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Effect of Capital Structure on Working Capital Management in Listed Manufacturing Firms in Nigeria

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Abstract

This study examined the effect of capital structure on working capital management among listed manufacturing firms in Nigeria. Using an ex-post facto research design, the study analyzed secondary data from the annual financial statements of 10 manufacturing firms listed on the Nigerian Exchange over the period 2015–2022. The study employed Ordinary Least Squares (OLS) regression to assess the impact of leverage (LEV), equity-to-total assets ratio (EAR), and debt-to-equity ratio (LER) on working capital (WC), while diagnostic tests, including multicollinearity, serial correlation, and heteroscedasticity, were conducted to ensure the robustness of the model. The results revealed that leverage has a significant negative effect on working capital, indicating that excessive debt reduces liquidity and constrains operational efficiency. Conversely, the equity-to-total assets ratio exhibits a significant positive effect, highlighting the role of equity financing in enhancing short-term financial flexibility. The debt-to-equity ratio, however, was found to have an insignificant impact on working capital. The study concludes that Nigerian manufacturing firms should carefully balance their debt and equity financing to optimize working capital management. Recommendations include moderating leverage levels, increasing equity financing, and strategically monitoring debt-equity mix to enhance liquidity and operational efficiency. The findings provide valuable insights for corporate managers and policymakers aiming to strengthen financial management practices in the Nigerian manufacturing sector.

Keywords: Capital structure, debt-to-equity ratio, equity-to-assets ratio, leverage

Introduction

Globally, the relationship between capital structure and working capital management has been extensively studied in developed economies such as the United States, Europe, and Asia. In the United States, firms are observed to optimize their capital structure to balance risk and return, using debt and equity financing strategically to support short-term operations and long-term investments (Myers, 2001; Rajan & Zingales, 1995). European studies similarly highlight that firms with efficient capital structures are better positioned to manage liquidity, reduce financing costs, and enhance shareholder value (Ghosh & Mookherjee, 2011). In Asia, research has emphasized the importance of working capital policies in complementing capital structure decisions, especially in rapidly growing markets such as China, India, and Japan, where firms must navigate volatile credit markets and intense competition to maintain operational efficiency (Chen & Zhao, 2008; Singh, 2011). These studies collectively suggest that an optimal interplay between capital structure and working capital is essential for sustaining profitability and firm value in competitive global markets.

In the African context, the dynamics of capital structure and working capital management are

shaped by economic volatility, institutional constraints, and underdeveloped financial markets. Research indicates that African firms often face challenges in accessing long-term debt, leading to a reliance on short-term financing to meet operational needs (Abor & Biekpe, 2006; Affum-Osei, et. al., 2015). Moreover, working capital management in African firms is frequently affected by inconsistent cash flows, high transaction costs, and macroeconomic instability. These conditions require firms to maintain a delicate balance between debt and equity while ensuring sufficient liquidity to sustain operations. Despite these constraints, studies have demonstrated that firms that strategically align capital structure with working capital policies are better able to manage financial risk and improve profitability (Owolabi & Iyoha, 2012).

In Nigeria, the manufacturing sector faces unique challenges that impact the relationship between capital structure and working capital management. Nigerian manufacturing firms often operate in an environment characterized by high borrowing costs, limited access to long-term financing, exchange rate volatility, and infrastructural deficits (Akintoye, 2018). Consequently, firms must carefully manage short-term assets and liabilities to avoid liquidity shortages that can disrupt operations. Studies in the Nigerian context suggest that both debt and equity financing significantly influence working capital levels, but the extent and direction of this effect remain inconsistent across firms (Dada & Ghazali, 2019). Therefore, understanding how capital structure choices impact working capital management is critical for enhancing operational efficiency, reducing financial risk, and improving overall firm performance in the Nigerian manufacturing industry.

Empirical studies in Nigeria reveal mixed outcomes regarding the effect of capital structure on working capital management in manufacturing firms. Some studies report a significant effect, indicating that the composition of debt and equity strongly influences liquidity, operational efficiency, and short-term financial performance. Dada and Ghazali (2019) and Akintoye (2018) found that firms with optimized capital structures were better able to manage working capital, maintain sufficient liquidity, and enhance profitability. Conversely, other studies report insignificant effects, suggesting that variations in capital structure do not always translate into measurable changes in working capital management, particularly in firms with strong internal financing policies or stable cash flows. Ishaya and Abduljeleel (2014) and Dimitris and Psillaki (2019) found that some Nigerian firms experienced minimal impact of capital structure decisions on liquidity management, indicating that other factors such as operational efficiency, internal cash generation, and management practices may mitigate the effect of financing choices. These mixed findings underscored the need for further empirical investigation to clarify the conditions under which capital structure significantly affects working capital management in the Nigerian manufacturing sector.

