Impact of Financial Leverage on Performance of Manufacturing Sector Firms in Nigeria

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Abstract

Background: Manufacturing sector is known as a catalyst for development, globally. However, in Nigeria, the performance of the sector has shown a declining trend so far. Additionally, evidence from the theory and empirical predictions on the possible relationship between leverage and performance are unclear and mixed, which calls for more empirical studies.

Objectives: Impact of financial leverage on performance was investigated, drawing from listed firms in the manufacturing sector of Nigeria.

Methods: Ex-post facto and longitudinal designs are used. We collected from the yearly reports and financial statements, data of 25 firms from 2011 to 2023. Descriptive statistics and the static panel methods are employed to analyse the data collected.

Results: The main findings from the best panel estimator- fixed effects model, reveal that debt ratio negatively impacts performance; debt-to-equity ratio positively impacts performance, and interest coverage ratio has a positive but insignificant impact on performance, proxy with earnings per share. The findings also reveal an existence of non-linear connection binding debt ratio with performance. For the link binding debt-to-equity ratio to the performance, a non-linear relationship in the form of inverted U-shape was discovered.

Conclusion: High component of debt in the financial structure of firms diminish performance. This is because the cost related to debt financing is fixed and huge. Firms should reduce over-reliance on debt financing, since it has the capacity to erode earnings and performance, if it not well managed. Manufacturing firms may adopt an appropriate mix of debt with equity to match the costs of debt with its benefits.

Implication: High borrowing costs may exacerbate the negative impact of excessive debt on firm performance. Policymakers and financial regulators may therefore promote financial market reforms that reduce lending rates and expand access to structured financing instruments. Additionally, regulatory bodies such as the Nigerian Exchange Group (NGX) may encourage better disclosure and monitoring of firms' capital structure positions to enhance transparency and investor confidence.

Keywords: Financial leverage, financial performance, manufacturing firms, Nigeria

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Introduction

The manufacturing sector remains a critical engine of economic growth and industrialisation in many emerging economies, including Nigeria. Despite its strategic importance for employment creation, value addition, and export diversification, the sector has faced persistent structural and performance challenges over the past decade. For instance, Nigeria's manufacturing contribution to Gross Domestic Product (GDP) contracted sharply from 16.04 percent in late 2023 to around 12.68 percent in mid-2024, reflecting declining production capacity, infrastructural constraints, and competitiveness pressures within the real sector. These trends highlight the fragile growth environment under which manufacturing firms operate, with limited access to credit and rising cost pressures constraining meaningful value creation; credit data show credit to the sector fell significantly as of March 2025 (National Bureau of Statistics [NBS], 2025)

Within this challenging environment, capital structure decisions, particularly the use of debt financing, are central to firm financial performance. Financial leverage is the presence of debt in the capital structure (Abubakar, 2021). Theoretical frameworks such as the trade-off theory and pecking order theory posit that firms balance the benefits of debt (e.g., tax shields and investment funding) against the costs of financial distress and agency problems (Myers, 1984). Empirically, the relationship between leverage and performance is mixed, with studies in the Nigerian context documenting negative, positive, and insignificant effects of various leverage proxies on performance. Many empirical literatures in an attempt to validate theoretical predictions have reported a significant negative relationship (Arowolo & Muritala, 2025; Hannyama et al., 2025; Okezie et al., 2025), some authors have discovered a positive relationship (Abubakar & Uthman, 2025; Ibrahim & Isiaka, 2021), and yet, others did not document any significant association between financial leverage and financial performance (Mohammed & Mohammed, 2025; Okwii-Njelita & Egbunike, 2022). As evident from the foregoing, it is clear that investigations on the leverage-performance link are controversial and calls for more empirical studies. This study, therefore, examines how financial leverage impacts performance, by employing data of 25 manufacturing firms in Nigeria from 2011 to 2023.

Review of Literature

Financial performance is a broad indicator of an overall financial health of a firm, and it indicates how well a company makes money and uses its resources to meet the needs of its investors and other stakeholders (Man & Wong, 2013).

