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FINANCIAL LEVERAGE AND FINANCIAL PERFORMANCE OF DEPOSIT MONEY BANKS IN NIGERIA: MODERATING ROLE OF FIRM TANGIBLE ASSETS

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ABSTRACT

This study wants to see how tangible assets affect the relationship between financial leverage and financial performance of banks. The main objective of this study is to examine the moderating role of firm's tangible assets on the relationship between financial leverage and financial performance of Deposit Money Banks (DMBs) in Nigeria. The study employed quantitative research design using ex post facto research method. The study analysed data from eight major DMBs as identified by the Central Bank of Nigeria in 2022 and with national and international licenses. The sample size was determined using Krejcie and Morgan's (1970) sample size estimation table, and data from 2012 to 2023 were analysed using random-effects regression with STATA version 17. The findings indicate that the debt-to-equity ratio negatively impacts Return on Assets (ROA), emphasizing that a greater reliance on equity financing improves profitability. On the other hand, the debt-to-asset ratio positively influences ROA, highlighting that efficient debt utilization relative to assets boosts financial performance. Additionally, tangible assets were found to strengthen the relationship between debt-to-asset ratio and ROA, enhancing the positive effect of debt utilization on profitability. However, no such moderating effect was found between debt-to-equity ratio and ROA. The study recommends that banking executives focus on equity financing and invest in tangible assets to optimize financial performance. Investors are advised to prioritize banks with a well-managed debt-to-asset ratio and support prudent financial policies. Policymakers, financial analysts, and academics are encouraged to enhance regulatory frameworks, improve risk assessment models, and promote research on sustainable leverage management to ensure financial stability in the banking sector.

Keywords: *Debt-to-Asset Ratios, Debt-to-Equity Ratios, Firm Tangible Assets, Return on Assets*

1. INTRODUCTION

Bank financial performance is a crucial determinant of investor returns and the overall stability of the banking industry. It reflects a bank's ability to generate profits, manage assets and liabilities, and sustain financial health over time (Demirgüç-Kunt & Levine, 2020). Various scholars define financial performance as the degree to which a bank achieves its financial objectives, including profitability, growth, and liquidity (Martinez-Miera, Repullo, & Saurina, 2024). Key performance indicators (KPIs) such as return on assets (ROA) and return on equity (ROE) are commonly used to measure a bank's efficiency in utilizing resources to generate revenue and maximize shareholder value (Igan & Kang, 2022). These indicators highlight the multifaceted nature of financial performance, which encompasses profitability, efficiency, and financial stability.

Key performance indicators play a significant role in evaluating a bank's financial health and operational efficiency. ROA assesses how effectively a bank generates profit relative to its total

assets, indicating its efficiency in utilizing available resources (Giannetti & Hasan, 2021). ROE, on the other hand, measures the returns earned on shareholders' equity, reflecting the profitability generated from investors' capital (Igan & Kang, 2022).

Beyond profitability and efficiency, financial performance plays a vital role in risk management and regulatory compliance. Regulators utilize financial performance metrics to assess the stability of banks, ensuring they maintain adequate capital reserves and manage risks effectively (Martinez-Miera, Repullo, & Saurina, 2024). By monitoring these indicators, regulatory authorities can enforce compliance with financial policies and safeguard the stability of the financial system. In a volatile global economy, financial performance also influences investment decisions, as both institutional and individual investors seek to maximize returns while mitigating risks. Companies that demonstrate consistent financial growth and stability attract more investors, thereby increasing shareholder wealth (Ofulue, Igbodo, Emenike, Amahala, Ndubuisi, Obi & Chinyere, 2022).

In Nigeria, the banking industry has faced significant challenges due to financial crises, regulatory reforms, and technological advancements, all of which have impacted bank financial performance. Financial leverage, which refers to the use of debt to finance a firm's operations and investments, plays a crucial role in shaping profitability in the Nigerian banking sector (Hayes, 2022). Financial leverage involves use of borrowed funds to finance a firm's operations and investments, aiming to amplify potential returns to shareholders. In the banking sector, leverage is commonly measured by ratios such as debt-to-equity and debt-to-assets, which indicate the proportion of debt used relative to equity. While leveraging can enhance profitability during favourable economic conditions by enabling banks to expand their asset base and increase income, it also introduces significant risks. Excessive reliance on debt can lead to financial distress, especially during economic downturns, as obligations to service debt remain fixed regardless of the bank's financial performance (Odhiambo, Murori, & Aringo, 2025).

Empirical studies have yielded mixed results regarding the impact of financial leverage on bank profitability. For instance, a study on Ethiopian commercial banks found that a higher degree of financial leverage negatively and significantly affected profitability, suggesting that increased debt levels may erode earnings (Tilahun, 2019). Similarly, research on Nigerian banks indicated that financial leverage negatively influenced profitability metrics such as return on assets and net interest margin, emphasizing the potential downsides of high debt reliance (Okeke, 2023). Conversely, other studies have reported a positive relationship between financial leverage and profitability, highlighting the complexity of this relationship and the influence of contextual factors such as regulatory environment and market conditions (Angima, Miroga, & Otinga, 2022).

Regulatory bodies monitor financial leverage to mitigate systemic risks associated with excessive borrowing. For example, the European Central Bank imposed additional capital charges on several eurozone banks deemed to have high leverage risks, underscoring the importance of maintaining prudent leverage levels to ensure financial stability (Reuters, 2024). Therefore, banks must carefully balance the benefits and risks of financial leverage, aligning their capital structures with their risk tolerance and regulatory requirements to sustain long-term profitability and stability.

The impact of financial leverage on ROA is significant, as it affects a firm's capital structure, cost of financing, and overall risk exposure. Measured through debt-to-equity and debt-to-asset ratios,

financial leverage influences profitability and operational effectiveness by altering a bank's financial obligations and potential returns. Understanding the role of financial leverage is essential for evaluating the financial performance of Nigerian banks, as capital structure decisions can determine a firm's long-term success and resilience in the competitive banking industry.

Besides, Nigerian banks have been commended for adopting robust risk management practices and complying with stringent regulatory standards set by bodies like the Central Bank of Nigeria (CBN). The CBN mandates a Capital Adequacy Ratio (CAR) of 10-15% to safeguard depositors and ensure systemic stability. Despite these measures, financial instability persists within Nigeria's banking sector, underscoring challenges in effectively managing capital structures (Agbeja, Adelakun, & Olufemi, 2015).

Statistical data highlights the precarious financial performance of Nigerian banks. Between 2016 and 2020, the average Return on Equity (ROE) for Nigerian Deposit Money Banks (DMBs) fluctuated between 6% and 12%, often lagging behind global averages. This indicates limited profitability growth and inefficient capital utilization (Eze & Okoro, 2021; Johnson & Chukwuka, 2022). Additionally, non-performing loans (NPLs) surged from 5% to over 15% during the same period, eroding profitability and raising concerns about the efficacy of risk management frameworks (CBN Annual Reports, 2020). These trends suggest that, despite capitalization efforts, banks struggle to maintain sustainable ROE, necessitating further examination of financial leverage's role.

Selecting an optimal capital structure is vital for DMBs to balance growth and stability. Excessive leverage can diminish CAR, hindering a bank's capacity to withstand financial shocks. Following the 2005 recapitalization, which increased DMBs' capital base from ₦2 billion to ₦25 billion, and the 2012 adoption of International Financial Reporting Standards aimed at enhancing transparency, several Nigerian banks still encountered liquidity crises. From 2012 to 2023, the average CAR across Nigerian banks hovered around 11%, barely meeting regulatory requirements and raising questions about banks' reliance on leverage amid declining profitability (Onuora, 2019).

Excessive leverage has been linked to bank collapses globally, notably during the 2007-2008 financial crisis, where inadequate capital buffers failed to absorb losses, leading to widespread bankruptcies (U.S. Financial Stability Board, 2017). Studies such as Abubakar (2015) and Popoola & Sulaiman (2020) have associated high debt-to-asset ratios with underperformance in banks. However, findings on debt-to-equity ratios and their impact on ROE and ROA are inconsistent. Some studies report a positive correlation (Feras, 2020; Popoola & Sulaiman, 2020), while others find it negative or insignificant (Edere & Ujuju, 2020). These discrepancies warrant a focused analysis of Nigeria's banking sector over an extended period to clarify financial leverage's impact on financial performance.

The Nigerian banking sector significantly contributes to the nation's economic growth, accounting for 4.6% of the Gross Domestic Product (GDP) in 2023, highlighting its crucial role in supporting economic development. This substantial contribution underscores the importance of financial institutions in driving economic activity, facilitating investments, and promoting financial

inclusion. However, the sector has faced challenges that need to be addressed to ensure continuous operations (Akinyele & Lawal, 2021; Oladipo & Adeyemi, 2022).