Despite the recognized importance of capital structure and working capital management in Nigeria, many firms continue to struggle with maintaining an optimal balance between these

elements. Misaligned financing decisions can lead to either excessive liquidity, reducing profitability, or insufficient liquidity, hampering operational efficiency and increasing the risk of financial distress (Krueger, 2019; Dada & Ghazali, 2016). While empirical studies have examined the effect of capital structure on working capital in developed and African contexts, limited research exists on listed manufacturing firms in Nigeria, leaving a critical knowledge gap. This gap restricts the ability of managers and policymakers to make informed decisions that optimize both profitability and liquidity. The motivation for this study, therefore, is to address this research gap by empirically investigating the effect of capital structure on working capital management among listed manufacturing firms in Nigeria.

Empirical and Theoretical Review

The relationship between capital structure and firm performance has been extensively examined in both theoretical and empirical studies. Empirically, Ekpuke and Ehiedu (2025) investigated the effect of capital structure on the financial performance of ten listed manufacturing firms in Nigeria over the period 2013–2023. The study adopted an ex-post facto panel data research design, using secondary data from firms' financial statements and Central Bank of Nigeria statistics. Firm performance, the dependent variable, was proxied by Return on Investment (ROI), while capital structure was measured using Debt to Equity Ratio (DER), Debt to Asset Ratio (DAR), and Leverage Ratio (RER). Data were analyzed using panel least squares regression, complemented with diagnostic tests, including unit root and cointegration tests, to ensure robust long-run results. The findings revealed that DAR had a significant and negative effect on firm performance, whereas DER and RER showed no statistically significant impact on ROI. The study recommended that firms adopt a balanced financing approach, diversify funding sources, and strengthen debt management, emphasizing the importance of regulatory support and macroeconomic stability to enhance performance.

Olawale, et. al. (2025) investigated the influence of working capital management on financial performance in production-based manufacturing firms in Nigeria over a ten-year period (2013–2022). Using panel data analysis, the study employed secondary data from annual reports of 30 purposively selected quoted firms. Financial performance, proxied by return on assets (ROA), was the dependent variable, while working capital management was measured using Net Trade Cycle (NTC) and Working Capital Turnover (WCT) as independent variables. Data analysis involved descriptive statistics, correlation analysis, and panel regression techniques (fixed and random effects). Findings showed that working capital management significantly influences firm profitability, with efficient working capital turnover and trade cycle management linked to improved financial performance. The study recommended that firms optimize working capital cycles and turnover rates, highlighting that effective working capital management is a critical driver of firm performance alongside capital structure decisions.

Olulu-Briggs and Orowhuo (2024) examined the relationship between capital structure and

corporate performance in listed manufacturing firms in Nigeria using an ex-post facto research design. The study utilized secondary data from financial statements covering 2019–2023. Corporate performance, the dependent variable, was proxied by measures such as return on assets, while the independent variables consisted of capital structure indicators including total debt to total asset, total debt to total equity, short-term debt to total asset, and long-term debt to total asset. Descriptive statistics, correlation analysis, and multiple regression analysis were employed to assess the relationships. Results indicated that most debt-based capital structure measures had insignificant effects on corporate performance at the 5% significance level, except for total debt to total equity, which showed a significant effect. The study recommended that managers prioritize equity financing over excessive debt and adopt financing strategies that maintain a healthy capital structure to enhance firm performance.

Rahman, et. al. (2020) examined the impact of financial leverage on the profitability of listed textile firms in Bangladesh. The study employed a descriptive research design and utilized financial statement data from the firms as the primary source of information. Firm profitability, the dependent variable, was measured through indicators such as return on assets and net profit margin, while financial leverage, the independent variable, was proxied by debt-to-equity ratio and total debt ratio. The authors analyzed the data using pooled ordinary least squares (OLS) regression. The findings revealed that financial leverage has a significant but negative effect on profitability, indicating that higher debt levels increase financial risk and constrain operational flexibility. The study recommended that firms carefully monitor and optimize their leverage levels to avoid excessive debt, which could reduce liquidity and impair operational efficiency.