Financial leverage refers to the proportion of debt to equity in the capital structure of a company (Anifowose et al., 2020). The dimensions of financial leverage are discussed hereunder.

Debt Ratio

This is the sum of short-term debts and long-term debts in the capital structure. Short-term debt is used to finance current assets that can be quickly converted into cash (Edore & Ujuju, 2020). Long-term debts are debts and financial obligations maturing over one year (Edore & Ujuju, 2020).

Debt-to-Equity Ratio

It refers to a proportion of debt and financial liabilities to equity shareholders have been invested in a corporation (Ofulue et al., 2022). A higher debt to equity ratio indicates that more creditor financing is preferred over investor financing (Ofulue et al., 2022).

Interest Coverage Ratio

This ratio is used to assess a company's ability to make interest payments on bank loans (Strahan, 1999).

The trade-off and the pecking order theories are reviewed. Each theory has been discussed below.

The trade-off theory was developed by Myers (1984), which asserts that an optimal capital structure exists, and firms work towards attaining it. An optimal capital structure is achieved when the marginal present value of tax shield on additional debt is equal to the marginal present value of the costs of financial distress on additional debt (Myers, 1984). Financial leverage impacts positively on firm's performance by limiting conflicts between shareholders and managers resulting from having excess cash (Myers, 1984). The trade-off theory suggests high profitable firms in order to benefit from tax shields, will use more debt, and because they generate higher returns, they have low chances of becoming financially distressed. Thus, the trade-off theory predicts a positive relationship between firms' leverage ratios and their performance.

In contrast, Donaldson (1961) was among the pioneered scholars that developed the pecking order theory using evidence from an interview survey of 25 large United States (U.S) corporations. Later, Myers (1984) and Myers and Majluf (1984), provided a theoretical justification of Donaldson's discovery. According to these scholars, the choice between debt and equity is a function of information that is available to both managers and investors. Managers will be resistant to issue an under-valued equity, and investors are quite aware that managers will act in this manner. In this situation, internal funds and debt will be favoured over equity (Abubakar, 2021). Myers (1984) described this kind of financing pattern as the 'Pecking Order Theory' of financing. Hence, financial leverage is negatively associated with financial performance (Abubakar, 2021).

Following the review of theories, empirical studies on the proxies of leverage and financial performance were reviewed, and hypotheses developed thereafter.

Debt Ratio and Financial Performance

Mohammed and Mohammed (2025), and Sosa et al. (2024) document an insignificant impact of debt ratio on the financial performance. Olu-Akinola et al. (2025), Ogbu et al. (2025). Arhinful and Radmehr (2023), Nabil et al. (2021), Okonkwo and Okonkwo (2020), and Chen (2020), show that the debt ratio has a negative and statistically significant effect on the financial performance. Bui et al. (2021) and Karaca. (2025) confirm a nonlinear relationship in the form of an Inverted-U shape, between debt ratio and financial performance. However, Abubakar and Uthman (2025), Lestari (2021), Shaik and Sharma (2021), and Mamaro and Legotlo (2021), show that debt ratio has a positive effect on the financial performance. Based on the most of the empirical evidence and the argument of the pecking order theory, hypothesis one is formulated as:

H1: Debt ratio has a negative significant impact on financial performance.

Debt-to-Equity Ratio and Financial Performance

Lawani et al. (2023), Chalise and Adhikari (2022), Shaikh et al. (2022), Ofulue et al. (2022), Abubakar (2021), Okonkwo and Okonkwo (2020) indicate that debt-to- equity ratio has a significant negative effect on financial performance. However, a non-significant effect between debt-to- equity ratio and financial performance was found by Okwii-Njelita and Egbunike (2022). In contrast, Abubakar and Maishanu (2025), Yildiz and Akgul (2025); Ibrahim and Isiaka (2021), Shaik and Sharma (2021), and Anifowose et al. (2020), confirmed a positive relationship between debt-to- equity ratio and financial performance. Following the empirical reviews and the trade-off theory argument, hypothesis two is developed as follows:

H2: Debt-to-equity ratio impacts positively on financial performance.

