affects the value of listed manufacturing firms in Nigeria over the period 2015 to 2024. The analysis drew on balanced panel data and applied fixed effects estimation after carrying out tests for heteroskedasticity, multicollinearity, and model suitability. The results showed that a high debt ratio reduces firm value, while a balanced mix of debt and equity supports stronger market valuation. The debt-to-capital ratio did not show a meaningful influence, suggesting that this measure of leverage may not capture the financing conditions that shape valuation in the sector. Firm size remained an important determinant of value, supporting the view that scale and operational capacity play central roles in market performance. The findings strengthen the evidence for the Trade-Off Theory in the Nigerian manufacturing context. Moderate use of debt appears beneficial, but value declines once borrowing becomes excessive. The results also lend partial support to Agency Theory, as firms with well-managed leverage structures tend to show improved valuation signals. From a broader perspective, the study highlights how financing decisions influence competitiveness in a sector faced with rising costs, currency pressure, and limited access to long-term credit.

The study recognizes several limitations. Purposive sampling may affect the extent to which results apply to all manufacturing firms. The reliance on accounting records may also mask short-term shocks and informal financing practices common in the industry. Despite these limitations, the study extends current literature by applying a longer time frame and highlighting how different leverage measures behave under prolonged macroeconomic instability.

### Recommendations

Manufacturing firms should adopt a financing structure that avoids heavy dependence on total debt. A more balanced approach that strengthens equity while maintaining controlled borrowing is likely to support long-term value. Firms should also strengthen debt planning by aligning repayment schedules with operating cash flows. Effective monitoring of interest-bearing obligations reduces the risk of distress and improves investor confidence.

The positive role of size suggests that firms may benefit from expansion strategies where resources permit. Mergers, capacity upgrades, and supply-chain consolidation can help reduce production costs and improve access to credit, both of which contribute to stronger market valuation.

### Policy Implications

A stable macroeconomic environment remains central to improving financing conditions for manufacturers. Predictable interest rates, better access to long-term industrial credit, and measures that reduce exchange-rate volatility would lower borrowing costs and support value creation. Improved infrastructure and energy reliability would further help firms channel borrowed funds toward productive investment rather than recurrent overheads.

**Suggestions for Future Research**

Future studies may explore nonlinear relationships between leverage and firm value, as optimal borrowing levels may vary across scales of operation. Sector-specific analyses within manufacturing could also reveal important differences in how firms respond to debt. Studies that incorporate market sentiment or macroeconomic shocks may further enrich understanding of valuation patterns in the industry.

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