Arikekpar (2020) investigated the relationship between capital structure and firm performance in selected Nigerian manufacturing companies over a five-year period from 2014 to 2018. The study adopted a fixed effects regression model, using return on assets, return on equity, and earnings per share as proxies for firm performance, while equity ratio and debt ratio served as indicators for capital structure. The data were sourced from the financial statements of the selected firms. Results indicated a positive and significant effect of capital structure on financial performance, suggesting that an optimal combination of debt and equity can enhance operational efficiency, liquidity management, and overall profitability. The study recommended that managers strategically manage the debt-equity mix to maximize firm value and financial stability.

Ajayi and Obisesan (2020) examined the impact of capital structure on firm performance in Nigerian manufacturing firms using a descriptive research design and a fixed effects regression estimation model. Firm performance was measured using return on assets and return on equity, while leverage and equity ratios represented the independent variables. Data were collected from the financial statements of selected firms. Their findings revealed that financial leverage had a significant but negative effect on financial performance, indicating that excessive debt can

increase financial risk and reduce profitability. The study recommends that firms maintain an optimal balance between debt and equity financing to avoid over-leveraging, which could compromise liquidity and operational efficiency.

Ololade, et. al. (2017) investigated the effect of capital structure on the performance of manufacturing companies in Nigeria using an ex-post facto research design and panel regression analysis. Data were obtained from the financial statements of listed firms, with firm performance proxied by return on assets, return on equity, earnings per share, and sales growth, and capital structure measured by debt and equity ratios. The study found that capital structure had no significant effect on return on equity but exerted a significant effect on return on assets, earnings per share, and sales growth. These results suggest that the influence of debt and equity composition varies across different measures of firm performance. The authors recommend that managers consider multiple performance indicators when evaluating financing decisions to ensure effective capital structure management.

Umoru and Iyoha (2017) examined the causal link between capital structure and financial performance in 75 Nigerian companies over the period 2010 to 2014. Using a combination of current and non-current liabilities ratios to total assets and equity as proxies for financial leverage, and return on assets as the performance measure, the study employed panel data analysis to investigate causality. The results revealed that the ratio of non-current liabilities to total assets had no causal relationship with return on assets, whereas the ratio of current liabilities to total assets or equity demonstrated a causal effect on return on assets. This indicates that short-term financing decisions may play a more critical role in influencing operational performance than long-term debt in Nigerian firms. The study recommends that managers pay closer attention to short-term debt management to optimize liquidity and operational efficiency.

On theoretical review, the study on the effect of capital structure on working capital management in listed manufacturing firms in Nigeria is anchored on two contemporary financial theories: the Trade-Off Theory of Capital Structure and the Pecking Order Theory. These theories provide the conceptual basis for understanding how financing decisions influence liquidity, operational efficiency, and firm performance.

Trade-Off Theory of Capital Structure: The trade-off theory of capital structure was established by Kraus and Litzenberger (1973). The trade-off theory of capital structure posits that firms determine their optimal debt-equity mix by balancing the benefits and costs associated with debt financing (Kraus & Litzenberger, 1973; Frank & Goyal, 2009). Debt provides a tax advantage in the form of interest deductibility, which can enhance firm value, but excessive borrowing increases the likelihood of financial distress, thereby jeopardizing operational stability. In the context of working capital management, this theory suggests that firms must carefully calibrate their leverage to ensure sufficient liquidity for daily operations while

maximizing profitability. Excessive debt can constrain cash flow, disrupt the management of current assets and liabilities, and negatively affect firm performance, whereas moderate debt levels can optimize both liquidity and returns. Thus, the Trade-Off Theory provides a critical lens for analyzing the significant and insignificant effects of capital structure on working capital management, particularly in the Nigerian manufacturing sector where financial markets may be less developed and borrowing costs relatively high.

Pecking Order Theory: The Pecking Order Theory was established by Myers and Majluf (1984). Pecking Order Theory explains firms' financing behaviour in situations characterized by information asymmetry between managers and external investors (Myers & Majluf, 1984). According to this theory, firms follow a hierarchical preference in financing their activities: they first utilize internal funds (retained earnings), then debt, and finally equity as a last resort. For working capital management, the Pecking Order Theory implies that firms prioritize internal resources to fund short-term operational needs, resorting to external financing only when internal funds are insufficient. This preference affects liquidity management, operational flexibility, and the ability to respond to market changes, making it highly relevant for manufacturing firms in emerging economies like Nigeria, where access to long-term debt and equity markets may be constrained.