Interest Coverage and Financial Performance

Okonkwo et al. (2025), and Arhinful and Radmehr (2023) unveil that interest coverage ratio (ICR) has a positive and statistically significant effect on the financial performance. In contrast, Anifowose et al. (2020) uncover a negative relationship between ICR and financial performance. Conversely, Abubakar et al. (2025) did not report a significant relation between ICR and financial performance. Thus, the third hypothesis is

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formulated below:

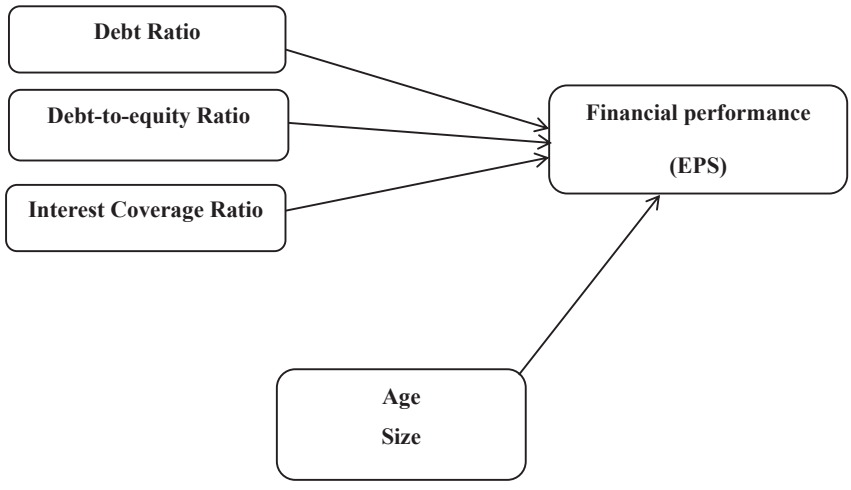
H3: Interest coverage ratio impacts positively on financial performance.

Conceptual Framework

The conceptual framework showing the independent variables, control variables and the dependent variable is shown as figure 1.

Figure 1

Conceptual Framework



Methods

This research employed Ex-post facto and longitudinal designs because historical data were collected from different firms over a range of period. This design has the benefits of observing changes at different times and removing time-constant unobserved heterogeneity (Hsiao, 2022; Klevmarken, 1989; Moulton, 1986). The population comprises 55 manufacturing firms from nine sectors of the Nigerian economy. Out of the 55 firms, three firms quoted after the cut-off year 2011 were removed, resulting to a total number of 52 firms. Out of these 52 firms, eight firms with some missing annual reports and financial statements were excluded to bring down the number to 44 firms. From these 44 firms, 19 firms with incomplete information were also excluded, leaving a final sample of 25 listed manufacturing firms selected purposively based on the foregoing criteria.

Data pertinent to the study were retrieved from the annual report and financial statements of firms from 2011 to 2023. Descriptive statistics (mean, minimum, maximum, and standard deviation) and static panel techniques namely, pooled ordinary least squares (POLS), fixed effect model (FEM), and random effect model (REM) were employed for analysis. A lot of advantages abound the adoption of static panel data technique, including revealing more information, variability, providing efficiency and minimising collinearity, and gaining additional degree of freedom, and obtaining unbiased estimates (Hsiao, 2022).

The model utilised is presented hereunder:

$$EPS_{it} = \beta_0 + \beta_1 DBR_{it} + \beta_2 DER_{it} + \beta_3 ICR_{it} + \beta_4 AGE_{it} + \beta_5 SIZE_{it} + C_{it} + \mu_{it} \quad - \quad (1)$$

To capture non-linear relationship, we use square terms of the independent variables to produce equation 2.

$$EPS_{it} = \beta_0 + \beta_1 DBR^2_{it} + \beta_2 DER^2_{it} + \beta_3 ICR^2_{it} + \beta_4 AGE_{it} + \beta_5 SIZE_{it} + C_{it} + \mu_{it} \quad - \quad (2)$$

Where: EPS = earnings per share, = intercept, and = coefficients of the independent variables, and = coefficients of th control variables, subscript i and t refer to each firm i in year t, C = unit-specific error component, = the remaining error component.

