Impact of Financial Efficiency on Profitability of Deposit Money Banks

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ABSTRACT

The profitability of deposit money banks remained fundamental to financial system stability, efficient financial intermediation, and sustainable economic growth. However, the persistent fluctuations in the profitability of Nigerian deposit money banks despite several successive reforms, recapitalisation programmes, prudential regulations and other measures introduced to strengthen the Nigerian banking system. This paper therefore examined the impact of financial efficiency on the profitability of deposit money banks in Nigeria over the period 2005Q1–2025Q4. Specifically, the paper investigated the effects of bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio on bank profitability measured by return on assets (ROA). The paper adopted an ex-post facto research design and utilized the Fully Modified Ordinary Least Squares (FMOLS) estimation technique. The results showed that bank overhead costs to total assets exerted a negative but statistically insignificant impact on return on assets. This implied that although increases in operating and administrative expenses relative to total assets tended to reduce the profitability of deposit money banks, the impact was not sufficiently strong to significantly influence profitability during the paper period. Bank net interest margin had a positive and statistically significant impact on profitability. This indicated that improvements in banks' ability to generate net interest income from their earning assets significantly enhanced return on assets, highlighting the importance of efficient intermediation in sustaining bank profitability. The bank cost-to-income ratio exerted a negative and statistically significant impact on return on assets. The finding suggested that increases in operating expenses relative to operating income significantly weakened the profitability of deposit money banks, emphasizing the need for prudent cost management and improved operational efficiency to sustain long-run financial performance. Therefore, the paper recommended that the management of deposit money banks should strengthen asset-liability management to sustain higher net interest margins, implement comprehensive cost-management and digital transformation strategies to reduce operating expenses relative to income, while the Central Bank of Nigeria should reinforce supervisory measures that promote operational efficiency and prudent cost management across the banking industry.

Keywords: Financial efficiency, Deposit money banks, Return on assets, Bank net interest margin, Cost-to-income ratio JEL Codes: G21, G28, C22, D24, L25

INTRODUCTION

The profitability of deposit money banks remains a critical indicator of financial system stability and economic health globally. Deposit money banks, which constitute the backbone of most financial systems, derive their profitability primarily through intermediation activities, fee-based services, and investment operations. Return on Assets (ROA), a key profitability indicator, measures how efficiently banks utilise their asset base to generate earnings, providing insights into management effectiveness and operational performance. Globally, bank profitability has experienced considerable volatility over the past two decades, influenced by regulatory changes, technological disruptions, monetary policy shifts, and economic cycles. The 2008 global financial crisis marked a crisis moment for bank profitability worldwide, triggering stricter capital requirements under Basel III frameworks and fundamentally altering risk management practices. Post-crisis recovery has been uneven, with developed markets experiencing compressed margins due to prolonged low-interest rate

environments, while emerging economies have grappled with different challenges including currency volatility, political instability, and evolving regulatory landscapes (Putra & Devia, 2026).

In Sub-Saharan Africa, deposit money banks operate within a distinctive context characterized by financial inclusion imperatives, infrastructure deficits, and macroeconomic volatility. The region's banking sectors have demonstrated resilient profitability despite numerous issues, with average ROA figures frequently exceeding those of mature markets (Twairesh & Alserhan, 2025). The Nigerian banking experience provides a particularly helpful case study of deposit money bank profitability dynamics in an emerging market context because the sector has undergone several regulatory reforms, recapitalization exercises, financial crises, technological transformations, and macroeconomic shocks over the past two decades. These developments have significantly influenced the earnings capacity of deposit money banks (Ezie *et al.,* 2025).

Nigeria's banking sector experienced severe distress during the 2008–2009 global financial crisis, culminating in regulatory interventions by the Central Bank of Nigeria (CBN), including bank recapitalization, mergers, acquisitions, and enhanced supervisory frameworks. Nigeria's banking sector, comprising approximately twenty-four deposit money banks as of 2024, represents the largest and most sophisticated in West Africa, with total assets exceeding ₦77 trillion (Onaolapo & Odedoyin, 2024).

Available statistics from the World Bank Global Financial Development Database and the IMF Financial Soundness Indicators reveal considerable fluctuations in Nigerian banks' ROA between 2005Q1 and 2025Q4. ROA stood at 2.10% in 2005Q4 before declining slightly to 1.75% in 2006Q4, recovering to 2.67% in 2007 Q4 and 2.11% in 2008Q4. However, profitability deteriorated sharply during the banking crisis, reaching -8.82% in 2009Q4, reflecting the severe effects of rising non-performing loans and systemic banking distress. Following regulatory interventions, ROA rebounded to 3.80% in 2010 before moderating to 0.42% in 2011Q4. Thereafter, profitability stabilised within a relatively narrow range, fluctuating between 1.29% and 3.25% from 2012Q1 to 2025Q4. Specifically, ROA declined from 2.21% in 2019 to 1.73% in 2020 and further to 1.32% in 2021 amid pandemic-related economic disruptions. The indicator subsequently improved to 1.68% in 2022Q4, 1.84% in 2023Q4, reached 3.50% in 2024Q4 before diminishing to 2.30% in 2025. This trend demonstrates that although Nigerian deposit money banks have remained profitable overall following post-crisis reforms, profitability has continued to fluctuate in response to changing macroeconomic conditions, regulatory policies, and operational dynamics (Onaolapo & Odedoyin, 2024; World Bank, 2025).

Beyond profitability, financial efficiency has increasingly attracted global attention because it reflects how effectively banks manage available financial resources to maximize returns while minimizing unnecessary operating costs. Efficient banks are expected to control operating expenses, optimize revenue generation, improve resource allocation, strengthen competitive positioning, and enhance shareholder value. In Nigeria, financial efficiency in deposit money banks has improved over time, largely due to regulatory reforms, technological advancement, and increased competition, although significant challenges remain. Bank overhead costs to total assets declined from 7.28% in 2005Q1 to 4.90% in 2025Q4 after peaking at 7.86% in 2006, indicating better cost management, branch rationalization, and increased adoption of digital banking, despite persistent infrastructure and security costs (World Bank, 2025). Bank net interest margin exhibited considerable volatility, falling from 7.30% in 2005Q1 to 2.24% in 2010Q4 following the banking crisis before peaking at 11.92% in 2011Q4. It subsequently declined to 3.28% in 2022Q4 due to competitive and regulatory pressures but recovered to 5.10% in 2025, supported by tighter monetary policy and improved asset repricing (CBN, 2024; World Bank, 2025). Similarly, the cost-to-income ratio deteriorated sharply during the banking crisis, rising from 59.73% in 2008Q1 to 202.04% in 2010Q4, before improving steadily to 51.15% in 2016. Although it fluctuated between 59.39% and 66.80% from 2018Q1 to 2025Q4, the overall trend reflects gradual operational improvements. Nevertheless, Nigeria's efficiency indicators remain above international benchmarks, suggesting the need for continued cost optimization and operational reforms (Dinka & Asfaw, 2026).