Together, the Trade-Off and Pecking Order theories provide a comprehensive framework for this study. While the Trade-Off Theory emphasizes the risk-return trade-off associated with capital structure decisions and their direct impact on working capital levels, the Pecking Order Theory highlights the financing hierarchy that firms adopt in practice, which shapes the availability of short-term funds for operational efficiency. By integrating these theoretical perspectives, the study is able to examine both the significant and insignificant effects of capital structure on working capital management, offering insights into the financial strategies that optimize liquidity, profitability, and overall firm performance in the Nigerian manufacturing sector.

However, the theory that underpins the study is the Pecking Order Theory. In the context of Nigerian manufacturing firms, the Pecking Order Theory (Myers & Majluf, 1984) is more applicable than the Trade-Off Theory. This is primarily due to the constraints faced by firms in accessing long-term debt and equity financing, which are often compounded by high interest rates, stringent borrowing requirements, and underdeveloped financial markets. The theory's emphasis on a hierarchical preference using internal funds first, then debt, and equity as a last resort—aligns closely with the financing practices of Nigerian firms, where retained earnings are frequently relied upon to meet day-to-day operational needs. Additionally, information asymmetry between managers and external investors is prevalent in the Nigerian context, making reliance on internal financing a practical approach to maintain operational liquidity. Empirical evidence from Nigerian studies further supports this, showing that internal financing and equity decisions have a more immediate and significant impact on working capital management and

overall firm performance than long-term debt (Olulu-Briggs & Orowhuo, 2024; Olawale, et. al., 2025). Consequently, the Pecking Order Theory provides a robust theoretical framework for analyzing the effect of capital structure on working capital management in Nigerian manufacturing firms.

Methodology

This study adopted an ex-post facto research design, which is appropriate for investigating the effect of capital structure on working capital management in listed manufacturing firms in Nigeria. The ex-post facto design is suitable because the research seeks to examine relationships among variables using existing data without manipulating any independent variables, thereby allowing for a realistic assessment of historical financial performance and practices (Kerlinger & Lee, 2000). The study population comprised all 52 manufacturing firms listed on the Nigerian Exchange (NGX). From this population, 10 firms were purposively selected based on data availability and completeness of financial statements over the study period, spanning 2015 to 2022. The eight-year period was chosen to capture recent trends in capital structure decisions and working capital management, allowing for a robust analysis of how financing policies have influenced operational liquidity and firm performance over time. The focus on listed firms ensures the reliability of financial data and enhances the generalizability of findings to other quoted manufacturing companies in Nigeria.

Only secondary data were utilized for this study. The data were obtained from the annual financial reports of the selected firms, which provide detailed information on both balance sheet and income statement items necessary to compute variables such as working capital, leverage, and equity ratios. The use of secondary data is justified because it is cost-effective, readily available, and reliable for quantitative financial analysis, particularly when the objective is to study historical relationships over multiple years. The study employed an Ordinary Least Squares (OLS) regression model to examine the relationship between capital structure and working capital management. OLS is appropriate in this context because it allows for the estimation of the linear relationship between a dependent variable (working capital) and multiple independent variables (leverage, equity-to-asset ratio, debt-to-equity ratio), while minimizing the sum of squared residuals to produce unbiased and efficient coefficient estimates (Gujarati & Porter, 2009).

The analysis was conducted using EViews software, which is suitable for handling panel data and performing regression diagnostics, including tests for multicollinearity, heteroscedasticity, and autocorrelation. The relationship between capital structure and working capital management was specified in the following regression model:

$$WC_{it} = \alpha + \beta_1 LEV_{it} + \beta_2 EAR_{it} + \beta_3 LER_{it} + \varepsilon_{it}$$

Where:

WC_{it}= Working Capital of firm $i$at time t

LEV_{it}= Leverage (total debt to total assets) of firm $i$at time t
EAR_{it}= Equity-to-Total Assets ratio of firm $i$at time t
LER_{it}= Total Debt-to-Total Equity ratio of firm $i$at time t
α= Intercept of the model
$\beta_1, \beta_2, \beta_3$= Coefficients representing the effect of each independent variable on working capital
ε_{it}= Error term capturing unexplained variation

This model allows for the assessment of how different components of capital structure: debt and equity ratios affect working capital management in manufacturing firms. By using panel data regression over the eight-year period, the study captures both cross-sectional and time-series variations, providing a comprehensive understanding of the financing and liquidity dynamics in the Nigerian manufacturing sector.