Table 1 outlined the variables and their measurement.

Table 1

Variables and Measurements

Variable	Acronym	Type	Measurement	Source
Debt Ratio	DBR	Independent variable	Total debt divided by total capital.	Arhinful and Radmehr (2023).
Debt-to-Equity Ratio	DER	Independent variable	Total debt divided shareholders' equity.	Bui et al. (2021).
Interest Coverage Ratio	ICR	Independent variable	Earnings before interest and taxes (EBIT) divided by interest expense.	Arhinful and Radmehr (2023).
Earnings per share	EPS	Dependent variable	Net income divided by the number of Shares Outstanding	Abubakar et al. et al. (2025).
Age	AGE	Control variable	Number of years of a firm since incorporation.	Abubakar et al. et al. (2025).
Size	SIZ	Control variable	Natural logarithm of total revenue.	Abubakar et al. et al. (2025).

Results and Discussion

Table 2 provides the descriptive results.

Table 2 shows that debt ratio (DBR) has a mean of 0.34, suggesting that 34% of the capital of the manufacturing firms is financed by debt, while the remaining 66% by equity. This shows that equity is more accessible to the firms than debt. Table 2 also reveals that debt-to-equity ratio (DER) has a mean of 0.83, confirming the earlier position that firms had more equity than debt in the financial composition. Furthermore, in Table 2, the average ICR is 9.01 times, suggesting that EBIT is nine times over the interest expenses, affirming that firms have no difficulty in fulfilling their debt obligations. Table 2 also shows that EPS, has a mean of 3.73, portraying that a unit investment in the shares of firms will generate after tax earnings of ₦3.73 for the shareholders.

Table 2

Descriptive Results

Variable	Mean	Minimum	Maximum	Std. Dev.
DBR	0.34	-3.22	1.37	0.32
DEQ	0.83	-5.16	9.11	1.34
ICR	9.01	-102.96	677.26	42.30
AGE	49	7	100	20.15
SIZ	7.29	3.73	9.11	1.04
EPS	3.73	-100.26	61.77	10.73

Following the descriptive analysis, pre-diagnostic test was done through multicollinearity test. We used the correlation matrix and variance inflation factor (VIF) to test multicollinearity, and Table 3 contains the results.

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Table 3

Collinearity Statistic: Correlation Matrix and VIF

	DBR	DER	ICR	AGE	SIZE	VIF
DBR	1					1.76
DER	0.52	1				2.89
ICR	-0.13	-0.09	1			6.14
AGE	-0.07	-0.06	-0.01	1		1.19
SIZE	-0.04	-0.18	0.01	0.36	1	1.25

It is glaring from the results in Table 3 that the correlations between the variables are within the acceptable threshold of 0.9, and the VIFs are less than 10, which according to Hair et al. (2014), does not imply multicollinearity problem.

The results of the three static panel estimators are contained in Table 4.

Table 4

Regression Results

	Dependent Variable: EPS		
	POLS	FEM	REM
CONSTANT	-11.68(-2.53**)	-41.97(-2.96***)	-12.25(-2.09**)
DBR	-9.83(-4.64)***	-14.12(-7.57)***	-11.86(-6.05)***
Sq_DBR	-2.41(-2.45)**	-4.51(-5.00)***	-3.21(-3.47)***
DER	5.38(8.22)***	6.50(12.63)***	6.05(10.54)***
Sq_DER	-0.55(-5.54)***	-0.78(-9.53)***	-0.66(-7.39)***
ICR	0.07(2.33)**	0.03(1.27)	0.05(1.65)*
Sq_ICR	-0.00(-2.11)**	-4.74(-1.12)	-0.00(-1.52)
L_AGE	-1.99(-1.85)*	10.76(2.92)***	-1.23(-0.88)
SIZ	3.18(5.78)***	0.98(0.67)	2.96(4.27)***
Adjusted R-squared	0.26	0.57	0.26
F-statistic	15.02 (0.00)***	14.27(0.00)***	15.02(0.00)***
Standard error	9.25	7.06	9.29
Durbin-Watson	0.82	1.48	0.82

Note. The values in parentheses for constant & variables are t ratios and those for F- statistic are p-values.