The relationship between financial efficiency and deposit money bank profitability constitutes a critical area of scholarly inquiry with high implications for banking strategy, regulation, and financial system stability. Theoretical frameworks in banking literature posit that efficiency improvements directly enhance profitability

through multiple transmission mechanisms: cost reduction increases net income for any given revenue level; operational optimization enables competitive pricing that drives market share gains; resource allocation effectiveness maximizes returns from deployed capital; and superior efficiency signals management quality that attracts investor confidence and lowers funding costs.

Given that financially efficient deposit money banks are essential for promoting financial intermediation, sustaining credit creation, enhancing financial system stability, and supporting economic growth, it is imperative to examine how financial efficiency, represented by bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio, has influenced the profitability of deposit money banks in Nigeria. Therefore, it is in the interest of this paper to conduct an analysis of how these dimensions of financial efficiency have impacted the return on assets (ROA) of deposit money banks in Nigeria over the period 2005Q1 to 2025Q4.

The paper raised and addressed the following research questions:

i. To what extent does bank overhead costs to total assets influence the profitability of deposit money banks in Nigeria?
ii. What is the impact of bank net interest margin on the profitability of deposit money banks in Nigeria?
iii. How has bank cost-to-income ratio impacted the profitability of deposit money banks in Nigeria?

LITERATURE REVIEW

Conceptual Clarifications

Financial Efficiency

Financial efficiency in banking represented a multidimensional construct that captured the capacity of deposit money banks to optimize resource utilization, minimize operational costs, and maximize output from given inputs in their intermediation and service delivery functions. Scholars provided varying conceptualizations of this critical performance dimension, reflecting its complexity and contextual applicability. Mehzabin *et al.* (2023) defined financial efficiency as the ability of banks to generate maximum revenue while maintaining minimal cost structures, emphasizing the dual objectives of income optimization and expense minimization that characterized efficient banking operations.

Bank overhead costs to total assets constituted a specific measure of operational efficiency that quantified the proportion of a bank's asset base consumed by administrative and operational expenses. Istaiteyeh *et al.* (2024) defined this metric as the ratio of non-interest expenses including personnel costs, premises expenses, technology investments, and administrative overheads to total assets, providing insight into how efficiently banks managed their cost structures relative to their resource base. They argued that lower ratios indicated superior operational efficiency, suggesting that banks successfully controlled expenses while maintaining or expanding their asset bases.

Bank net interest margin represented the efficiency of a bank's core intermediation function, measuring the spread between interest income earned on loans and investments and interest expense paid on deposits and borrowings. Naveed *et al.* (2025) defined net interest margin as net interest income expressed as a percentage of average interest-earning assets, conceptualizing it as a profitability and efficiency metric that reflected pricing power, asset-liability management effectiveness, and competitive positioning in lending and deposit markets.

The bank cost-to-income ratio provided a comprehensive efficiency measure by expressing total operating expenses as a percentage of total operating income, thereby capturing how effectively banks converted revenues into profits after covering operational costs. Di Paola *et al.* (2026) defined this ratio as the quotient of operating expenses divided by operating income, with lower percentages indicating superior efficiency whereby banks generated more income per unit of cost incurred, reflecting streamlined operations, effective

resource allocation, and productivity advantages. Their conceptualization emphasized cost-to-income ratio as a holistic efficiency indicator that subsumed various operational dimensions including personnel productivity, technology effectiveness, process optimization, and management quality.

For purposes of this paper, financial efficiency was operationally defined as the capacity of deposit money banks to optimize operational cost structures, maximize intermediation spreads, and convert revenues into profits through effective resource management, as measured by bank overhead costs to total assets reflecting operational expense efficiency, bank net interest margin capturing intermediation pricing efficiency, and bank cost-to-income ratio representing comprehensive income generation efficiency relative to expense levels.

Bank Profitability

Bank profitability had been widely regarded as one of the most important indicators of the financial health, operational sustainability, and overall performance of banking institutions. It had generally been conceptualized as the ability of banks to generate sufficient earnings from their assets, equity, and business operations while maintaining acceptable levels of risk. Karadayi (2023) defined bank profitability as the capacity of financial institutions to generate consistent financial returns through efficient utilization of available resources and prudent management of banking activities. Similarly, Sitnicka *et al.* (2025) described bank profitability as the financial outcome of banking operations arising from effective asset allocation, revenue generation, cost control, and risk management. Karadayi (2023) further viewed bank profitability as the extent to which banks transformed financial resources into sustainable earnings capable of supporting long-term growth, shareholder value, and financial stability. Likewise, Sitnicka *et al.* (2025) argued that profitability reflected the overall success of managerial decisions regarding lending, investment, liquidity management, and operating efficiency.

Among the various measures of bank profitability, return on assets (ROA) had remained one of the most widely accepted indicators in banking research because it evaluated the efficiency with which management utilized total assets to generate net earnings. According to Putra and Devia (2026), ROA had measured the proportion of net income earned from each unit of total assets employed by a bank, thereby indicating the effectiveness of asset utilization. Ortega-Perals *et al.* (2025) maintained that ROA provided a comprehensive measure of managerial efficiency because it incorporated the combined effects of revenue generation, expense management, and asset deployment. Similarly, Manta et al. (2026) asserted that ROA had been preferred over several alternative profitability indicators because it assessed earnings independently of financing structure and reflected management's ability to convert assets into profits. Argimon *et al.* 2023) further emphasized that ROA had facilitated meaningful comparisons of profitability across banks of varying sizes and capital structures.

In this paper, bank profitability had been defined as the ability of deposit money banks in Nigeria to generate earnings from their total assets through efficient financial intermediation, prudent resource utilization, and effective managerial decisions, as measured by return on assets (ROA).

Theoretical Underpinning

The theoretical underpinning for this paper was the Efficient Structure Hypothesis (ESH) propounded by Harold Demsetz (1973). The hypothesis suggested that differences in the profitability of firms, including banks, could be explained by differences in their levels of efficiency rather than merely by market concentration or market power. Demsetz (1973) argued that firms that managed their resources more efficiently were better positioned to operate at lower costs, generate greater output from available inputs, and consequently achieve superior financial performance. In the banking context, Berger (1995) extended the Efficient Structure Hypothesis by distinguishing between X-efficiency and scale efficiency. X-efficiency emphasised the ability of banks to minimise unnecessary operating costs through better management, technology, and resource utilisation, while scale efficiency reflected the advantages that could arise when banks operated at an appropriate size that enabled them to exploit economies of scale. The significance of the theory to the present study was its explanation of how differences in the financial efficiency of deposit money banks could be associated with differences in their profitability. Specifically, the theory provided a basis for

examining whether the efficiency with which Nigerian deposit money banks managed their operating resources, interest-generating activities, and overall cost structure, represented by bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio, could help explain variations in return on assets (ROA).

EMPIRICAL REVIEW

Empirical investigations into financial efficiency and bank profitability had increasingly examined whether banks' cost structures, resource utilisation and income-generating capacity had explained differences in financial performance. Recent studies had adopted overhead-cost measures, cost-to-income ratios, net interest margins and related operating-efficiency indicators, although their findings had differed considerably across countries, samples and analytical techniques.