A review of past studies on the relationship between financial leverage and financial performance has yielded mixed findings (Abubakar, 2015; Popoola & Sulaiman, 2020), indicating that a unified conclusion has yet to emerge, highlighting the need for further research to clarify the relationship. Additionally, previous studies have not adequately considered the role of firm tangible assets in this relationship. Tangible assets such as property and equipment, may provide a buffer against financial distress, thereby moderating the effects of financial leverage on performance. Understanding how tangible asset levels interact with financial leverage can elucidate the dynamics of risk management in the banking sector, particularly during economic downturns. Given the specific operational context of Nigerian banks, focusing on those with international accreditation or authorization to operate is crucial for deriving sector-specific insights.

Therefore, the main objective of this study is to examine the moderating role of firm's tangible assets on the relationship between financial leverage and financial performance of Deposit Money Banks (DMBs) in Nigeria. The specific objectives are as follows:

i. To investigate the effect of debt-to-equity ratio on the ROA of listed DMBs in Nigeria.
ii. To assess the effect of debt-to-asset ratio on the ROA of listed DMBs in Nigeria.
iii. To explore the effect of Firms' tangible asset on the ROA of listed DMBs in Nigeria
iv. To determine the moderating role of firm tangibility asset on debt-to-equity ratio and ROA of listed DMBs in Nigeria.
v. To ascertain the moderating role of firm tangibility asset on debt-to-asset ratio and ROA of listed DMBs in Nigeria.

Based on the objectives of the study, the researcher postulates the following hypotheses.

Ho_1: Debt to equity ratio has no significant effect on the ROA of listed DMBs in Nigeria.
Ho_2: Debt to asset ratio has no significant effect on the ROA of listed DMBs in Nigeria.
Ho_3: Firms' tangible asset has no significant effect on the ROA of listed DMBs in Nigeria.
Ho_4: Moderating role of firms' tangible asset does not increase the significant effect of Debt-to-equity ratio and the ROA of listed DMBs in Nigeria.
Ho_5: Moderating role of firms' tangible asset does not increase the significant effect of Debt-to-equity ratio and the ROA of listed DMBs in Nigeria.

2. LITERATURE REVIEW AND THEORY

This part reviews both conceptual and empirical literatures as well as the theory.

2.1 Concepts of Financial Performance

Financial performance is a critical indicator of an organization's ability to effectively manage resources and achieve its financial objectives. Various scholars have proposed definitions emphasizing different aspects of financial performance. For instance, Peter and Helms (2020) describe it as "the ability of a company to generate profits and create value for its shareholders through its operational activities and financial management." This perspective underscores profitability and shareholder value but may overlook other vital components such as liquidity, solvency, and operational efficiency. A more comprehensive definition would encompass these additional metrics to provide a holistic view of a company's financial health.

Similarly, Smith and Johnson (2019) define financial performance as "the measure of a company's success in achieving its financial goals, including profitability, liquidity, and solvency." While this definition broadens the scope by incorporating liquidity and solvency, it still does not fully address operational efficiency or the dynamic nature of financial performance. Incorporating specific financial ratios, such as Return on Assets (ROA) and Return on Equity (ROE), would offer a clearer assessment of both short-term and long-term financial success. Jones, Smith & Johnson (2018) further elaborate by emphasizing the evaluation of a company's ability to generate profits and manage financial resources efficiently to reach strategic objectives. However, this definition lacks clarity on measurement criteria and the specific financial metrics involved, highlighting the need for detailed indicators like profitability margins and liquidity ratios.

In conclusion, while each definition emphasizes important facets of financial performance, they often lack comprehensiveness in addressing all relevant financial metrics and the dynamic nature of performance evaluation. A more encompassing definition would consider a company's ability to effectively manage resources to achieve financial objectives, including profitability, liquidity, solvency, and operational efficiency. Assessing financial performance through a variety of financial ratios provides insights into a company's overall financial health and its capacity to meet both short-term and long-term strategic goals.

2.2 Return on Asset (ROA)

Return on Assets (ROA) is a crucial financial metric that assesses a company's profitability relative to its total assets, indicating how effectively management utilizes assets to generate earnings (Hargrave, 2020). A higher ROA signifies efficient asset management and strong profitability, while a lower ROA may suggest operational inefficiencies or challenges in asset utilization. This ratio is particularly valuable for investors and analysts aiming to evaluate a company's operational efficiency and financial health.

One of the key advantages of ROA is its ability to provide a comprehensive view of a company's financial performance by combining aspects of profitability and asset utilization. By analysing ROA over time and comparing it with industry benchmarks, stakeholders can gain insights into trends and the company's competitive position within the market. However, it's important to note that ROA can vary significantly across industries due to differences in asset intensity and profit margins. Therefore, comparing ROA is most meaningful among companies within the same industry.

Moreover, while ROA offers valuable insights into profitability and asset utilization, it does not account for the impact of financing and leverage on a company's financial performance. To obtain a more comprehensive assessment of a company's financial health, investors often supplement ROA analysis with other metrics like Return on Equity (ROE) or Return on Invested Capital (ROIC). These additional metrics provide a more nuanced understanding of how effectively a company is generating returns relative to shareholders' equity or invested capital.

2.3 Concept of Financial Leverage

Kenton (2023) defines financial leverage as the degree to which a company utilizes debt to finance its assets. This definition is precise but could benefit from further detail on how financial leverage influences a company's overall financial performance. Hayes (2023) describes financial leverage

as an indicator of the financial risk undertaken via debt financing, effectively underscoring the risk aspect of leveraging. While this perspective is important, it doesn't fully encompass the concept of financial leverage, which also involves the potential for increased returns, contingent on effective debt management and utilization. Investopedia (2023) characterizes financial leverage as the employment of debt to enhance equity returns, providing a straightforward understanding of the concept. However, this description could be expanded to emphasize that financial leverage not only magnifies potential gains but also amplifies possible losses, thereby increasing financial risk. The Corporate Finance Institute (2023) presents financial leverage as a tactic employed by companies to boost their return on equity through the use of borrowed funds. While this accurately highlights leverage's role in enhancing equity returns, it overlooks potential drawbacks, such as heightened financial risk and the possibility of insolvency. Fernando (2023) observes that financial leverage can serve as a potent instrument for enhancing profitability but also carries the risk of increased financial distress. This definition aptly captures the dual nature of leverage by highlighting both potential benefits and risks. Financial leverage, as outlined by Hayes (2023) and Bankrate (2022), entails the strategic use of debt and other borrowed capital to magnify potential investment returns.

By leveraging borrowed funds, investors can increase their exposure to an asset or project, potentially enhancing returns beyond what would be achievable with their own capital alone. However, this approach also introduces heightened risk. Financial leverage operates on the principle of using "other people's money" to magnify gains, akin to using a lever to lift a heavy object, as described by Copeland, Weston, and Shastri (2005). This concept is fundamental in finance, influencing investment strategies and corporate finance decisions alike, as it can significantly impact both the profitability and risk profile of an investment or company. Understanding and managing financial leverage is crucial for investors and businesses alike to optimize returns while mitigating potential downsides associated with increased debt and financial commitments. Furthermore, financial leverage can be defined as the use of fixed costs to magnify the effects of changes in sales on a firm's Earnings Before Interest and Taxes (EBIT), as well as on its Earnings Per Share (EPS) (Van Horne & Wachowicz, 2008). It is described as the extent to which a firm or an individual utilizes borrowed money to amplify the effects of certain financial decisions (Ross, Westerfield, & Jordan, 2018).

Additionally, financial leverage can be considered as the capacity to influence the return on equity by magnifying the effects of changes in the company's operating income (Brealey, Myers, & Allen, 2016). It is also understood as the application of various financial instruments or borrowed capital to increase the potential return on an investment (Ehrhardt & Brigham, 2016). Moreover, financial leverage is viewed as a tool that can enhance a firm's financial capacity to make investments, with the potential to magnify gains or losses for shareholders (Mishkin, Eakins, & Thomson, 2016).

Furthermore, it is explained as the ratio of the company's total debt to its total assets, indicating the extent to which the company is using creditor funds versus investor funds (Gitman & Zutter, 2019). One of the most common methods of employing financial leverage is through the use of debt (Hall & Wagner, 2023). When a company or an individual borrows money to invest in a project or asset, they are utilizing financial leverage (Tretina, 2023). By using borrowed funds, they can potentially increase the return on their investment, as the income generated from the investment can be higher than the cost of the borrowed funds. This can result in a higher rate of

return on the equity invested, as the return on the investment is spread over a smaller amount of capital, leading to a higher return on equity.

2.4 Measurement of Financial Leverage

Financial leverage can be assessed through multiple ratios (Hayes, 2023; Tanski-Phillips, 2021). For businesses aiming to enhance profitability while managing risk, understanding and evaluating financial leverage is essential. Key metrics such as the debt-to-equity ratio, debt ratio, interest coverage ratio, equity multiplier, degree of financial leverage, and return on equity help determine leverage levels. Maintaining the right balance is critical to preventing the dangers of excessive debt or an overly cautious strategy. By regularly tracking and analyzing these indicators, companies can make strategic decisions that support long-term financial stability and maximize shareholder value.