'***', '**' and '*' imply significant at 1%, 5% and 10% respectively.

The results of the F-statistic in Table 4 for the three models have 1% level of significance, implying that the models are worthy of consideration for analysis. In order to select the most appropriate from the three models, the restricted F-test, the Hausman test, and the Lagrange multiplier test are employed, and the results confirmed that the FEM is the best. Hence, the discussion of findings and conclusion are based on the FEM.

To ensure the basic regression model assumptions are not undermined, autocorrelation and heteroskedasticity tests are conducted, and the Durbin-Watson (D-W) statistic and Distribution free Wald test used to check autocorrelation and heteroskedasticity respectively, confirmed that these two problems are present. To arrest these problems. this study applies the robust heteroskedasticity- autocorrelation consistent (HAC) standard errors to the FEM, and the results shown in Table 5.

Table 5

Results of the Robust FEM

Dependent Variable: EPS	
Fixed Effect Model	
CONSTANT	-41.97(-1.87)*
DBR	-14.12(-1.71)*
Sq_DBR	-4.51(-2.05)**
DER	6.50(1.67)*
Sq_DER	-0.78(-1.96)**
ICR	0.03(1..50)
Sq_ICR	-4.74(-1.45)
L_AGE	10.76(1.78)**
SIZ	0.98(0.50)
Adjusted R-squared	0.57
F-statistic	14.27(0.00)***
Standard error	7.06
Durbin-Watson	1.48

Note. The values in parentheses for constant & variables are t ratios and those against F- statistic is p-value. '***', '**' and '*' imply significant at 1%, 5% and 10% respectively.

Table 5 indicates that debt ratio possess a negative and statistical impact on performance represented by earnings per share. This submission is affirmed by the 10% significant t-ratio of -.187. To capture the non-linear relationship, debt ratio was squared, and the results was consistent and significant, confirming that debt ratio and performance are non-linearly related.

In Table 5, debt-to-equity ratio was shown as having a positive and significant impact on performance at 10% significant level. Conversely, the square term of the debt-to-equity ratio is negatively significant at 5%, confirming a non-linear inverted U-shaped relationship. Table 5 also shows that the third measure of leverage-the ICR and its square term have insignificant impact on performance.

The adjusted R-square is 0.57, while the f-statistic of 14.27 has a 1% significant level, confirming that the independent variables together explained about 57% of the variation in the dependent variable. The moderate R-square and the significant f-statistic testifies to the model fit, suggesting that model can be considered good for analysis and making conclusion.

In the coming paragraphs, the discussion of research findings is highlighted. This study provides evidence that the effect of leverage on performance among listed Nigerian manufacturing firms is both non-linear and economically sensitive to debt composition. The results reveal three key insights.

First, the debt ratio exhibits a significant negative linear and quadratic effect on earnings per share (EPS), indicating that excessive total debt erodes shareholder value at an increasing rate. This finding reinforces the financial distress cost argument of the trade-off theory and aligns with recent evidence by Olu-Akinola et al. (2025) and Karaca. (2025), who document that high aggregate leverage magnifies performance deterioration in volatile emerging markets. In Nigeria's macroeconomic environment characterized by high interest rates, exchange rate instability, and inflationary pressures, the marginal cost of debt appears to outweigh its tax advantages beyond moderate levels. The accelerating negative effect suggests that total leverage accumulation amplifies risk exposure rather than operational efficiency.