At the broader Sub-Saharan African level, Dinka and Asfaw (2026) examined the impact of efficiency and income diversification on commercial-bank performance using 35 banks between 2007 and 2021, resulting in 525 observations. Secondary data had been obtained from World Bank development indicators and global financial databases, while two-step system Generalized Method of Moments had been employed to address endogeneity and dynamic persistence. ROA had represented the principal performance measure, while NIM had been employed as a robustness measure. Operational efficiency had been measured by the cost-to-income ratio, allocative efficiency by deposits to total assets, and income diversification by non-interest income to total income. The findings had indicated that operational efficiency, allocative efficiency and income diversification had positive and significant effects on ROA, while operational efficiency had also significantly influenced NIM. However, the positive coefficient reported for the cost-to-income-based efficiency measure had required careful interpretation because increases in the conventional cost-to-income ratio ordinarily reflected greater cost intensity. Furthermore, the paper had excluded 2022–2024 because of incomplete data and had treated NIM as a performance indicator rather than as an explanatory measure of financial efficiency.

A more recent Indonesian investigation by Putra and Devia (2026) analysed macroeconomic and internal determinants of bank profitability among banks listed on the Indonesia Stock Exchange with minimum core capital of Rp6 trillion. The paper had covered quarterly observations from the first quarter of 2018 to the fourth quarter of 2024 and had employed dynamic panel regression based on the System Generalized Method of Moments to address possible endogeneity. ROA had served as the dependent profitability measure, while net interest margin, operating expenses to operating income, credit growth, non-performing loans, capital adequacy ratio, loan-to-deposit ratio, inflation and the Bank Indonesia policy rate had been incorporated as explanatory factors. The findings had shown that NIM positively and significantly affected ROA, whereas operating expenses to operating income, the Indonesian BOPO measure closely related to the cost-to-income ratio, had negatively and significantly affected ROA. Inflation and the policy rate had also positively affected profitability, whereas credit growth had exerted a negative effect. Nevertheless, the investigation had concentrated on relatively large listed Indonesian banks, thereby excluding smaller institutions. The paper had also omitted overhead costs to total assets, while its 2018–2024 period had been comparatively short despite the use of quarterly observations.

Extending the evidence across several banking systems, Albaity *et al.* (2026) investigated bank profitability among 406 publicly traded banks located in 20 Middle Eastern and North African countries over 2010–2023, generating 5,684 bank-year observations. The paper had used unconditional quantile regression to determine whether explanatory variables behaved differently across profitability levels, while System GMM and generalized least squares had provided robustness checks. ROA and ROE had represented profitability, and the cost-to-income ratio had captured bank efficiency alongside bank size, non-performing loans, innovation, environmental performance, inflation and GDP-related factors. The empirical results had established that cost-to-income ratio negatively affected ROA and ROE across the profitability quantiles, indicating that stronger cost pressure relative to income had been associated with poorer profitability among both relatively weak and highly performing banks. Although the paper had benefited from an extensive sample and a methodology capable of detecting heterogeneous effects, financial efficiency had not constituted its principal research focus because cost-to-income ratio had been included mainly as a bank-specific control. Moreover, overhead costs to

total assets and NIM had not been simultaneously examined as efficiency determinants, while pooling 20 institutionally diverse MENA economies had potentially obscured country-specific banking relationships.

Focusing specifically on Indonesian commercial banks, Berliana *et al.* (2025) investigated financial-ratio, macroeconomic and ownership determinants of profitability among 32 commercial banks during 2017–2023, producing 224 bank-year observations. The researchers had employed a quantitative research approach, secondary data obtained from banks' financial statements and official databases, and panel-data regression using EViews 12. Bank profitability had been measured by ROA, while the explanatory variables had included non-interest income, bank size, loan-loss provision, capital adequacy ratio, overheads, non-performing loans, inflation, interest rate and foreign ownership. The results had established that overhead costs significantly affected profitability, with greater overhead expenditure being associated with lower bank profitability. Loan-loss provision, capital adequacy and non-performing loans had also significantly influenced profitability, whereas non-interest income, size, inflation, interest rate and foreign ownership had been statistically insignificant. Although the paper had provided direct evidence concerning overhead expenditure and ROA, it had covered only Indonesian commercial banks over seven years. More importantly, it had not jointly incorporated net interest margin and cost-to-income ratio alongside overhead costs as measures of financial efficiency, thereby leaving a broader efficiency-profitability specification unexplored.

In another recent Indonesian investigation, Rizky *et al.* (2025) analysed the financial performance of 43 conventional commercial banks listed on the Indonesia Stock Exchange over the period 2020–2024. A quantitative hypothesis-testing research design had been adopted, while secondary financial-statement data had been analysed through panel-data regression. ROA had served as the dependent variable, whereas loan growth, non-performing loans, loan-to-deposit ratio, market share, loan-loss provision, cost-to-income ratio, effective tax rate and net interest margin had constituted the explanatory variables. Particularly relevant to financial efficiency, the cost-to-income ratio had exerted a negative and statistically significant effect on ROA, whereas net interest margin had produced a positive and significant effect. Loan growth, loan-loss provision and effective tax rate had also negatively affected ROA, while the loan-to-deposit ratio had exerted a positive effect; non-performing loans and market share had remained insignificant. Nevertheless, the five-year study period had been relatively short, bank overhead costs to total assets had been omitted, and macroeconomic influences had not been incorporated into the estimated model. The concentration on listed Indonesian banks had further reduced the direct applicability of its findings to the Nigerian banking environment.

In the Vietnamese banking industry, Nguyen and Vu (2025) assessed the determinants of commercial-bank profitability using nine Vietnamese commercial banks during 2013–2024. The paper had employed secondary panel data and estimated pooled OLS, fixed-effects, random-effects and feasible generalized least-squares models to strengthen the reliability of the results. Profitability had been measured principally through ROA and NIM, while the explanatory factors had included equity-to-assets ratio, non-performing loans, loan-to-deposit ratio, bank size, cost-to-income ratio, GDP growth, market concentration and COVID-19 effects. Their findings had revealed that the cost-to-income ratio exerted a negative effect on ROA, indicating that increased operating costs relative to operating income had been associated with reduced asset profitability. The ratio had equally produced a negative influence when NIM had served as the profitability outcome. NPLs and industry concentration had negatively affected ROA, whereas equity-to-assets ratio, GDP growth and bank size had exerted positive effects. Although the paper had incorporated recent data through 2024 and several econometric estimators, its sample had comprised only nine banks. It had further considered only cost-to-income ratio among the three efficiency indicators adopted in the present Nigerian study, while NIM had been treated as an alternative dependent variable rather than an explanatory efficiency measure.