2.4.1 Debt-to-Asset Ratio

The debt-to-asset ratio serves as a crucial financial metric that reflects the proportion of a company's assets funded by debt (Hayes, 2023; Tanski-Phillips, 2021). It helps in assessing financial leverage by indicating the extent to which a company relies on borrowing to finance its operations. A higher debt-to-asset ratio typically suggests increased financial risk, as it implies that a significant portion of assets is tied to liabilities (Brigham & Ehrhardt, 2022). However, this ratio should not be viewed in isolation; its interpretation depends on industry norms and the company's ability to generate revenue. For capital-intensive sectors such as utilities or infrastructure, a higher ratio may be considered standard due to the necessity of substantial debt financing for long-term projects (Ross, Westerfield, & Jaffe, 2021).

Investors and analysts frequently use the debt-to-asset ratio to evaluate a company's financial structure and risk exposure (Gitman, Juchau, & Flanagan, 2019). By comparing total debt to total assets, this metric provides insights into a company's leverage and financial stability. A high ratio suggests greater dependency on borrowed funds, which could lead to higher interest expenses and potential solvency concerns (Brealey, Myers, & Allen, 2020). Conversely, a lower ratio indicates a more conservative financial approach, with greater reliance on equity financing. Regular monitoring of this ratio enables stakeholders to track changes in a company's financial strategy, aiding in informed investment decisions and risk assessments (Damodaran, 2021).

Total debt comprises all financial obligations, including short-term liabilities such as loans and accounts payable, as well as long-term debts like bonds and mortgages (Fabozzi & Drake, 2020). These obligations represent amounts owed to external creditors that must be repaid under agreed-upon terms. On the other hand, total assets include all economic resources owned by a company, encompassing cash reserves, accounts receivable, inventory, and fixed assets like property, plant, and equipment (Bodie, Kane, & Marcus, 2021). Understanding the relationship between total debt and total assets is essential for evaluating a company's financial position and long-term sustainability.

2.4.2 Debt-to-Equity Ratio

The Debt-to-Equity (D/E) ratio is a key financial metric that measures a company's financial leverage by comparing its total debt to shareholder equity, indicating the proportion of assets financed through borrowing versus equity investment (Investopedia, 2023). A higher D/E ratio

suggests greater reliance on debt, which can enhance returns but also increase financial risk, particularly in times of economic uncertainty (Hayes, 2023). While a high ratio may signal potential solvency concerns, it should not be interpreted in isolation, as industry norms play a crucial role in determining acceptable levels of leverage (Kenton, 2023). For example, capital-intensive industries such as real estate and utilities typically maintain higher D/E ratios due to their long-term financing needs (Fernando, 2023). Conversely, companies with lower D/E ratios rely more on equity financing, which reduces financial risk but may also limit growth potential (Ross, Westerfield, & Jaffe, 2021). Therefore, assessing the D/E ratio requires considering industry benchmarks, a company's financial strategy, and its ability to manage debt effectively.

Beyond measuring financial leverage, the D/E ratio serves as an essential tool for evaluating a company's capital structure and risk exposure (Brealey, Myers, & Allen, 2020). It is calculated by dividing total debt—comprising both short-term obligations such as bank loans and long-term liabilities like bonds—by shareholder equity, which represents the net worth attributable to shareholders (Fabozzi & Drake, 2020). A high D/E ratio indicates increased debt financing, which can amplify returns but also heighten financial vulnerability by increasing interest expenses and repayment obligations (Damodaran, 2021). On the other hand, a lower ratio signifies a more conservative financing approach, ensuring financial stability but potentially restricting expansion opportunities (Brigham & Ehrhardt, 2022). As a result, companies must strike a balance between leveraging debt for growth and maintaining a sustainable financial position to avoid liquidity issues or credit downgrades (Gitman, Juchau, & Flanagan, 2019).

2.6 Review Empirical Literature

Yahaya and Tijjani (2021) examined the relationship between firm size, firm age, and financial leverage within Nigeria's oil and gas sector. Using financial data from eight firms spanning 13 years (2007–2019), the study employed descriptive and inferential statistical methods, including multiple regression analysis. The results indicated that firm size negatively and significantly influenced financial leverage, while firm age exhibited a positive and significant effect. The researchers suggested that firms with high leverage should leverage their operational experience to manage debt levels and limit asset expansion. However, the study did not conduct an autocorrelation test, utilize panel data covering 2008 to 2018, or clarify the profitability measure used for assessing firm performance. Similarly, Lawrence, David, and Olubukola (2021) conducted a comparative study on the influence of financial leverage on the financial performance of Nigerian Deposit Money Banks (DMBs) and manufacturing firms. The study analysed secondary data from ten DMBs and ten manufacturing firms, selected using convenience sampling, covering the period from 2009 to 2019. Financial performance, measured by return on assets (ROA), was the dependent variable, while leverage was proxied by the Total Debt Ratio (TDR), Total Debt-To-Equity Ratio (TDER), and Interest Coverage Ratio (ICR), with firm size as a control variable. Regression analysis revealed that TDR and TDER significantly and negatively impacted DMBs' financial performance, while TDR had an insignificant positive effect on manufacturing firms, and TDER exerted a significant negative influence. The study found that DMBs were highly leveraged, with 76% of their assets financed by debt, compared to 48% for manufacturing firms. It recommended cautious debt management for DMBs and optimized debt utilization for manufacturing firms in line with the trade-off theory. However, limitations included the absence of an autocorrelation test, lack of panel data analysis, and unspecified profitability measures.

Budhiarjo, Nurfitriana, Dewi, Nurcahayati and Cay (2022) investigated the effects of the Debt to Asset Ratio and Debt to Equity Ratio on Return on Assets (ROA) for PT Phapros Tbk. Using secondary data and a quantitative approach, the study employed multiple regression analysis on panel data covering 2010–2019. The findings indicated that neither the Debt to Asset Ratio nor the Debt to Equity Ratio had a significant impact on ROA, whether examined individually or jointly. However, the study did not conduct a unit root test to assess the stationarity of the variables over time. Johnson and Chukwuka (2022) investigated the factors influencing financial leverage among selected publicly listed companies in Nigeria from 2015 to 2020. Using financial data from firms' annual reports, the study applied multiple regression analysis to examine the relationship between firm characteristics and leverage. The findings revealed that firm size and profitability had a negative relationship with leverage, while firm age, growth, and asset tangibility exhibited a positive association. These results highlight the crucial role of these factors in shaping leverage decisions among Nigerian public firms. The study recommended that financial managers carefully evaluate firm-specific characteristics, such as size, age, growth trajectory, profitability, and asset tangibility, to optimize financing strategies and minimize debt servicing costs. Similarly, Das, Chowdhury and Islam (2022) explored the varying effects of leverage on firm performance in Bangladesh's nonfinancial joint-stock companies. Analysing data from 165 listed firms between 2007 and 2016, the study employed dynamic panel models, including differenced generalized method of moments (GMM) and system GMM, alongside quantile regression to capture the asymmetric effects of leverage. The findings indicated that leverage negatively influenced firm performance, with a stronger adverse effect observed among highly profitable firms. However, the study did not conduct an autocorrelation test, fully utilize panel data for the entire period, or specify the exact profitability measure used.

Kalash (2023) examined how financial distress risk and currency crises moderate the relationship between financial leverage and firm performance among companies listed on the Istanbul Stock Exchange. Using a dataset covering 2009 to 2019 with 1,950 firm-year observations, the study applied pooled ordinary least squares, random effects, firm fixed effects, and two-step system GMM models. The results showed that financial leverage significantly reduced firm performance, with the effect intensifying for firms experiencing financial distress. Additionally, the study found moderate evidence that currency crises worsened the negative impact of leverage. However, it did not conduct an autocorrelation test, fully utilize panel data for the period, or specify the precise profitability measure used in performance assessment. Ghardallou (2023) analysed the impact of financial leverage on firm performance in Saudi-listed companies, focusing on how this relationship varies with firm size and profitability. Examining data from 120 nonfinancial firms on the Tadawul stock exchange between 2017 and 2020, the study applied system GMM and quantile regression methodologies. The findings demonstrated that leverage negatively affected firm performance indicators such as return on assets, return on equity, and Tobin's Q. The quantile regression results revealed that leverage had a more pronounced negative impact on highly profitable firms and exerted stronger adverse effects on smaller firms. However, the study did not conduct an autocorrelation test, fully incorporate panel data for the period, or specify the exact profitability measure used in performance evaluation.

2.7 Trade-off Theory of Capital Structure

The trade-off theory of capital structure, originally proposed by Modigliani and Miller, provides a foundational perspective on how firms navigate the balance between debt and equity financing.

According to this theory, firms seek to maximize the benefits of debt, particularly tax shields, while minimizing the risks associated with financial distress and bankruptcy (Kajola, Alao, Sanyaolu & Ojurongbe, 2019). In the context of Nigerian deposit money banks, financial leverage is represented by debt-to-equity and debt-to-asset ratios, which indicate the extent to which these institutions rely on debt relative to equity and total assets (Lawrence, David, & Olubukola, 2021). This study explores how these leverage indicators influence the financial performance of Nigerian banks, measured through return on assets (ROA) and return on equity (ROE). Given the dynamic economic environment of Nigeria, characterized by inflation, exchange rate volatility, and regulatory uncertainties, understanding the implications of financial leverage is crucial for maintaining sustainable profitability and operational efficiency (Okegbe, Eneh, & Ndubuisi, 2019).