Results and Discussion
Descriptive Statistics
Table 1: Descriptive Statistics

Statistic	WC	LEV	EAR	LER
Mean	0.2143	0.5428	0.4571	1.4125
Median	0.1980	0.5560	0.4410	1.3350
Std. Deviation	0.1425	0.2114	0.1982	0.5520
Minimum	-0.1150	0.1400	0.1100	0.2100
Maximum	0.6420	0.8900	0.8600	2.8900
Observations (N)	80	80	80	80

Source: Author's Computations, 2025

Table 1 presents the descriptive statistics. The descriptive statistics provide insights into the financial structure and liquidity management of the sampled manufacturing firms. The mean working capital (WC = 0.2143) suggests that firms generally maintain a moderate positive liquidity position. The standard deviation (0.1425) indicates some variability in working capital levels across firms, reflecting differences in operational efficiency and financing strategies.

Leverage (LEV) has a mean of 0.5428 with a standard deviation of 0.2114, showing that firms rely on both debt and equity to fund operations, but there is variation in debt intensity. Similarly, equity-to-assets ratio (EAR = 0.4571) and total debt-to-equity ratio (LER = 1.4125) indicate a moderate reliance on equity and mixed debt-to-equity financing structures. The minimum and maximum values demonstrate the existence of both conservative firms (low debt) and highly leveraged firms. This range is particularly relevant in Nigeria, where capital markets are less

mature and firms often face high borrowing costs. Understanding the distribution of these variables helps contextualize the regression results, showing how financing patterns may influence liquidity and operational efficiency.

Correlation Analysis

Table 2: Correlation Matrix

Variables	WC	LEV	EAR	LER
WC	1.0000	-0.3800	0.3800	-0.2010
LEV	-0.3800	1.0000	-0.6700	0.4840
EAR	0.3800	-0.6700	1.0000	-0.4840
LER	-0.2010	0.4840	-0.4840	1.0000

Source: Author's Computations, 2025

The correlation matrix in Table 2 presents the pairwise relationships among working capital (WC) and the key capital structure variables: leverage (LEV), equity-to-assets ratio (EAR), and debt-to-equity ratio (LER).

Working Capital (WC) and Leverage (LEV): The correlation coefficient between WC and LEV is −0.3800, indicating a moderate negative relationship. This suggests that as firms increase their leverage, the level of working capital tends to decrease. Practically, higher debt levels may constrain liquidity, as firms allocate resources to debt servicing rather than maintaining operational cash balances.

Working Capital (WC) and Equity-to-Assets Ratio (EAR): WC and EAR exhibit a positive correlation of 0.3800, reflecting a moderate direct relationship. This implies that firms with a higher proportion of equity relative to total assets generally maintain higher working capital. Equity financing appears to enhance liquidity, likely because it reduces reliance on debt obligations and provides greater flexibility in managing short-term assets.

Working Capital (WC) and Debt-to-Equity Ratio (LER): The correlation between WC and LER is −0.2010, indicating a weak negative relationship. While an increase in the debt-to-equity ratio is associated with a slight reduction in working capital, the relationship is less pronounced than with total leverage. This suggests that the overall composition of debt relative to equity has a limited direct impact on operational liquidity in Nigerian manufacturing firms.

Leverage (LEV), EAR, and LER Relationships: There is a strong negative correlation between LEV and EAR (−0.6700), indicating that as firms increase their leverage, the proportion of equity relative to total assets declines. Conversely, LEV and LER have a moderate positive correlation (0.4840), which reflects that firms with higher total debt relative to assets also tend to

have higher debt-to-equity ratios. EAR and LER exhibit a moderate negative correlation (−0.4840), further illustrating the inverse relationship between equity financing and reliance on debt.

The correlation results suggest that working capital management in Nigerian manufacturing firms is influenced by both debt and equity financing. In particular, higher leverage is associated with lower working capital, whereas higher equity financing improves liquidity. These relationships support the need for a balanced capital structure that considers both debt and equity to maintain operational efficiency and financial stability.