Using a considerably longer time horizon, Twairesh and Alserhan (2025) examined the influence of selected financial factors on the performance of 12 Jordanian banks over the 2006–2023 period. Annual secondary data had been analysed through an autoregressive distributed lag framework after unit-root testing, thereby allowing the researchers to distinguish short-run from long-run effects. Banking performance had been evaluated through ROA, ROE and NIM, while capital adequacy, cost-to-income ratio, debt-to-equity ratio, loan-to-deposit ratio and bank size had constituted the major explanatory variables. The results had indicated that the cost-to-income ratio adversely affected Jordanian bank performance in both the short and long run, suggesting

that higher operating costs relative to generated income had weakened profitability. Bank size had positively influenced performance in both horizons, while the loan-to-deposit ratio had positively affected long-run performance but had produced no meaningful short-run effect; debt-to-equity ratio had remained insignificant. Despite its useful separation of short- and long-run relationships, the investigation had been restricted to Jordan and had relied on only one direct financial-efficiency proxy. Bank overhead costs to total assets had been excluded, while NIM had been employed as a performance outcome rather than examined alongside cost-to-income ratio as a determinant of ROA.

Within the Nigerian banking environment, Onaolapo and Odedoyin (2024) examined operating efficiency and financial performance among 12 listed deposit money banks from 2011 to 2020. The researchers had employed an ex-post facto design, secondary panel data, Pearson correlation, panel least-squares regression, Hausman testing and one-way ANOVA, with the fixed-effects model selected for interpretation. Operating efficiency had been captured by non-interest cost to total assets, net interest income to total assets, operating expenses to operating income and bank size, while financial performance had been proxied by net interest margin. The results had revealed that non-interest cost to total assets exerted a negative and significant effect on NIM, while net interest income to total assets had exerted a positive and significant effect. Operating expenses to operating income had produced a positive but insignificant effect, whereas bank size had negatively and significantly affected NIM. Despite its relevance, the paper had not employed ROA as the profitability measure, had purposively sampled only 12 banks and had terminated its analysis in 2020. Furthermore, using an interest-income measure as an explanatory variable while NIM had served as the dependent variable had created considerable conceptual proximity between the variables.

Drawing evidence from the Middle East and North Africa, Abu Khalaf *et al.* (2024) had investigated the effect of non-interest income and other bank-specific variables on commercial-bank profitability using 40 banks drawn from Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates over 2010–2022. The researchers had employed correlation analysis alongside pooled OLS, fixed-effects and random-effects regressions, while ROA had represented bank profitability. Among the variables relevant to financial efficiency, bank overhead costs had exhibited a negative and marginally significant relationship with ROA across the estimated models, indicating that greater operating expenses relative to the banking resource base had been associated with weaker profitability. Non-interest income had positively and significantly influenced ROA, while capital adequacy, loan-loss provisions and bank size had also been incorporated into the models. However, the paper had concentrated principally on income diversification rather than financial efficiency, and overhead cost had appeared mainly as a control variable. It had also omitted cost-to-income ratio and net interest margin as explanatory efficiency indicators, while its sample of only five banks per country had limited representation of the entire banking systems considered.

Across Asian banking markets, Mehzabin *et al.* (2023) had investigated how capital structure, operating efficiency and non-interest income had influenced bank profitability using 492 banks from 28 Asian countries over the period 2004–2018. The paper had utilised balanced panel data and fixed-effects regression following the Hausman specification test, while ROA had represented the principal profitability measure and ROE had been employed for robustness. Operating efficiency had been measured as non-interest expenses relative to total assets, which had closely resembled bank overhead costs to total assets. The findings had indicated that operating efficiency exerted a positive and significant effect on profitability, which had implied that lower operating expenses and effective cost management had enhanced bank profitability. Leverage and non-interest income had also recorded positive and significant effects, whereas long-term debt had been insignificant. However, the paper had combined developed and emerging Asian banking systems with considerably different regulatory and institutional structures, had ended in 2018 and had excluded macroeconomic factors such as GDP growth, inflation and competition.

METHODOLOGY

The paper adopted an ex-post facto research design because it relied on historical data that had already occurred and could not be manipulated by the researcher. This design was appropriate for examining the impact of financial efficiency on the profitability of deposit money banks in Nigeria, since the variables had

been observed over time from secondary sources. The design enabled the paper to investigate relationships among the variables without introducing controls or interventions. It also supported the use of time-series econometric techniques to determine whether variations in financial efficiency had explained changes in bank profitability.

This paper utilised quarterly secondary data covering the period 2005Q1 to 2025Q4. The secondary data were quantitative in nature and consisted of time-series observations on return on assets (ROA), bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio. Return on assets data were obtained from the International Monetary Fund (IMF) Financial Soundness Indicators (FSI) database and the Federal Reserve Bank of St. Louis (FRED), which sourced the indicator from the World Bank. Data on bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio were sourced from the World Bank's Global Financial Development Database through the FRED database. These sources were selected because they provide internationally recognized, reliable, consistent, and comparable banking sector statistics that are widely utilized in empirical banking and financial sector research.

Guided by the Efficient Structure Hypothesis, this paper adapted and modified the empirical model of Dinka and Asfaw (2026), who examined the influence of efficiency and income diversification on the performance of commercial banks in Sub-Saharan Africa. Accordingly, the functional and baseline regression models for the paper were specified as follows:

$$ROA_t = \alpha_0 + \alpha_1 BOC_t + \alpha_2 BNIM_t + \alpha_3 BCI_t + u_t \quad (1)$$

Where;

ROA is Return on Assets

BOC is Bank Overhead Costs to Total Assets

BNIM is Bank Net Interest Margin

BCI is Bank Cost-to-Income Ratio

α_0 the constant.

$\alpha_1, \alpha_2, \alpha_3$ are the slope coefficients of bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio.

u_t the residual.

The empirical analysis commenced with the Augmented Dickey–Fuller (ADF) unit root test as a preliminary diagnostic procedure to determine the stationarity properties of the time series variables before estimating the regression model. The test, developed by Dickey and Fuller (1979), was employed to ascertain whether the variables possessed unit roots or were stationary at their levels or after differencing. Establishing the stationarity of the variables was essential because regressions involving non-stationary time series could produce spurious results, thereby leading to misleading coefficient estimates and invalid statistical inferences. Consequently, the ADF unit root test provided a basis for determining the order of integration of the variables and selecting the appropriate estimation technique for the paper. The ADF model was expressed as:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^{k} \delta_i \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

Where:

$\mathbf{\Delta Y_t}$ = First difference of the variable under investigation;

α = Constant (intercept); **β** = Coefficient of the deterministic time trend; **t** = Time trend; **γ** = Coefficient of the lagged level variable; $\mathbf{Y_{t-1}}$ = Lagged value of the variable under investigation; $\sum_{i=1}^{k} \delta_i \Delta Y_{t-i}$ = Sum of the lagged first-difference terms included to eliminate serial correlation; $\boldsymbol{\delta_i}$ = Coefficient of the *i*th lagged first-difference term; **k** = optimal lag length; and $\boldsymbol{\varepsilon_t}$ = White-noise error term.

The null hypothesis of the ADF test stated that the variable contained a unit root ($\boldsymbol{\gamma = 0}$), implying that the series was non-stationary. The alternative hypothesis stated that the variable was stationary ($\boldsymbol{\gamma < 0}$).