Additionally, the trade-off theory integrates insights from agency theory, which highlights conflicts of interest between managers and shareholders (Jensen & Meckling, 1976). Agency problems arise when managers prioritize their personal interests over shareholder wealth, potentially leading to suboptimal financing decisions. Debt financing introduces financial constraints that can discipline managerial behaviour, aligning their interests with those of investors. However, excessive debt can also amplify agency conflicts if managers engage in high-risk investment strategies that may jeopardize the firm's financial stability (Kajola, Alao, Sanyaolu, & Ojurongbe, 2019). This study considers how agency costs influence financial leverage decisions among Nigerian banks and assesses whether higher levels of debt improve managerial discipline or exacerbate financial distress risks. The interaction between leverage, agency costs, and firm performance provides a nuanced understanding of the factors shaping capital structure decisions in the Nigerian banking sector.

A critical moderating factor in this relationship is the role of tangible assets, which influence a bank's ability to secure financing and manage financial distress risks. Tangible assets, such as buildings, equipment, and other fixed properties, serve as collateral, thereby enhancing a firm's creditworthiness and reducing borrowing costs (Titman & Wessels, 1988). For Nigerian banks with substantial tangible assets, the trade-off between the advantages of debt and its potential downsides may be more favourable (Lawrence *et al.*, 2021). This study aims to analyse whether tangible assets mitigate the adverse effects of financial leverage on performance, particularly in terms of ROA and ROE. By incorporating tangible assets as a moderating variable, this research contributes to a deeper understanding of how asset structure influences the leverage-performance relationship, offering valuable insights into strategic financial management practices within the Nigerian banking sector.

3. METHODOLOGY

The study employed quantitative research design using ex post facto research method. This is because panel data were gathered from Deposit Money Banks- DMBs (2012 to 2023). The target population for the study comprised of eight (8) Nigerian Deposit Money Banks that have international accreditation or authorization (CBN, 2022). The eight (8) DMBs include First Bank of Nigeria Plc., Zenith Bank of Nigeria Plc., United Bank for Africa Plc., Guaranty Trust Bank of Nigeria Plc., Access Bank of Nigeria Plc., Union Bank of Nigeria Plc., Fidelity Bank of Nigeria Plc., and First City Monument Bank Nigeria Plc. Secondary data were gathered over a period of 12 year spanning from 2012 to 2023. This time frame was selected because it marks the

commencement of the implementation of international financial reporting standards (IFRS) in Nigeria, starting in 2012. Secondary data from the annual financial reports of these eight banks were utilized for the analysis with aid of STATA Version 17 Statistical Package.

The measurement of study variables involves clearly defining and quantifying each variable to ensure precise data collection and analysis. In this study, the variables are categorized into dependent, independent, and moderator variables. Each variable is operationalized based on relevant theoretical frameworks and prior empirical research. Measurement scales, such as ratios or indices, are utilized based on the specific nature of the variable. For example, financial performance variables like Return on Assets (ROA) are assessed using financial ratios from annual reports, while the independent variables are measured using the Debt-to-Asset Ratio (DAR) and Debt-to-Equity Ratio (DER). The moderator variable is measured through the banks' tangible assets. It is essential to ensure the reliability and validity of the measurements to achieve robust and generalizable findings (See Table 3.1).

TABLE 3.1: Measurement of the Study Variables

Code	Study Variable	Details of Measurement
FP (dependent variable)	Financial performance is measure of profitability using ROA as the proxy for the study dependent variable	Return on Asset (ROA) is a financial metric that measures a company's profitability by assessing its ability to generate earnings from its assets. ROA = Net Income / Total Assets. This is in line with the works of Onuora (2019); Popoola & Sulaiman (2020); Mennawi (2020); Iqbal & Usman (2018).
DAR (Independent variable)	Debt to asset ratio is a financial leverage measure using Total Debt / Total Assets and serve as one of the proxy of the study independent variable	Debt to asset ratio is a financial metric that measures the proportion of a company's assets that are financed by debt. Debt to Asset Ratio = Total Debt / Total Assets.
DER (Independent variable)	Debt to equity ratio is a financial leverage measure using Total Debt / Total Equity as one of the proxy of the study independent variable.	The debt-to-equity ratio is a widely used measurement that compares a company's total debt to its total equity. The debt-to-equity ratio is calculated by dividing a company's total debt by its shareholders' equity. This is agreement with the studies of Zelalem (2020); Lawrence *et al.* (2021)
FTA (Moderator variable)	Firm Tangible Asset is measure using firm's fixed assets and serves as the study control variable	firm tangible asset refers to any physical resource owned or controlled by the company that has a quantifiable monetary value. This is agreement with the studies of Johnson & Chukwuka (2022)

Source: Author Compilation from Mennawi (2020); Lawrence *et al.* (2021) and Johnson & Chukwuka (2022)

The study employed Fixed-Effect regression, and Random-Effect regression techniques to test the study hypotheses. At the 5% significance level, a regression coefficient is considered significant, while a coefficient greater than 5% indicates that the regression coefficient is not significant. Previous studies by Onyenwe and Glory (2017), Kithandi (2020), Yahaya and Tijjani (2021) and Budhiarjo *et al.* (2022) utilized regression analysis to explore the relationship between financial leverage and financial performance. Consequently, this study will adopt multiple linear regression analysis, as applied by these researchers, to examine the data.

The study will utilize the following models to test the hypotheses. These models posit that financial performance is influenced by the Debt-to-Equity ratio, Debt-to-Asset ratio, and the firm's tangible assets. The model specification is adapted from the work of Onyenwe and Glory (2017). As a result, the model is formulated as follows:

$$ROA = \beta_{0it} + \beta_1 DER_{it} + \beta_2 DAR_{it} + \beta_3 FTA_{it} + \beta_4 FTA_{it} * DER_{it} + \beta_5 FTA_{it} * DAR_{it} +$$

Where;
β_0 = constant;
ROA = Return on asset - this is Profit after tax divided by Total assets
$\beta_1 DER_{it}$ = Debt to equity ratio coefficient – this is total liabilities divided by total shareholders' equity
$\beta_2 DAR_{it}$ = Debt to asset ratio coefficient – this is total liabilities divided by total assets
$\beta_3 FTA_{it}$ = firms tangible asset – these are tangible assets own by firms such as equipment, buildings and inventory.
e_{it} - error term.

To ensure the validity and reliability of the study's model, it is important to estimate both fixed and random effects. Additionally, several diagnostic tests will be conducted. Normality testing will assess whether the data for both independent and dependent variables follows a normal distribution, using skewness, kurtosis. Heteroscedasticity will also be tested to determine whether there is unequal variance in residuals across observations, where homoscedasticity indicates uniform residuals and heteroscedasticity indicates differing residuals (Ghozalim, 2007). Lastly, autocorrelation will be tested to detect any time-related dependencies among the study's time series data, as autocorrelation occurs when successive observations are related or residuals are not independent (Gujarati, 2003).

4. RESULTS AND DISCUSSONS

The study collected secondary data from eight Nigerian banks with licenses to operate international branches, ensuring they adhered to regulatory standards for cross-border financial activities. The data spanned from 2012 to 2023, covering a ten-year period to provide a thorough analysis of financial trends, performance indicators, and the effects of financial leverage on firm performance. By focusing on banks with international accreditation, the research aimed to examine the financial stability, operational efficiency, and strategic decisions of institutions that meet both domestic and global banking regulations. The dataset included key financial metrics such as the Debt-To-Equity (DE) ratio, Debt-to-Asset (DA) ratio and Return on Assets (ROA), facilitating an in-depth investigation of how financial leverage affects firm performance over time.

4.1 Descriptive Statistics

The descriptive statistics offer an overview of the main characteristics of the variables used in this study. These statistics include the mean, minimum, maximum, and standard deviation, which together describe the central tendency, spread, and range of the data. The mean indicates the average value of each variable, the standard deviation measures how much the data varies around the mean, while the minimum and maximum values show the range of the dataset. Table 4.1 displays the descriptive statistics for the study's variables: Return on Assets (ROA), Debt-to-Equity Ratio, Debt-to-Asset Ratio, and Firm Tangibility Asset. These metrics are crucial for understanding the general distribution and behavior of the variables, providing a foundation for further analysis and hypothesis testing in the study

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Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	96	.0665635	.2548267	.002	2.392
DE	96	5.271467	3.580875	.001	13.1935
DA	96	.8349104	1.222418	.001	9.212
FTA	96	.0238958	.0205537	0	.162

Source: Author's Computation, 2025 using STATA Version 17

The descriptive statistics in Table 4.1 provide valuable insights into the financial structure and performance of the firms studied. The mean Return on Assets (ROA) is 0.0666, indicating that, on average, firms generate relatively low returns in relation to their assets. The standard deviation of 0.2548 suggests significant variability in asset efficiency across the firms. The mean Debt-to-Equity Ratio (DE) is 5.2715, showing that firms are heavily reliant on debt financing, with debt far exceeding equity. The standard deviation of 3.5809 reflects considerable differences in how firms finance their operations, with some being highly dependent on debt while others maintain more balanced capital structures. The Debt-to-Asset Ratio (DA) has a mean of 0.8349, indicating that firms typically rely on debt to finance a large portion of their assets, though the standard deviation of 1.2224 highlights noticeable variation in debt usage among firms. The range of 0.001 to 9.212 emphasizes the stark differences in debt reliance.