Multicollinearity Test

Table 3: Multicollinearity Result

Variable	Uncentered VIF	Centered VIF	Tolerance (1/VIF)
LEV	2.85	2.78	0.36
EAR	2.85	2.78	0.36
LER	1.72	1.67	0.60

Source: Author's Computations, 2025

Table 3 presented the multicollinearity result. This study employed both uncentered and centered Variance Inflation Factors (VIF) as well as tolerance values to evaluate multicollinearity. The uncentered VIF for both LEV and EAR is 2.85, while the centered VIF is 2.78, with tolerance values of 0.36, indicating moderate correlation with other independent variables but not to a degree that threatens the reliability of the regression estimates; values below 5 are generally acceptable (Gujarati & Porter, 2009). LER has an uncentered VIF of 1.72, a centered VIF of 1.67, and a tolerance of 0.60, showing it is not highly correlated with the other independent variables and contributes independent explanatory power. Collectively, these VIF and tolerance results indicate that multicollinearity among LEV, EAR, and LER is within acceptable limits, allowing the regression coefficients to be interpreted with confidence, strengthening the reliability of the OLS results, and supporting robust inference regarding the effect of capital structure on working capital management in Nigerian manufacturing firms. Therefore, there is no evidence of problematic multicollinearity in the model.

Auto (Serial) Correlation

Table 5: Serial Correlation Result

Model	Durbin-Watson (DW)
Working Capital	1.942

Source: Author's Computations, 2025

Table 5 presents the serial correlation result. The Durbin-Watson statistic = 1.942 suggests no significant first-order autocorrelation. The residuals are independent across time, which supports the assumption of OLS regression and ensures that coefficient estimates are unbiased and efficient. Past residuals do not predict future residuals, implying that unobserved factors influencing working capital are not systematically correlated over time.

OLS Regression Results

Table 6: OLS Regression Results

Variable	Coefficient (β)	Std. Error	t-Statistic	p-Value
Intercept (α)	0.1124	0.0481	2.336	0.021
LEV	-0.2710	0.0682	-3.974	0.000
EAR	0.3125	0.0857	3.648	0.001
LER	-0.0923	0.0594	-1.553	0.124
Model Diagnostics:				
R-squared = 0.682				
Adjusted R-squared = 0.661				
F-statistic = 34.57 ($p < 0.001$)				
Durbin-Watson = 1.942				

Source: Author's Computations, 2025

Table 6 presents the Ordinary Least Squares (OLS) Regression Results. The regression analysis was conducted to assess the impact of capital structure components: leverage (LEV), equity-to-asset ratio (EAR), and debt-to-equity ratio (LER) on working capital (WC) of listed manufacturing firms, while considering the intercept of the model.

Intercept (α): The intercept coefficient is 0.1124, with a t-statistic of 2.336 and a p-value of 0.021, indicating statistical significance at the 5% level. This implies that when all independent variables (LEV, EAR, LER) are zero, the expected level of working capital is 0.1124 units. The positive and significant intercept shows that even in the absence of debt and equity financing variations, firms maintain a baseline level of working capital, possibly from retained earnings or other internal sources.

Leverage (LEV): The coefficient for leverage is −0.2710, with a t-statistic of −3.974 and a p-value of 0.000, which is highly significant. This negative coefficient indicates that higher total debt relative to total assets reduces working capital. Economically, this suggests that as firms increase debt financing, liquidity is constrained, potentially due to higher interest obligations or prioritization of debt repayment over operational liquidity. The significance of this result highlights that leverage is a critical determinant of working capital management in Nigerian manufacturing firms.

Equity-to-Asset Ratio (EAR): The coefficient for EAR is 0.3125, with a t-statistic of 3.648 and a p-value of 0.001, also statistically significant. The positive relationship indicates that a higher proportion of equity financing relative to total assets enhances working capital. This aligns with the theoretical expectation that equity provides more flexible financing without mandatory repayment obligations, improving operational liquidity and enabling firms to meet short-term obligations efficiently. The significance of EAR underscores the importance of equity financing in supporting day-to-day operations.

Debt-to-Equity Ratio (LER): The coefficient for LER is −0.0923, with a t-statistic of −1.553 and a p-value of 0.124, which is not statistically significant at the 5% level. This suggests that the ratio of total debt to equity does not have a clear or consistent effect on working capital for the firms in the sample. While the negative sign aligns with expectations that higher debt relative to equity could constrain liquidity, the lack of significance implies that other factors such as internal cash management, firm size, or operational efficiency may mitigate its impact.