After estimating the long-run equation, the residuals were extracted and tested for stationarity using the following residual-based ADF regression:

$$\Delta\hat{u}_t = \rho\hat{u}_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta\hat{u}_{t-i} + \varepsilon_t \quad (3)$$

where:

where $\hat{u}_t$ represented the estimated residuals from the cointegrating regression, ρ was the parameter of interest, $\gamma_i$were coefficients of lagged residual differences, $p$was the lag length, and $\varepsilon_t$was the error term. The null hypothesis stated that the residuals contained a unit root, implying no cointegration, while the alternative hypothesis stated that the residuals were stationary, implying the existence of cointegration.

Following the confirmation of a long-run equilibrium relationship among the variables through the Engle–Granger cointegration test, the paper estimated the long-run parameters using the Fully Modified Ordinary Least Squares (FMOLS) estimator proposed by Phillips and Hansen (1990).

The general long-run regression model estimated using the FMOLS technique was specified as:

$$y_t = \beta_0 + \sum_{i=1}^{k} \beta_i x_t + \varepsilon_t \quad (4)$$

where:

y_t = dependent variable;

x_t = vector of explanatory variables;

β_0 = intercept;

β_i = long-run slope coefficients; and

ε_t = stochastic error term.

Incorporating equation (1) into the FMOLS framework, the resulting specification of equation (4) for the purpose of this paper is expressed as:

$$ROA_t = \alpha_0 + \sum_{t=1}^{T} \alpha_1 BOC_t^* + \sum_{t=1}^{T} \alpha_2 NIM_t^* + \sum_{t=1}^{T} \alpha_3 BCI_t^* + \varepsilon_t \quad (5)$$

The FMOLS estimator was selected because it was specifically developed for estimating cointegrated time-series models and effectively corrected for the problems of endogeneity and serial correlation that commonly affected conventional Ordinary Least Squares (OLS) estimates. By incorporating semi-parametric adjustments into the estimation process, FMOLS generated consistent, asymptotically unbiased, and efficient long-run coefficient estimates. The technique was therefore particularly suitable for variables integrated of order one, that had been established to share a long-run equilibrium relationship.

A limitation of the study was the use of only three explanatory variables, bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio, to explain the profitability of deposit money banks in Nigeria. Although these variables captured important dimensions of financial efficiency, bank profitability could also be influenced by other bank-specific and macroeconomic factors such as capital adequacy, non-performing loans, liquidity, bank size, inflation, monetary policy rate, and exchange rate movements. Their exclusion reduced the explanatory coverage of the model and could create omitted-variable bias where excluded factors were correlated with both the included variables and return on assets. However, the restricted specification was deliberate because the study focused specifically on financial efficiency, while the relatively small annual sample from 2005Q1 to 2025Q4 also required a parsimonious model. Future studies could incorporate additional control variables to test the robustness of the relationships identified and broaden overall explanatory power.

RESULTS AND DISCUSSIONS

Descriptive Statistics Results

Descriptive statistics were employed to summarize the basic characteristics of the variables used in the paper and to provide preliminary insights into their distributional properties over the paper period. Specifically, the descriptive statistics presented the mean, maximum, minimum, standard deviation, skewness, kurtosis, and Jarque–Bera statistics for return on assets (ROA), bank overhead costs to total assets (BOC), bank net interest margin (BNIM), and bank cost-to-income ratio (BCI). These statistics were useful in understanding the central tendency, variability, distributional pattern, and normality of the variables before conducting further econometric analysis.

Table 1: Descriptive statistics results

	ROA	BOC	BNIM	BCI
Mean	0.831815	5.627738	5.948095	74.37256
Maximum	3.800000	7.860000	11.92000	202.0400
Minimum	-23.26	4.380000	2.240000	51.15000
Std. Dev.	4.395849	1.001868	1.989275	35.64747
Skewness	-3.91255	0.687396	0.483083	2.659583
Kurtosis	18.18496	2.203999	3.510425	8.709763
Jarque-Bera	1021.353	8.832839	4.179042	213.1322
Probability	0.000000	0.012077	0.123746	0.000000
Observations	84	84	84	84

Source: Researcher's Computation Using EViews-12 (2026)

The results indicated that return on assets (ROA) recorded a mean value of 0.8318, suggesting that, on average, Nigerian deposit money banks generated approximately 0.83% returns on their assets during the paper period. The maximum value of 3.80% showed that banks attained relatively high profitability in some years, whereas the minimum value of –23.26% revealed the existence of substantial losses during adverse periods, particularly during episodes of banking sector instability. The standard deviation of 4.3958 indicated considerable variation in profitability throughout the paper period, suggesting that bank earnings were highly responsive to changes in both internal operational conditions and the macroeconomic environment. The skewness coefficient of –3.9126 revealed that the distribution of ROA was highly negatively skewed, implying that extreme negative profitability observations occurred more frequently than exceptionally high profits. The kurtosis value of 18.1850, which greatly exceeded the benchmark value of three, indicated a highly leptokurtic distribution characterized by extreme observations and heavy tails. Furthermore, the Jarque–Bera statistic of 1021.353 with a probability value of 0.0000 showed that ROA did not follow a normal distribution, reflecting the presence of significant outliers arising from periods of exceptional banking sector performance and severe financial distress.

For bank overhead costs to total assets (BOC), the mean value of 5.6277% suggested that operating and administrative expenses accounted for an average of approximately 5.63% of banks' total assets during the paper period. The maximum value of 7.86% and the minimum value of 4.38% indicated that although overhead costs varied across the years, the fluctuations were relatively moderate compared with those observed for profitability. This observation was further supported by the relatively low standard deviation of 1.0019, suggesting that overhead costs remained fairly stable throughout the paper period. The positive skewness coefficient of 0.6874 implied that the distribution was moderately right-skewed, indicating that years characterized by relatively high operating costs occurred more frequently than unusually low-cost periods. The kurtosis value of 2.2040, being slightly below the normal benchmark of three, suggested a platykurtic distribution with fewer extreme observations. Nevertheless, the Jarque–Bera statistic of 8.8328 and its associated probability value of 0.0121 indicated that the variable departed significantly from normality at the 5 percent significance level.

The descriptive statistics further showed that bank net interest margin (BNIM) recorded an average value of 5.9481%, implying that Nigerian deposit money banks earned approximately 5.95% net interest income relative to their earning assets over the paper period. The maximum value of 11.92% reflected periods during which banks recorded exceptionally strong interest spreads, whereas the minimum value of 2.24% suggested periods of compressed margins arising from changing monetary conditions and funding costs. The standard deviation of 1.9893 indicated moderate variability in net interest margins over the paper period. The skewness coefficient of 0.4831 suggested that the distribution was moderately positively skewed, implying that relatively higher net interest margins occurred more frequently than unusually low margins. Similarly, the kurtosis value of 3.5104, which was only slightly greater than three, indicated a distribution that was close to normal with only a modest concentration of observations around the mean. The Jarque–Bera statistic of 4.1790 with a probability value of 0.1237 implied that the null hypothesis of normality could not be rejected at the conventional 5 percent significance level. Therefore, BNIM was the only variable among those considered that exhibited an approximately normal distribution.