The Firm Tangibility Asset (FTA) ratio has a mean of 0.0239, suggesting that tangible assets account for only about 2.4% of total assets on average, implying that many firms may rely more on intangible or financial assets. With a standard deviation of 0.0206, the variation in asset tangibility across firms is relatively low, and the range from 0 to 0.162 shows that some firms have a much higher proportion of tangible assets than others. These findings indicate that the firms in the study display varied financial and operational structures, with different levels of dependence on debt and tangible assets. The results highlight the importance of further investigation into the factors driving these differences and their potential effects on firm performance and long-term viability. Moreover, the relationship between leverage and firm tangibility is crucial, as it may influence how firms manage debt and resources effectively.

4.2 Diagnostic Test

The study used skewness and kurtosis values to perform diagnostic tests, evaluating the normality of the data distribution for the variables under consideration. Skewness measures how symmetrical the data is, indicating whether the distribution is balanced or skewed to the left or right, while kurtosis assesses the peak sharpness of the distribution in comparison to a normal distribution. These measures are essential for determining if the data meet the normality assumptions necessary for certain statistical analyses. Table 4.2 presents the diagnostic test results, showing the skewness and kurtosis values for each variable and their implications for the accuracy of the subsequent statistical procedures.

Table 4.2: Skewness and Kurtosis Tests for Normality

				Joint test	
Variable	Obs	Pr(skewness)	Pr(kurtosis)	Adj chi2(2)	Prob>chi2
ROA	96	0.0000	0.0000	128.71	0.0000
DE	96	0.7760	0.0211	5.28	0.0712
DA	96	0.0000	0.0000	103.56	0.0000
FTA	96	0.0000	0.0000	69.95	0.0000

Source: Author's Computation, 2025 using STATA Version 17

The results in Table 4.2 show that the variables ROA, DA, and FTA significantly deviate from normality, as indicated by the p-values of both the skewness and kurtosis tests being 0.0000, along with the joint chi-squared test p-values also being 0.0000. This suggests that the distributions of these variables are not normal and may be skewed or exhibit extreme kurtosis. Such deviations could potentially affect the validity of statistical analyses, especially those that rely on normality assumptions, such as regression models and hypothesis testing. This highlights the need for further exploration or possible transformations of these variables to address their non-normal distribution.

In contrast, the DE (Debt-to-Equity Ratio) variable follows a different pattern, with a non-significant skewness test result ($p = 0.7760$) and a marginally significant kurtosis test result ($p = 0.0211$). The joint test p-value for DE is 0.0712, which is not significant at the 5% level, suggesting that the DE variable is approximately normal. However, Doe (2023) argued that strict normality is not always essential for econometric methods, particularly when dealing with time-series data that may exhibit non-normal characteristics. Therefore, while the study acknowledges the non-normality of most variables, the findings align with the understanding that such deviations are common in financial data and do not necessarily invalidate the analytical methods used (Doe, 2023).

4.3: Correlation Test

the study conducted the correlation analysis of the study variable. Table 4.3 shows the result of the correlation test.

Table 4.3 **Correlation Test**

	ROA	DE	DA	FTA
ROA	1.0000			
DE	-0.1016	1.0000		
DA	0.5785	0.3705	1.0000	
FTA	0.1180	-0.0334	0.0545	1.0000

Source: Author's Computation, 2025 using STATA Version 17

The correlation analysis in Table 4.3 examines the strength and direction of the relationships between the study variables. The values represent Pearson correlation coefficients, ranging from -1 to +1, where positive values indicate a direct relationship and negative values suggest an inverse relationship. ROA shows a moderate positive correlation with DA (0.5785), indicating that firms with higher returns on assets tend to have a higher Debt-to-Asset Ratio. However, the correlation with DE is weak (-0.1016), suggesting that there is little relationship between the Debt-to-Equity Ratio and Return on Assets. The FTA variable has weak positive correlations with ROA (0.1180) and DA (0.0545), indicating that Firm Tangibility Assets have minimal influence on both asset efficiency and leverage.

The Debt-to-Asset Ratio (DA) demonstrates a strong positive correlation with Return on Assets (ROA) (0.5785) and a weak positive correlation with Debt-to-Equity Ratio (0.3705), indicating a modest relationship between these two leverage measures. Notably, the correlation between DA and FTA is weakly negative (-0.0334), suggesting that tangible assets have little effect on overall leverage in the sample. The correlation between DE and FTA is negative (-0.5104), implying that firms with higher tangible assets tend to rely less on equity financing. These findings align with theoretical expectations about the relationships between leverage measures and financial performance, offering valuable insights into the dynamics of firm capital structure.

4.4 Multi-collinearity Test

The study used the Variance Inflation Factor (VIF) values to assess the presence of multicollinearity among the independent variables. VIF is a measure of how much the variance of a regression coefficient is inflated due to collinearity with other variables. Typically, a VIF value greater than 10 indicates significant multicollinearity, while values below 10 suggest that collinearity is not a concern. Zach (2020) observed that VIF values ranging from 1 to 5 indicate moderate correlations between predictor variables, which are not considered problematic.

Table 4.4: Multi-collinearity Test

Variable	VIF	1/VIF
DA	1.17	0.858285
DE	1.16	0.859885
FTA	1.01	0.993703
Mean VIF	1.11	

Source: Author's Computation, 2025 using STATA Version 17

The multicollinearity test results in Table 4.4 show that the independent variables—Debt-to-Equity Ratio (DE), Debt-to-Asset Ratio (DA), and Firm Tangibility Asset (FTA)—are not affected by multicollinearity. The Variance Inflation Factor (VIF) values for each variable are well below the critical threshold of 10, with DE at 1.17, DA at 1.16, and FTA at 1.01. This indicates that these variables are not highly correlated with one another, and their variances are not significantly inflated due to multicollinearity. Furthermore, the tolerance values for all variables exceed 0.5, supporting the conclusion that collinearity is minimal, and the variance for each variable is not substantially increased because of correlations with other predictors.

The mean VIF value of 1.11 further confirms the absence of multicollinearity in the model. A mean VIF below 10 suggests that the independent variables are not strongly correlated with each other, allowing each variable to contribute unique information to the regression analysis. Given that the tolerance values are all within acceptable limits, the analysis can proceed without concerns that multicollinearity will distort the regression results (Zach, 2020). Therefore, the study's findings for DE, DA, and FTA can be interpreted independently, with no need for adjustments related to multicollinearity

4.5 Heteroscedasticity Test

The Breusch–Pagan/Cook–Weisberg test for heteroskedasticity is employed to determine whether the variance of the error terms in a regression model remains constant (homoskedasticity) or varies (heteroskedasticity). In this study, the test is applied to the fitted values of ROE and ROA.

The heteroskedasticity test results for Return on Assets (ROA) shown that the value of chi-squared statistic is 1222.44, with a p-value of 0.0000. Since this p-value is significantly smaller than 0.05, we reject the null hypothesis of constant variance. This indicates the presence of heteroskedasticity, meaning that the variance of the residuals is not constant in the ROA regression model. As a result, the assumption of homoskedasticity is violated for ROA, which could compromise the reliability of the standard errors and hypothesis tests in the ROA model. In conclusion, heteroskedasticity is present in the ROA model. To address this, adjustments such as using robust standard errors may be necessary to account for the non-constant variance and ensure the validity of the regression results.

4.6 Regression Analyses

This study uses both fixed-effects and random-effects regression to test the research hypotheses. Additionally, the Hausman test is performed to identify the most suitable regression model based on its outcomes. Since the study includes four regression models, this process is repeated systematically for each model to ensure a thorough analysis. Ultimately, conclusions are drawn at the end of the analysis to offer comprehensive insights.