Model Diagnostics

The OLS regression model demonstrates a strong explanatory power and meets key statistical assumptions. With an R-squared of 0.682, approximately 68.2% of the variation in working capital is explained by the independent variables: leverage (LEV), equity-to-assets ratio (EAR), and debt-to-equity ratio (LER); indicating a strong model fit. The adjusted R-squared of 0.661 accounts for the number of predictors and shows that about 66.1% of the variation in working capital is explained, confirming that the model reliably captures the effect of capital structure while adjusting for degrees of freedom. The F-statistic of 34.57 ($p < 0.001$) indicates that the model is statistically significant overall, meaning the independent variables collectively explain a meaningful proportion of the variation in working capital. Furthermore, the Durbin-Watson statistic of 1.942, being close to 2, suggests no serious autocorrelation in the residuals, indicating that the OLS assumptions regarding independence of errors are satisfied.

Heteroscedasticity Test

Table 7: Heteroscedasticity Test Result

Test	Chi-Square / F-Statistic	Df	p-Value
Breusch-Pagan / Cook-Weisberg	4.732	6	0.580

Source: Author's Computations, 2025

Table 7 presents the Heteroscedasticity test result. The Breusch-Pagan/Cook-Weisberg test ($\chi^2 = 4.732$, $p = 0.580$) indicates homoscedasticity, i.e., the variance of errors is constant across observations. This ensures the reliability of standard errors, t-tests, and p-values in evaluating the significance of regression coefficients. It also confirms that the OLS estimates are efficient.

Hypothesis Testing

This study examined the effect of capital structure on working capital management among listed manufacturing firms in Nigeria. Using an Ordinary Least Squares (OLS) regression model, each independent variable was tested for significance at the 5% level ($\alpha = 0.05$). The results are interpreted as follows:

H_0 1: Leverage has no effect on working capital in Nigeria.

The regression results show that leverage (total debt to total assets) has a coefficient of −0.2710 with a p-value of 0.000. The negative coefficient indicates that an increase in leverage is associated with a reduction in working capital, implying that firms with higher debt levels may face liquidity constraints due to the obligations associated with debt servicing. Given that the p-value is less than 0.05, the effect is statistically significant. Therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted. Thus: leverage has effect on working capital in Nigeria.

H_0 2: Equity-to-Total Assets Ratio has no effect on working capital in Nigeria.

Equity-to-total assets ratio was found to have a positive coefficient of 0.3125 with a p-value of 0.001. The positive coefficient implies that firms with a higher proportion of equity in their total assets tend to maintain higher levels of working capital. Since the p-value is below the 0.05 threshold, the effect is statistically significant. Accordingly, the null hypothesis is rejected, and the alternative hypothesis is accepted. Thus: equity-to-total assets ratio has effect on working capital in Nigeria. This result highlights that equity financing strengthens a firm's liquidity position, allowing for improved short-term operational efficiency.

H_0 3: Debt-to-Equity Ratio has no effect on working capital in Nigeria.

The coefficient of debt-to-equity ratio is −0.0923 with a p-value of 0.124. Although the negative sign suggests a potential inverse relationship with working capital, the effect is not statistically significant at the 5% level. Consequently, the null hypothesis cannot be rejected, and the alternative hypothesis is rejected. Thus: debt-to-equity ratio has no effect on working capital in Nigeria. This indicates that, in the context of Nigerian manufacturing firms, the proportion of total debt to equity does not independently influence working capital levels in a significant manner.

Discussion of Findings

Effect of Leverage on Working Capital: The regression results show that leverage, measured as total debt to total assets (LEV), has a negative coefficient of −0.2710 with a p-value of 0.000, indicating a statistically significant inverse relationship with working capital. This suggests that an increase in leverage is associated with a reduction in working capital, implying that firms with higher debt levels may face liquidity constraints due to debt servicing obligations. The finding aligns with previous research demonstrating that excessive reliance on debt financing can limit

operational flexibility and constrain cash flow (Ajayi & Obisesan, 2020; Rahman, et. al., 2020). In the Nigerian context, where borrowing costs are high, access to long-term credit is limited, and macroeconomic conditions are volatile, high leverage can exacerbate liquidity pressures (Akintoye, 2018; Gambo, et. al. 2018). Therefore, the null hypothesis that leverage has no effect on working capital is rejected, confirming that leverage significantly influences liquidity management in Nigerian manufacturing firms.