Second, the debt-to-equity ratio demonstrates a positive linear relationship with performance alongside a significant inverted U-shaped effect. This confirms the existence of an optimal capital structure threshold. Moderate leverage enhances performance, likely through tax shields and disciplinary effects on management; however, once leverage exceeds the optimal band, rising agency and distress costs reverse these gains. The inverted U-shape provides strong empirical support for the trade-off framework within the Nigerian manufacturing context. These results suggest that a combination of debt with equity will impact positively on the financial performance than relying solely on debt, which was found to undermine financial performance. The descriptive results confirmed that the sampled firms used equity more than debt in the capital structure. This confirms that equity portion was able to suppress the adverse impact of debt on earnings. This finding is supported by the results of Abubakar and Maishanu (2025). However, the result contradicts the empirical discovery of Zhang and Kimani (2025).

Third, the interest coverage ratio shows a positive but statistically insignificant relationship with EPS. This suggests that while debt-servicing capacity reflects financial stability, it does not independently drive shareholder returns. Consistent with Nkosi (2024) performance appears more sensitive to overall leverage structure than to interest coverage metrics alone. Also, the test of a non-linear or quadratic relationship between the interest coverage ratio and the financial performance was not supported.

Conclusion and Suggestions

This study examines the impact of leverage on performance in Nigeria with emphasises on listed manufacturing firms. A panel data of 25 listed manufacturing firms from 2011 to 2023 was explored. The main findings reveal that debt ratio has a significant and negative impact on performance; debt-to-equity ratio has a positive and significant impact on performance, and interest coverage ratio has a positive but insignificant impact on performance. An existence of non-linear connection between debt ratio and performance was also unveiled. A non-linear relationship in the form of inverted U-shape was also discovered in the debt-to-equity ratio-performance nexus.

High component of debt in the financial structure of firms will diminish performance. This is because the cost related to debt financing is fixed and huge. However, the adverse effect of debt can be mitigated through an appropriate blend with equity.

Based on the major findings, this study recommends as follows: Firms may minimize financing with debt instruments as increase in the usage of debt will attenuates earnings, and consequently, diminish financial performance. To increase financial performance, manufacturing firms should adopt an appropriate debt-to-equity ratio. In addition, manufacturing firms may take measures to increase the interest coverage ratio through improved earnings.

This study is confined to listed companies in the manufacturing cycle. As such, there is the need to be cautious and careful when generalising the findings in other contexts. Another limitation is the sample selection and sample size. Many firms were excluded due to inaccessibility of their annual report and financial statements for some periods. More so, the variables have multiple measures in the literature, and we only consider one measure per variable, which may lead to differences in results with those authors whom have adopted alternative measures. Furthermore, the analysis covers 2011–2023, excluding data from 2024, which may contain more recent financial trends and macroeconomic developments. By recognising the aforementioned limitations, future research could extend the study period to include 2024 and beyond, using firms from the financial services sector, and incorporating additional measures of performance, such as the total Q and the ratio of Maris, which have only received little attention in the literature. This study utilised two firm

level factors as control variables, future studies should adopt more firm-level factors, industry factors and macroeconomic factors.

Implications

From a policy perspective, the findings highlight the importance of improving access to affordable long-term financing for manufacturing firms in Nigeria. High borrowing costs may exacerbate the negative impact of excessive debt on firm performance. Policymakers and financial regulators should therefore promote financial market reforms that reduce lending rates and expand access to structured financing instruments.

Additionally, regulatory bodies such as the Nigerian Exchange Group (NGX) and financial oversight institutions may encourage better disclosure and monitoring of firms' capital structure positions to enhance transparency and investor confidence. Sound financial reporting standards can help stakeholders assess leverage risk more accurately.

Authors' contribution statement

Conceptualization and the review of literature were done by the second author, while the first author did the data collection, analysis, interpretation of results, conclusion, writing, editing, and finalization of the manuscript for publication consideration.

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Declaration interest

The authors declare no conflict of interest.

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