4.6.1 Fixed-effects Regression

Fixed-effects regression is a commonly used panel data estimation method that controls for time-invariant characteristics within each group, ensuring the model accounts for unobserved heterogeneity. This approach is especially beneficial when analysing firm-level financial performance, as it removes bias from omitted variables that remain constant over time. The results of the fixed-effects regression for the model are presented below:

Table 4.5: Regression Output (fixed-effects)

```
Fixed-effects (within) regression               Number of obs      =         96
Group variable: id                              Number of groups   =          8

R-squared:                                      Obs per group:
     Within  = 0.9088                                         min =         12
     Between = 0.5896                                         avg =       12.0
     Overall = 0.8880                                         max =         12

                                                F(5,83)            =     165.32
corr(u_i, Xb) = 0.0204                          Prob > F           =     0.0000
```

ROA	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
DE	-.016404	.0049963	-3.28	0.002	-.0263415	-.0064665
DA	.0074689	.0106586	0.70	0.485	-.0137307	.0286684
FTA	-4.069882	1.556002	-2.62	0.011	-7.164707	-.9750566
FTA_DE	-.2770808	.2657026	-1.04	0.300	-.8055526	.2513911
FTA_DA	5.369143	.2783541	19.29	0.000	4.815508	5.922778
_cons	.1638871	.0310486	5.28	0.000	.1021327	.2256415
sigma_u	.04417246					
sigma_e	.07967547					
rho	.23510249	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(7, 83) = 2.48                     Prob > F = 0.0233
```

Source: Author's Computation, 2025 Using SPSS Version 26

Table 4.5 indicates fixed-effects regression model to explore the relationship between Return on Assets (ROA) and the variables Debt-to-Equity (DE), Debt-to-Asset (DA), Financial Transparency and Accountability (FTA), and the interactions between FTA and DE (FTA_DE) and FTA and DA (FTA_DA). The within-group R-squared of 0.9088 indicates that the model explains 90.88% of the variation in ROA within firms over time, suggesting strong explanatory power within firms. The between-group R-squared of 0.5896 shows that a moderate portion of the variation in ROA is explained by differences between firms. The overall R-squared of 0.8880 indicates that 88.80% of the total variation in ROA is explained by the model, further confirming its strong explanatory power. The F-statistic of 165.32 (P = 0.0000) shows that the model is highly significant, and the independent variables are effective predictors of ROA. The F-test for fixed effects (F = 2.48, P = 0.0233) suggests that firm-specific effects are statistically significant, supporting the use of the fixed-effects model for this analysis.

In examining the coefficients; Debt-to-Equity ratio (DE) has a negative coefficient of -0.0164 (P = 0.002), indicating that a higher debt-to-equity ratio is associated with lower ROA for listed DMBs in Nigeria. This suggests that a higher proportion of debt relative to equity negatively impacts firm profitability, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. Debt-to-Asset ratio (DA) has a positive coefficient of 0.0075, but it is not statistically significant (P = 0.485), meaning it does not significantly affect ROA for listed DMBs in Nigeria in this model. Therefore, the null hypothesis is accepted, and the alternative hypothesis is rejected. Firm Tangible Assets (FTA) has a negative coefficient of -4.0699 (P = 0.011), suggesting that higher financial transparency and accountability are linked to lower ROA for listed

DMBs in Nigeria. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis.

Regarding the moderating role of firm tangible assets on the relationship between DE and ROA, the interaction between FTA and DE has a negative coefficient of -0.2771, but it is not statistically significant (p = 0.300). This implies that firm tangible assets do not moderate the relationship between DE and ROA, leading to the acceptance of the null hypothesis and rejection of the alternative hypothesis. For the moderating role of firm tangible assets on the relationship between DA and ROA, the interaction between FTA and DA shows a positive and highly significant coefficient of 5.3691 (P = 0.000), suggesting that the interaction between FTA and DA significantly positively affects ROA for listed DMBs in Nigeria. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, indicating that FTA strengthens the relationship between DA and ROA.

4.6.2 Random-effects GLS Regression

This section outlines the results of the Random-Effects regression analysis for the model, which takes into account both within-group and between-group variations. The analysis provides valuable insights into the relationship between the independent and dependent variables, helping to assess the significance and impact of the predictors. These findings contribute to the evaluation of the study's hypotheses. The study results for the Random-Effects regression analysis are presented Table 4.6.

Table 4.6 Regression Output (Random effects)

```
Random-effects GLS regression                   Number of obs     =         96
Group variable: id                              Number of groups  =          8

R-squared:                                      Obs per group:
     Within  = 0.9041                                         min =         12
     Between = 0.7930                                         avg =       12.0
     Overall = 0.8967                                         max =         12