With respect to bank cost-to-income ratio (BCI), the mean value of 74.3726% indicated that banks incurred operating expenses amounting to an average of about 74.37% of their operating income during the paper period. The maximum value of 202.04% reflected periods during which operating costs exceeded operating income, while the minimum value of 51.15% indicated years characterized by relatively stronger operational efficiency. The high standard deviation of 35.6475 demonstrated substantial fluctuations in operational efficiency over time, particularly during periods of banking sector restructuring and economic instability. The skewness coefficient of 2.6596 revealed a highly positively skewed distribution, indicating the occurrence of several years with exceptionally high cost-to-income ratios. Likewise, the kurtosis value of 8.7098 confirmed a highly leptokurtic distribution characterized by extreme observations. The Jarque–Bera statistic of 213.1322 with a probability value of 0.0000 further confirmed that the cost-to-income ratio did not follow a normal distribution, reflecting the presence of significant deviations arising from periods of unusually high operating costs relative to operating income.

Unit Root Test

The Augmented Dickey–Fuller (ADF) unit root test was conducted to determine the stationarity properties of the variables before estimating the long-run model.

Table 2: Summary of Unit Root Test Results

Variable	Levels: ADF Test Statistics (Critical Values)	1st Difference: ADF Test Statistics (Critical Values)	Order of Integration
BCI	-2.565541 (-3.471693)	-4.028416 (-3.465548)**	I(1)
BNIM	-1.083687 (-4.073859)	-3.679196 (-3.465548)**	I(1)
BOC	-2.362237 (-3.468459)	-3.189512 (-3.161067)***	I(1)
ROA	-3.063615 (-3.471693)	-3.979994 (-3.468459)**	I(1)

Note: The tests include intercept with trend; ** and *** significant at 5 and 10 percent.

Source: Researcher's Computation Using EViews-12 (2026)

The result for bank cost-to-income ratio (BCI) showed that the variable became stationary after first differencing. At first difference, the ADF test statistic was –4.028416, which was greater in absolute value than the 5 percent critical value of –3.465548. This result was statistically significant at the 5 percent level, leading to the rejection of the null hypothesis of a unit root. Consequently, the bank cost-to-income ratio was concluded to be stationary after first differencing and was therefore integrated of order one, I(1).

Similarly, the result for bank net interest margin (BNIM) indicated that the variable attained stationarity after first differencing. The calculated ADF test statistic of –3.679196 exceeded the critical value of –3.465548 in absolute terms and was statistically significant at the 5 percent level. The null hypothesis that the variable contained a unit root was therefore rejected. The result confirmed that bank net interest margin was integrated of order one, I(1).

For bank overhead costs to total assets (BOC), the unit root test also established stationarity at first difference. The computed ADF statistic of –3.189512 was greater than the corresponding critical value of –3.161067 in absolute terms and was statistically significant at the 10 percent level. Accordingly, the null hypothesis of a unit root was rejected, indicating that the variable became stationary after first differencing. The implication was that bank overhead costs to total assets followed an integrated process of order one, I(1), thereby satisfying the stationarity requirement for subsequent cointegration analysis.

The result for return on assets (ROA) equally revealed that the variable was stationary after first differencing. Specifically, the ADF test statistic of –3.979994 exceeded the critical value of –3.468459 in absolute terms and was significant at the 5 percent level. This led to the rejection of the null hypothesis of a unit root, confirming that return on assets was integrated of order one, I(1).

Co-integration Test

The Engle and Granger residual-based cointegration test was conducted after establishing that all the paper variables were integrated of order one, I(1), through the Augmented Dickey–Fuller (ADF) unit root test.

Table 3: Engel & Granger Co-integration Result

Residual		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.922221*	0.0002
Test critical values:	1% level	-2.596586	
	5% level	-1.945260	
	10% level	-1.613912	

Note: * p<0.01

Source: Researcher's Computation Using EViews-12 (2026*)*

The results presented in Table 3 showed that the estimated residuals were stationary at level, I(0). Specifically, the calculated ADF test statistic for the residuals was –3.922221, which exceeded the 1 percent critical value of –2.596586 in absolute terms. Furthermore, the associated probability value of 0.0002 was less than the 1 percent level of significance. Consequently, the null hypothesis of no cointegration was rejected in favour of the alternative hypothesis that the residuals were stationary.

FMOLS Regression Estimates

The results of the Engle–Granger cointegration test confirmed the existence of a stable long-run equilibrium relationship among financial efficiency and the profitability of deposit money banks in Nigeria. Having established the presence of cointegration, the paper proceeded to estimate the long-run coefficients using the Fully Modified Ordinary Least Squares (FMOLS) estimator. The FMOLS technique was considered appropriate because it produced consistent and efficient long-run parameter estimates by correcting for

endogeneity and serial correlation commonly associated with cointegrated time-series variables. The long-run estimation results obtained from the FMOLS model are presented in Table 4.

Table 4: FMOLS Result

Dependent Variable: ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BOC	-0.223299	0.582241	-0.383517	0.7024
BNIM	0.152268	0.061542	2.474199	0.0367
BCI	-0.083811	0.014188	-5.907152	0.0000
C	6.673427	2.402682	2.777490	0.0068
Goodness of Fit				
R-squared	0.638972			
Adjusted R-squared	0.517667			
Long-run variance	2.12559			

Source: Researcher's Computation Using EViews-12 (2026)

The estimated coefficient for bank overhead costs to total assets (BOC) was -0.223299, with a corresponding t-statistic of -0.383517 and a probability value of 0.7024. Since the probability value exceeded the conventional 5 percent significance level, the result indicated that bank overhead costs to total assets had a negative but statistically insignificant long-run association with the profitability of deposit money banks in Nigeria over the study period. The negative coefficient suggested that a one-percentage-point increase in bank overhead costs to total assets, which measured operating and administrative expenses relative to total assets, was associated with an estimated 0.2233 percentage-point decline in return on assets (ROA), other factors remaining constant. However, because the relationship was statistically insignificant, the evidence was insufficient to establish a systematic long-run association between BOC and ROA. The result further showed that bank net interest margin (BNIM) had a positive and statistically significant long-run relationship with the profitability of deposit money banks. Specifically, the estimated coefficient of 0.152268 indicated that a one-percentage-point increase in bank net interest margin, which measured the difference between interest income and interest expenses relative to earning assets, was associated with an approximately 0.1523 percentage-point increase in ROA, holding other factors constant. This positive association was supported by a t-statistic of 2.474199 and a probability value of 0.0367, which was below the 5 percent significance level. The result therefore indicated that higher net interest margins tended to be associated with higher profitability over the long run.