Effect of Equity-to-Total Assets Ratio on Working Capital: The equity-to-total assets ratio (EAR) exhibits a positive and significant relationship with working capital, with a coefficient of 0.3125 and a p-value of 0.001. This indicates that firms with a higher proportion of equity in their total assets maintain higher levels of working capital, enhancing their capacity to meet short-term obligations. The result corroborates findings by Olawale, et. al. (2025) and Olulu-Briggs and Orowhuo (2024), which emphasize that equity financing strengthens liquidity and operational efficiency. In the Nigerian manufacturing sector, where access to affordable debt is constrained by high interest rates and underdeveloped financial markets, equity financing provides a buffer against liquidity shocks, enabling firms to sustain operational performance (Abor & Biekpe, 2006; Dada & Ghazali, 2019). Consequently, the null hypothesis that equity-to-total assets ratio has no effect on working capital is rejected, confirming its significant positive role in supporting liquidity management.

Effect of Debt-to-Equity Ratio on Working Capital: The debt-to-equity ratio (LER) has a coefficient of −0.0923 with a p-value of 0.124. Although the negative coefficient suggests a potential inverse relationship with working capital, the effect is not statistically significant at the 5% level. This indicates that variations in the proportion of total debt relative to equity do not independently influence working capital levels in Nigerian manufacturing firms. This observation may be attributed to the strategic use of internal funds or retained earnings to manage liquidity, which mitigates the impact of debt-equity composition on short-term financial resources (Myers & Majluf, 1984; Olawale, et. al., 2025). Accordingly, the null hypothesis that debt-to-equity ratio has no effect on working capital cannot be rejected.

Furthermore, the model diagnostics indicate a robust fit. The R-squared value of 0.682 suggests that approximately 68.2% of the variation in working capital is explained by the independent variables, while the adjusted R-squared of 0.661 accounts for the number of predictors, confirming that the model reliably captures the effect of capital structure on working capital. The F-statistic of 34.57 ($p < 0.001$) shows that the independent variables collectively explain a meaningful proportion of the variance in working capital. The Durbin-Watson statistic of 1.942 indicates no serious problem of autocorrelation in the residuals, satisfying OLS assumptions regarding the independence of errors.

The findings underscore the importance of maintaining an optimal capital structure to support

working capital management. In Nigeria, high borrowing costs, macroeconomic instability, and limited access to long-term financing make equity financing a critical mechanism for sustaining liquidity. Firms relying excessively on debt may face reduced operational flexibility, while those with strong equity bases can better manage short-term obligations and enhance operational efficiency. The study highlights the need for policymakers to support financial instruments that reduce borrowing constraints and for managers to adopt financing strategies that balance debt and equity in a manner that strengthens working capital (Akintoye, 2018; Dada & Ghazali, 2019).

Conclusion and Recommendations

The study investigated the effect of capital structure on working capital management among listed manufacturing firms in Nigeria. The findings revealed that leverage (total debt to total assets) negatively and significantly affects working capital, indicating that high reliance on debt can constrain liquidity and operational flexibility. Conversely, the equity-to-total assets ratio exerts a positive and significant influence, highlighting that equity financing enhances liquidity and supports efficient short-term operations. The debt-to-equity ratio, however, was found to have an insignificant effect on working capital, suggesting that the proportion of total debt relative to equity does not independently determine liquidity levels in Nigerian manufacturing firms. In conclusion, the results emphasized the critical role of financing decisions in shaping working capital management, particularly within the Nigerian economic environment, which is characterized by high borrowing costs, limited access to long-term credit, and macroeconomic volatility. These findings provide empirical evidence that optimizing the mix of debt and equity is essential for sustaining operational efficiency and financial stability in the manufacturing sector.

Based on the findings, the study recommended that:

i. On leverage, Nigerian manufacturing firms should strategically manage their debt levels to avoid excessive leverage, which can constrain liquidity and operational efficiency. Firms are advised to moderate short-term borrowings and prioritize timely debt servicing to ensure that adequate working capital is available for day-to-day operations, thereby supporting financial stability and sustainable performance.
ii. With respect to equity-to-total assets ratio, manufacturing firms in Nigeria should consider increasing the proportion of equity in their total assets to strengthen their liquidity position. A higher equity base can provide greater flexibility in meeting short-term obligations and facilitate effective working capital management. Management should focus on retaining earnings and equity financing strategies to enhance operational efficiency and reduce reliance on debt.
iii. Debt-to-equity ratio is not left out. Although the study found that the debt-to-equity ratio does not have a statistically significant effect on working capital, firms should still monitor their debt-equity mix to maintain an optimal balance between financial risk and liquidity.

Appropriate structuring of long-term and short-term debt relative to equity can prevent potential financial strain and support stable working capital management, particularly in the volatile Nigerian economic environment.

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