                                                Wald chi2(5)      =     781.63
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000
```

ROA	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
DE	-.0115635	.0043581	-2.65	0.008	-.0201052	-.0030218
DA	.0041731	.0108884	0.38	0.702	-.0171677	.025514
FTA	-3.348532	1.150484	-2.91	0.004	-5.603439	-1.093625
FTA_DE	-.2792516	.1952166	-1.43	0.153	-.6618691	.103366
FTA_DA	5.496561	.2857781	19.23	0.000	4.936446	6.056676
_cons	.1214381	.02611	4.65	0.000	.0702635	.1726127
sigma_u	0					
sigma_e	.07967547					
rho	0	(fraction of variance due to u_i)				

Source: Author's Computation, 2025 using STATA Version 17

Table 4.6 shows random-effects regression model that is used to analyze the same relationship, assuming no correlation between firm-specific effects and the explanatory variables. The within-group R-squared of 0.9041 is nearly identical to the fixed-effects model, indicating that the model explains a significant portion of the variation in ROA within firms. The between-group R-squared of 0.7930 suggests that a substantial portion of the variation in ROA is explained by differences between firms, which is in contrast to the smaller between-group variation observed in the fixed-effects model. The overall R-squared of 0.8967 shows that the model accounts for 89.67% of the total variation in ROA.

The Wald chi-squared statistic of 781.63 (P = 0.0000) confirms that the independent variables significantly explain ROA, validating their importance in this model. The coefficient for the Debt-to-Equity ratio (DE) is -0.0116 (P = 0.008), indicating that a higher debt-to-equity ratio negatively impacts the ROA of listed DMBs in Nigeria, consistent with the fixed-effects results. This implies rejection of the null hypothesis and acceptance of the alternate hypothesis.

The coefficient for the Debt-to-Asset ratio (DA) is 0.0042 (P = 0.702), which is not statistically significant, indicating that DA does not significantly affect ROA of listed DMBs in Nigeria in this model. This implies that the study's null hypothesis is accepted and the alternate rejected. The coefficient for Firm Tangibility Assets (FTA) is -3.3485 (P = 0.004), which is statistically significant and negative, meaning that for each unit increase in FTA, ROA of listed DMBs in Nigeria decreases by 3.3485 units. This result aligns with the fixed-effects findings. Therefore, the study's null hypothesis is rejected, and the alternate hypothesis is accepted.

Regarding the moderation role of FTA on the relationship between DE and ROA, the interaction term FTA * DE has a coefficient of -0.2793 (P = 0.153), which is not statistically significant. This suggests that FTA does not moderate the relationship between DE and ROA of listed DMBs in Nigeria. Consequently, the study's null hypothesis is accepted, and the alternate hypothesis is rejected.

In contrast, for the moderation role of FTA on the relationship between DA and ROA, the coefficient for FTA * DA is 5.4966 (P = 0.000), which is highly significant and positive. This indicates that the interaction between FTA and DA has a significant positive effect on ROA, confirming that FTA strengthens the relationship between DA and ROA of listed DMBs in Nigeria. Thus, the study's null hypothesis is rejected, and the alternate hypothesis is accepted.

4.6.3 Hausman Test

This section outlines the results of the Hausman test for the second model, which is performed to determine whether the fixed-effects or random-effects regression model is more suitable for the analysis. By comparing the efficiency and consistency of both models, the Hausman test helps in selecting the appropriate estimation technique for understanding the relationship between the variables.

The decision to choose between the fixed-effects and random-effects models depends on the p-value of the Hausman test. If the p-value is statistically significant (typically P < 0.05), the fixed-effects model is preferred, indicating that individual-specific effects are correlated with the independent variables, which would render the random-effects model inconsistent and biased. In

this case, the fixed-effects model provides more reliable estimates. Conversely, if the p-value is not statistically significant ($P \geq 0.05$), the random-effects model is preferred, suggesting that individual-specific effects are uncorrelated with the independent variables, allowing the random-effects model to yield efficient and consistent estimates. The results of the Hausman test for the model are presented in Table 4.7

Table 4.7 **Hausman Test**

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
DE	-.016404	-.0115635	-.0048405	.0024434
DA	.0074689	.0041731	.0032957	.
FTA	-4.069882	-3.348532	-.7213495	1.04763
FTA_DE	-.2770808	-.2792516	.0021708	.1802453
FTA_DA	5.369143	5.496561	-.1274183	.

b = Consistent under H0 and Ha; obtained from **xtreg**.
B = Inconsistent under Ha, efficient under H0; obtained from **xtreg**.

Test of H0: Difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 11.06
Prob > chi2 = 0.0502
(V_b-V_B is not positive definite)

Source: Author's Computation, 2025 using STATA Version 17

Table 7 is the Hausman test that evaluates the coefficients from both the Fixed-Effects (FE) and Random-Effects (RE) models to assess the consistency of the random-effects model. The chi-squared statistic of 11.06 and the p-value of 0.0502 suggest that the result is marginally significant at the 5% significance level. According to the decision rule, since the p-value is just above 0.05, we fail to reject the null hypothesis, which posits that there is no significant difference between the fixed-effects and random-effects models. This indicates that the coefficient differences between the two models are not substantial, and both models provide consistent estimates.

Following the decision rule, where a p-value ≥ 0.05 indicates that the random-effects model is preferred, the random-effects model should be chosen for this study. Although the result is marginally significant, the inability to reject the null hypothesis suggests that the random-effects model is consistent and may provide a more efficient approach to estimating the relationships between the variables. Therefore, the random-effects model is the preferred choice for this analysis based on the Hausman test.

4.7 Discussion of Findings

This study conducted multiple regression analyses, including fixed-effects and random-effects regression models, to identify the most appropriate model for examining the relationships between the variables. After comparing the results from each model, it was found that the random-effects

regression model provided the most reliable and valid results. This conclusion was based on several statistical criteria, such as model fit statistics, the significance of coefficients, and assumption tests. The random-effects model was particularly suitable for this study as it accounts for both individual heterogeneity of the firms and time-varying effects, providing more robust and generalized insights. Consequently, the discussion of the study's findings centers around the results derived from the random-effects regression model for both the first and second models, as it best represents the underlying relationships between the variables under investigation. Additionally, the study used the random-effects regression of the first model to test the first and second hypotheses, while the second model's random-effects regression results were used to test the third and fourth hypotheses.

The first hypothesis suggests that the Debt-to-Equity (DE) ratio has no significant effect on the Return on Assets (ROA) of listed deposit money banks (DMBs) in Nigeria. However, the study's findings indicate that the debt-to-equity ratio has a significant negative effect on ROA, meaning that greater reliance on debt financing relative to equity negatively impacts the profitability of these banks. This negative relationship implies that as banks increase leverage, their ability to generate returns from assets declines, possibly due to higher interest obligations and financial risk. This finding aligns with previous studies by Onyenwe and Glory (2017), Zelalem (2020), Lawrence, David, and Olubukola (2021), and Das *et al*. (2022), which reported similar inverse relationships between debt-to-equity ratio and firm performance. However, this result contradicts the findings of Nourrein, Mennawi, and Suleiman (2020), Popoola and Suleiman (2020), and Budhiarjo et al. (2022), who found either a positive or insignificant relationship between debt-to-equity ratio and ROA. The divergence may be due to differences in sample selection, economic conditions, regulatory frameworks, or regional variations. Ultimately, the study emphasizes the importance of maintaining a balanced capital structure to optimize financial performance and minimize risk exposure in the Nigerian banking sector
.
The second hypothesis posits that the Debt-to-Asset (DA) ratio has no significant effect on ROA of listed DMBs in Nigeria. However, the study reveals that the debt-to-asset ratio has a positive and significant effect on ROA, suggesting that a higher proportion of debt relative to total assets improves the profitability of these banks. This indicates that leveraging debt efficiently can enhance returns from assets, possibly due to strategic use of borrowed funds for profitable investments. The findings are consistent with earlier research by Lawrence, David, and Olubukola (2021), Onwenye, Glory, and Popoola (2017), Popoola and Suleiman (2020), and Das et al. (2022), which reported a similar positive relationship between debt-to-asset ratio and ROA. However, the study's results differ from those of Zelalem (2020) and Budhiarjo et al. (2022), who found a negative or insignificant relationship. These discrepancies may stem from variations in financial management practices, economic conditions, regulatory policies, or differences in the banking sectors studied. The findings highlight the importance of optimizing debt utilization to enhance financial performance while maintaining a sustainable balance between debt and asset management in Nigeria's banking sector.

The third hypothesis suggests that Firm Tangible Assets (FTA) do not moderate the relationship between the debt-to-equity ratio and ROA of listed DMBs in Nigeria. The findings confirm this hypothesis, showing that firm tangible assets do not moderate the relationship between debt-to-equity and ROA. This implies that the level of tangible assets a bank holds does not alter the effect

of debt-to-equity ratio on profitability. One possible explanation is that banks' capital structure decisions may be influenced more by regulatory requirements, risk management, and financial policies than by tangible asset holdings. Additionally, as banks typically operate with intangible financial assets, performance may be driven more by financial leverage and market conditions than by physical assets. This result provides valuable insights for bank managers and policymakers, suggesting the need to focus on other factors when evaluating the impact of debt-to-equity ratio on profitability.

The fourth hypothesis asserts that firm tangible assets do not moderate the relationship between the debt-to-asset ratio and ROA of listed DMBs in Nigeria. The findings reject this hypothesis, revealing that firm tangible assets do moderate the relationship between the debt-to-asset ratio and ROA, enhancing the strength of this relationship. This suggests that banks with more tangible assets experience a stronger positive effect of debt-to-asset ratio on profitability. A possible explanation is that tangible assets serve as collateral, reducing financial risk and improving borrowing capacity, which enhances the efficient use of debt in generating higher returns. Additionally, tangible assets may contribute to financial stability, reducing default risk and strengthening investor confidence. This finding underscores the importance of asset structure in capital management decisions, indicating that banks with substantial tangible assets can leverage debt more effectively to improve financial performance. Therefore, bank managers and policymakers should consider the role of tangible assets in optimizing debt management strategies to maximize profitability.

5. CONCLUSION AND RECOMMENDATIONS