The estimation also revealed that bank cost-to-income ratio (BCI) had a negative and statistically significant long-run association with the profitability of deposit money banks in Nigeria. The estimated coefficient of -0.083811 suggested that a one-percentage-point increase in the bank cost-to-income ratio, which measured operating expenses as a proportion of operating income, was associated with an approximately 0.0838 percentage-point decline in ROA, other factors remaining constant. The coefficient was statistically significant, as reflected by the t-statistic of -5.907152 and the probability value of 0.0000, indicating significance at the 1 percent level. The result therefore suggested that higher operating expenses relative to operating income were associated with lower profitability over the long run. The estimated R-squared value of 0.638972 indicated that approximately 63.90% of the total variations in the profitability of deposit money banks were jointly explained by changes in bank overhead costs to total assets, bank net interest margin, and bank cost-to-income ratio during the paper period. Similarly, the adjusted R-squared value of 0.517667 showed that, after adjusting for the number of explanatory variables included in the model, approximately 51.77% of the systematic variations in return on assets were explained by the financial efficiency indicators. The estimated long-run variance of 2.12559 represented the variance of the long-run residual process after the FMOLS corrections for serial correlation and endogeneity had been applied. The relatively moderate value suggested that the remaining unexplained long-run disturbances in the model were reasonably contained after the necessary adjustments incorporated by the FMOLS estimator.

Model diagnostics results

The diagnostic checks were conducted to evaluate whether the estimated model satisfied important statistical assumptions relating to the distribution and independence of the residuals. Specifically, the Jarque-Bera normality test was used to determine whether the residuals were normally distributed, while the correlogram of residuals and its Q-statistic were employed to assess whether serial correlation remained in the residuals. For both tests, the null hypothesis was not rejected where the probability value exceeded the conventional 5 percent significance level.

Table 5: Diagnostic Checks

Tests		Outcomes	
		Coefficient	Probability
Normality Test	Jarque-Bera	1.679206	0.4318
Correlogram of Residuals	Q-stat	0.344099	0.1123

Source: Researcher's Computation Using EViews-12 (2025)

The Jarque-Bera normality test produced a statistic of 1.679206 with a probability value of 0.4318. Since the probability value was greater than 0.05, the null hypothesis that the residuals were normally distributed was not rejected. This indicated that the residuals from the estimated model approximated a normal distribution and did not exhibit significant departures from normality. The result therefore suggested that extreme residual behaviour was not sufficiently pronounced to undermine the statistical reliability of the estimated long-run model. Similarly, the correlogram of residuals reported a Q-statistic of 0.344099 with a probability value of 0.1123. Since the associated probability value exceeded the 5 percent significance level, the null hypothesis of no serial correlation could not be rejected. This implied that the residuals were not significantly autocorrelated at the reported lag structure. In other words, the unexplained component of return on assets did not exhibit systematic dependence across successive periods after the financial-efficiency variables had been incorporated into the model.

DISCUSSION OF FINDINGS

The findings of this paper revealed that bank overhead costs to total assets (BOC) had a negative but statistically insignificant impact on the profitability of deposit money banks in Nigeria, as measured by return on assets (ROA). The implication of this finding is that although increases in operating and administrative expenses relative to total assets tended to reduce the profitability of deposit money banks, the magnitude of the effect was not sufficiently strong to exert a statistically meaningful influence over the paper period. This suggests that Nigerian deposit money banks may have been able to offset rising overhead costs through alternative income sources, technological innovations, improved service delivery, or enhanced operational strategies, thereby weakening the overall influence of overhead costs on profitability. The result further implies that fluctuations in bank profitability during the period under review could not be attributed solely to changes in overhead costs, as other internal and external factors might have played more dominant roles. This outcome was broadly consistent with the findings of Abu Khalaf *et al.* (2024), who reported that bank overhead costs exhibited only a marginal influence on the profitability of commercial banks in the Middle East and North Africa, suggesting that operating expenses alone did not fully explain variations in bank performance. However, the finding contradicted Mehzabin *et al.* (2023), who found that improvements in operating efficiency significantly enhanced the profitability of banks across Asian countries, as well as Berliana *et al.* (2025), who established that overhead costs significantly reduced the profitability of Indonesian commercial banks. The disparity in findings could have resulted from differences in banking structures, regulatory environments, cost management practices, sample coverage, and estimation techniques adopted across the studies.

The paper also established that bank net interest margin (BNIM) had a positive and statistically significant impact on the profitability of deposit money banks in Nigeria. This finding implied that improvements in banks' ability to generate net interest income from their earning assets significantly enhanced their profitability. Since net interest income represented the primary source of earnings for most deposit money banks, an

improvement in the spread between interest income and interest expenses translated into greater returns on total assets. The result suggested that efficient pricing of loans and deposits, prudent asset-liability management, and effective intermediation activities remained important drivers of profitability within the Nigerian banking sector. The finding agreed with Onaolapo and Odedoyin (2024), who found that net interest income significantly improved the financial performance of listed deposit money banks in Nigeria. The result was also consistent with Mehzabin *et al.* (2023), whose study showed that operating efficiency significantly enhanced bank profitability across Asian banking systems by strengthening income-generating capacity. Similarly, Putra and Devia (2026) reported that net interest margin exerted a positive and significant effect on the profitability of Indonesian banks. The convergence of these findings across different banking systems suggested that efficient management of interest-earning assets remained a critical determinant of bank profitability regardless of institutional or geographical differences.

Furthermore, the findings indicated that bank cost-to-income ratio (BCI) had a negative and statistically significant impact on the profitability of deposit money banks in Nigeria. The implication of this finding is that increases in operating expenses relative to operating income significantly reduced the ability of deposit money banks to generate returns from their total assets. In other words, as a greater proportion of operating income was consumed by operating costs, the earnings available to improve profitability declined. This outcome highlighted the importance of prudent cost management, operational efficiency, digital transformation, and effective resource utilization in sustaining profitability within the Nigerian banking industry. The finding was consistent with the paper of Rizky *et al.* (2025), who reported that the cost-to-income ratio negatively and significantly affected the return on assets of Indonesian commercial banks. It also agreed with Nguyen and Vu (2025), who found that higher cost-to-income ratios significantly reduced the profitability of Vietnamese commercial banks. Similarly, Twairesh and Alserhan (2025) established that the cost-to-income ratio adversely affected the performance of Jordanian banks in both the short run and the long run, while Albaity *et al.* (2026) equally found that higher cost-to-income ratios significantly reduced bank profitability across Middle Eastern and North African countries. The consistency of these findings suggested that effective control of operating costs relative to income remained an important requirement for sustaining profitability across banking systems.

CONCLUSION AND RECOMMENDATIONS

The findings of this paper have shown that financial efficiency remained an important determinant of the profitability of deposit money banks in Nigeria, although its individual dimensions influenced profitability differently. Specifically, bank net interest margin exerted a positive and statistically significant impact on return on assets, indicating that improved earnings from core intermediation activities enhanced bank profitability. In contrast, the bank cost-to-income ratio had a negative and significant impact, implying that rising operating expenses relative to operating income weakened banks' ability to generate returns from their assets. Although bank overhead costs to total assets exhibited a negative relationship with profitability, its impact was statistically insignificant, suggesting that overhead costs alone did not significantly explain variations in bank profitability during the paper period. The paper thus concluded that strengthening financial efficiency through improved interest income generation and prudent cost management remained essential for enhancing the long-run profitability and sustainability of deposit money banks in Nigeria.

The following recommendations were made based on the findings:

i. Based on the finding that bank overhead costs to total assets exerted a negative but statistically insignificant impact on the profitability of deposit money banks, it is recommended that the management of deposit money banks should continue to strengthen cost-management practices by accelerating the adoption of digital banking platforms, process automation, shared service centres, and branch optimization strategies to reduce unnecessary administrative and operating expenses. Although the effect was statistically insignificant, sustained control of overhead costs would improve operational efficiency and create additional resources for investment in profitable banking activities. Furthermore, the Central Bank of Nigeria (CBN) should encourage banks to adopt cost-efficient technologies through supportive regulatory frameworks and promote periodic benchmarking of operating cost efficiency across the banking industry to facilitate the identification and dissemination of best operational practices.

ii. In view of the finding that bank net interest margin had a positive and statistically significant impact on the profitability of deposit money banks, the management of deposit money banks should strengthen asset-liability management practices by improving the pricing of loans and deposits, expanding high-quality earning assets, and reducing the volume of non-performing loans through stricter credit appraisal and effective loan monitoring mechanisms. This would enhance the generation of sustainable interest income without exposing banks to excessive credit risk. The Nigeria Deposit Insurance Corporation (NDIC) should also intensify risk-based supervision to ensure that efforts aimed at improving net interest margins do not compromise asset quality or financial system stability.

iii. Given that the bank cost-to-income ratio exerted a negative and statistically significant impact on the profitability of deposit money banks, it is recommended that the boards and executive management of deposit money banks should implement comprehensive operational efficiency programmes aimed at reducing operating costs relative to income. Such measures should include greater investment in financial technology, automation of routine banking operations, optimization of branch networks, enhanced energy efficiency, improved procurement systems, and periodic reviews of operating expenditures to eliminate avoidable costs. Additionally, the Bankers' Committee and the Chartered Institute of Bankers of Nigeria (CIBN) should organize regular capacity-building programmes on strategic cost management, operational efficiency, and digital transformation to enhance managerial competencies capable of sustaining the long-run profitability of deposit money banks in Nigeria.

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Appendices

Table: Data Presentation

Year	Bank Overhead Costs to Total Assets (%)	Bank Net Interest Margin (%)	Bank Cost-to-Income Ratio (%)	ROA
2005Q1	7.28	7.30	65.43	2.10
2005Q2	7.43	7.18	66.06	2.01
2005Q3	7.57	7.07	66.69	1.93
2005Q4	7.72	6.95	67.33	1.84
2006Q1	7.86	6.83	67.96	1.75
2006Q2	7.67	6.78	66.59	1.98
2006Q3	7.49	6.73	65.22	2.21
2006Q4	7.30	6.68	63.85	2.44
2007Q1	7.11	6.63	62.48	2.67
2007Q2	6.95	6.63	61.79	2.53
2007Q3	6.78	6.64	61.11	2.39
2007Q4	6.62	6.64	60.42	2.25
2008Q1	6.45	6.64	59.73	2.11
2008Q2	6.31	5.62	90.91	-4.23
2008Q3	6.17	4.60	122.10	-10.58
2008Q4	6.03	3.58	153.28	-16.92
2009Q1	5.89	2.56	184.46	-23.26
2009Q2	5.68	2.48	188.86	-16.50
2009Q3	5.46	2.40	193.25	-9.73
2009Q4	5.25	2.32	197.65	-2.97
2010Q1	5.03	2.24	202.04	3.80
2010Q2	5.65	4.66	168.25	2.96
2010Q3	6.28	7.08	134.46	2.11
2010Q4	6.90	9.50	100.66	1.27
2011Q1	7.52	11.92	66.87	0.42
2011Q2	7.26	11.28	65.50	1.13
2011Q3	7.00	10.64	64.12	1.84
2011Q4	6.74	10.00	62.75	2.54
2012Q1	6.48	9.36	61.37	3.25
2012Q2	6.41	8.95	61.97	2.95
2012Q3	6.33	8.54	62.57	2.66

2012Q4	6.26	8.13	63.17	2.36
2013Q1	6.18	7.72	63.77	2.06
2013Q2	6.12	7.57	63.35	2.07
2013Q3	6.06	7.42	62.93	2.09
2013Q4	5.99	7.27	62.51	2.10
2014Q1	5.93	7.12	62.09	2.11
2014Q2	5.80	7.02	61.46	1.95
2014Q3	5.67	6.92	60.82	1.79
2014Q4	5.54	6.81	60.19	1.62
2015Q1	5.41	6.71	59.55	1.46
2015Q2	5.15	6.45	57.45	1.42
2015Q3	4.90	6.18	55.35	1.38
2015Q4	4.64	5.92	53.25	1.33
2016Q1	4.38	5.65	51.15	1.29
2016Q2	4.45	6.09	51.34	1.42
2016Q3	4.53	6.53	51.53	1.56
2016Q4	4.60	6.96	51.72	1.69
2017Q1	4.67	7.40	51.91	1.82
2017Q2	4.78	7.09	53.78	1.90
2017Q3	4.90	6.79	55.65	1.97
2017Q4	5.01	6.48	57.52	2.05
2018Q1	5.12	6.17	59.39	2.12
2018Q2	5.18	6.10	59.78	2.14
2018Q3	5.24	6.02	60.18	2.17
2018Q4	5.30	5.95	60.57	2.19
2019Q1	5.36	5.87	60.96	2.21
2019Q2	5.24	5.58	61.04	2.09
2019Q3	5.13	5.30	61.12	1.97
2019Q4	5.01	5.01	61.19	1.85
2020Q1	4.89	4.72	61.27	1.73
2020Q2	4.82	4.44	62.21	1.63
2020Q3	4.75	4.17	63.16	1.53
2020Q4	4.68	3.89	64.10	1.42
2021Q1	4.61	3.61	65.04	1.32
2021Q2	4.57	3.53	64.41	1.41
2021Q3	4.53	3.45	63.77	1.50

2021Q4	4.49	3.36	63.14	1.59
2022Q1	4.45	3.28	62.50	1.68
2022Q2	4.52	3.50	63.58	1.72
2022Q3	4.59	3.72	64.65	1.76
2022Q4	4.65	3.93	65.73	1.80
2023Q1	4.72	4.15	66.80	1.84
2023Q2	4.75	4.31	66.18	1.94
2023Q3	4.79	4.48	65.55	2.04
2023Q4	4.82	4.64	64.93	2.13
2024Q1	4.85	4.80	64.30	2.23
2024Q2	4.86	4.88	64.10	2.28
2024Q3	4.88	4.95	63.90	2.25
2024Q4	4.89	5.03	63.70	2.21
2025Q1	4.90	5.10	63.50	3.17
2025Q2	4.89	5.07	63.49	3.25
2025Q3	4.88	5.04	63.47	2.05
2025Q4	4.87	5.01	63.46	2.32

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