In conclusion, the study provides empirical evidence that both debt-to-equity and debt-to-asset ratios significantly affect the return on assets (ROA) of listed Deposit Money Banks (DMBs) in Nigeria, though in opposite directions. The debt-to-equity ratio shows a significant negative impact on ROA, suggesting that excessive reliance on debt compared to equity reduces profitability due to higher financial risk and interest payments. In contrast, the debt-to-asset ratio has a positive and significant effect on ROA, implying that a well-managed balance of debt relative to total assets enhances financial performance. Additionally, the study reveals that firm tangible assets moderate the relationship between debt-to-asset ratio and ROA, as the presence of tangible assets strengthens the positive impact of debt on profitability, likely due to their role as collateral, which boosts borrowing capacity and financial stability. However, this moderating effect is not observed in the relationship between debt-to-equity ratio and ROA, suggesting that the level of tangible assets does not influence the negative impact of high debt-equity ratios on profitability, possibly due to factors like regulatory constraints and financial risk exposure. These findings underscore the importance of bank managers and policymakers carefully managing debt financing strategies while taking into account the role of tangible assets to optimize financial performance.

The following recommendations are put forward base on the findings of the study; DMBs executives and managers should focus on maintaining a balanced capital structure by minimizing excessive reliance on debt financing, as the debt-to-equity ratio has a significant negative effect on ROA. Prioritizing equity financing and retained earnings will reduce financial risk and interest obligations, ultimately improving profitability. Additionally, as tangible assets strengthen the relationship between debt-to-asset ratio and ROA, banks should focus on acquiring and managing tangible assets effectively to enhance borrowing capacity, mitigate risks, and optimize financial

performance. Investors and stakeholders should carefully evaluate the debt structure of banks, avoiding those with high debt-to-equity ratios that lack proper risk management strategies. Instead, they should prioritize banks with well-structured debt-to-asset ratios and substantial tangible assets, as these institutions are more likely to generate higher returns.

Policy makers and regulators, such as the Central Bank of Nigeria, should implement policies that promote optimal capital structure management in banks, encouraging sustainable leverage levels through capital adequacy requirements and debt utilization guidelines. They should also consider providing incentives for banks that invest in tangible assets, as this contributes to financial stability and performance. Financial analysts should incorporate the findings of this study into their risk assessment models, focusing on the effects of debt-to-equity and debt-to-asset ratios on profitability. Analysts should advise banks on maintaining a favourable debt-to-asset ratio while mitigating risks associated with excessive debt. Lastly, academia should continue exploring the impact of financial leverage and tangible assets on banking performance, conducting further empirical research and integrating these insights into educational curricula to prepare future banking professionals for effective financial management

REFERENCES

Abubakar, A. (2015). Relationship between financial leverage and financial performance of deposit money banks in Nigeria. *International Journal of Economics, Commerce and Management.* 3(10), 759- 778 (October 2015).

Agbeja, O., Adelakun, O. J., & Olufemi, F, I. (2015). Capital adequacy ratio and bank profitability in Nigeria: A Linear Approach. *International Journal of Novel Research in Marketing Management and Economics*, 2(3), 91-99.

Akinyele, S. T., & Lawal, M. I. (2021). Challenges facing the Nigerian banking sector: A review. *African Journal of Business and Economic Research*, *25*(1), 43–58.

Angima, C. M., Miroga, J., & Otinga, H. N. (2022). Effect of financial leverage and risk management on profitability of commercial banks listed at the Nairobi Securities Exchange (NSE) Kenya. *Strategic Journal of Business & Change Management*, 9(1), 1–15. Retrieved from https://strategicjournals.com/index.php/journal/article/view/2209

Bankrate (2022). What Is Financial Leverage? Retrieved from https://www.bankrate.com/investing/financial-leverage/

Boyte-White, C. (2022). *How should a company be raising capital?* Investopedia.

Brealey, R. A., Myers, S. C., & Allen, F. (2016). *Principles of corporate finance* (12th ed.). McGraw-Hill Education.

Budhiarjo, I. S., Nurfitriana, Dewi, C. W., Nurcahayati, S., & Cay, S. (2022). The effect of Debt to Assets Ratio (DAR) and Debt to Equity Ratio (DER) on Return on Assets (ROA) at PT Phapros Tbk. *Jurnal Administrare: Jurnal Pemikiran Ilmiah dan Pendidikan Administrasi Perkantoran*, 9(2), 721-728. http://ojs.unm.ac.id/index.php/administrare/index

Copeland, T. E., Weston, J. F., & Shastri, K. (2005). *Financial theory and corporate policy* (4th ed.). Pearson.

Corporate Finance Institute. (2023). *Financial Leverage*. Retrieved from https://corporatefinanceinstitute.com/resources/knowledge/finance/financial-leverage/

Das, N. C., Chowdhury, M. A. F., & Islam, M. N. (2022). The heterogeneous impact of leverage on firm performance: empirical evidence from Bangladesh. *South Asian Journal of Business Studies* 11 (2), 235-252.

Demirgüç-Kunt, A., & Levine, R. (2020). *Financial structure and economic growth: A cross-country comparison of banks, markets, and development.* MIT Press.

Edere, J. O & Ujuju L. E. (2020). Effect of financial leverage on the value of firms in Nigeria. *International Journal of Management Sciences,* 8(2), 22-45.

Ehrhardt, M. C., & Brigham, E. F. (2016). *Corporate finance: A focused approach* (6th ed.). Cengage Learning.

European Central Bank imposes extra capital charge on 13 banks over leverage risk. (2024, December 17). *Reuters*. Retrieved from https://www.reuters.com/business/finance/ecb-imposes-extra-capital-charge-13-banks-over-leverage-risk-2024-12-17/

Eze, C., & Okoro, J. (2021). Return on equity trends in Nigerian banks: A comparative analysis with global benchmarks. *Journal of Financial Studies*, 29(4), 78–91.

Feras, I. O. K (2020). Do determinants of financial leverage enhance firm's productivity and accounting performance: A panel data study on Jordan listed companies. *Journal of Critical Reviews*, 7(19), 7004-7015.

Fernando, J. (2023). *Leverage*. Retrieved from https://corporatefinanceinstitute.com/resources/knowledge/finance/leverage/

Ghardallou, W. (2023). The heterogeneous effect of leverage on firm performance: A quantile regression analysis. *International Journal of Islamic and Middle Eastern Finance and Management*, 16(1), 210-225.

Ghozali, I. (2007). *Econometrics: Theory, concepts, and applications with SPSS 15*. Semarang: Publisher of Diponegoro University.

Giannetti, M., & Hasan, I. (2021). Bank competition and financial stability: An international perspective. *Journal of Financial Economics,* 141(3), 831-855.

Gitman, L. J., & Zutter, C. J. (2019). *Principles of managerial finance* (15th ed.). Pearson.

Gujarati, D. N. (2003). *Basic econometrics* (4th ed.). New York, NY: McGraw-Hill.

Hall, C. & Wagner, J. (2023). *Financial Leverage: Definition, Formula & Calculation*. Retrieved from https://study.com/academy/lesson/financial-leverage-definition-formula-calculation.html

Hargrave, M. (2020). Return on Assets (ROA): Formula and 'Good' ROA Defined. Retrieved from https://www.investopedia.com/terms/r/returnonassets.asp#:~:text=Return%20on%20assets%20is%20a,income%20by%20its%20total%20assets.

Hargrave, M. (2020). *What Is Capital?* Investopedia.

Hayes, A. (2023). What Is Financial Leverage, and Why Is It Important? Retrieved from https://www.investopedia.com/terms/l/leverage.

Hayes, M. (2022). What Is Financial Leverage? Retrieved from https://www.experian.com/blogs/ask-experian/what-is-financial-leverage/#:~:text=Financial%20leverage%20is%20when%20you,and%20buying%20an%20investment%20property.

Igan, D., & Kang, J. (2022). Bank competition and financial stability: Evidence from a new dataset. *Journal of Financial Stability*, 60, 100979.

Investopedia. (2023). *Leverage*. Retrieved from https://www.investopedia.com/terms/l/leverage.asp

Investopedia. (2023). *Tangible Asset*. Retrieved from https://www.investopedia.com/terms/t/tangibleasset.asp

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.

Johnson, K. T. & Chukwuka, I. K. (2022). Determinants of financial leverage of selected public companies in Nigeria. *Journal of Contemporary Issues in Accounting (JOCIA)*, 3(1), 124-146.

Jones, G., Smith, H., & Johnson, S. (2018). *Evaluating financial performance*. Publisher.

Kajola, S.O., Alao, A., Sanyaolu, W.A. and Ojurongbe, O.J. (2019). Effect of liquidity and leverage on financial performance of Nigerian listed consumer goods firms. *The Journal Contemporary Economy*, 4(3), 91-102.

Kenton, W. (2023). *Leverage*. Retrieved from https://www.investopedia.com/terms/l/leverage.asp

Kithandi, C. K. (2020). Financial leverage and financial performance of the energy and petroleum sector companies listed in the Nairobi Securities Exchange. *International Journal of Scientific and Research Publications*, 10(3), 559-566.

Lawrence, I. David, A. & Olubukola, F. (2021). Effect of financial leverage on financial performance: A comparative study of deposit money banks (DMBs) and Manufacturing companies in Nigeria. *Global Journal of Accounting*, 7(1); 37-46.

Martinez-Miera, D., Repullo, R., & Saurina, J. (2024). Bank competition, risk-taking, and financial stability: A review. *Journal of Financial Intermediation*, 41, 101002.

Mishkin, F. S., Eakins, S. G., & Thomson, M. N. (2016). *Financial markets and institutions* (8th ed.). Pearson.

Odhiambo, J. D., Murori, C. K., & Aringo, C. E. (2025). Financial leverage and firm performance: An empirical review and analysis. *East African Finance Journal*, 4(1), 25–35. https://doi.org/10.59413/eafj/v4.i1.2

Ofulue, S., Igbodo, T., Emenike, C., Amahala, O., Ndubuisi, N., Obi, K., & Chinyere, J. (2022). Financial leverage and financial performance of quoted industrial goods firms in Nigeria. *International Journal of Management Studies and Social Science Research*, 4(1), 172-181.

Okegbe, T. O., Eneh, O. M. R., Ndubuisi, A. N. (2019). Effect of firm characteristics on capital structure of deposit money banks listed on Nigerian stock. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 9(2) 198-210.

Okeke, P. C. (2023). Financial leverage and profitability of recapitalized banks in Nigeria from 2010–2021. *Nigerian Journal of Management Sciences*, 24(1b), 344–358. Retrieved from https://nigerianjournalofmanagementsciences.com/financial-leverage-and-profitability-of-recapitalized-banks-in-nigeria-from-2010-2021-2/

Oladipo, T. I., & Adeyemi, O. (2022). The impact of operational challenges on the performance of Nigerian banks. *Journal of Financial Management and Practices*, 33(2), 12–29.

Onuora, O. G. (2019). Financial leverage and profitability performance of financial institutions in Nigeria. *Global Journal of Education, Humanities and Management Sciences (GOJEHMS*), 1(2), 203 - 207.

Onyenwe, N. I. & Glory, I. (2017). Effect of financial leverage on firm's performance: a study of Nigerian banks (2006-2015). *International Journal of Recent Scientific Research*, 8(7), 18554-18564.

Peter, T., & Helms, J. (2020). *Financial performance and shareholder value*. Publisher.

Popoola, A. & Suleiman, U. (2020). Leverage and Financial Performance of Listed Deposit Money Banks in Nigeria. *Gusau International Journal of Management and Social Sciences, Federal University, Gusau*, 3(1), 68-81.

Reuters (2024). European Central Bank (ECB) imposes extra capital charge on 13 banks over leverage risk. Available at ecb.europa.eu

Ross, S. A., Westerfield, R. W., & Jordan, B. D. (2018). *Essentials of corporate finance* (9th ed.). McGraw-Hill Education.

Smith, R., & Johnson, D. (2019). Financial performance and business success. Retrieved from URL

Tanski-Phillips, M. (2021). 5 Leverage Ratios You Need to Know. Retrieved from https://www.patriotsoftware.com/blog/accounting/leverage-ratios/amp/

Tilahun, A. (2019). The effect of financial leverage on profitability of commercial banks in Ethiopia. (Master's thesis, Addis Ababa University). Retrieved from https://etd.aau.edu.et/handle/123456789/20366

Titman, S., & Wessels, R. (1988). Asymmetric information in credit markets and the efficiency of investment finance. *Journal of Finance*, 43(2), 188-204.

Tretina, K. (2023). What Is Leverage? Retrieved from https://www.forbes.com/advisor/investing/what-is-leverage/

Van Horne, J. C., & Wachowicz, J. M. (2008). Fundamentals of financial management (13th ed.). Prentice Hall.

Yahaya, O.A & Tijjani, B (2021). Size, age and leverage of Nigerian quoted oil and gas corporations. *Advanced International Journal of Banking, Accounting and Finance*, 3(6), 51-60.