



Driving Stability and Returns: An Empirical Analysis of Financial Soundness and Profitability in Nigeria's Listed Commercial Banks

Chika Dennis Muomaife¹ , Gilbert Ogechukwu Nworie^{2*} , Ndidiamaka Phina Muomaife¹

¹ Department of Accountancy, Nnamdi Azikiwe University, 420110 Awka, Nigeria

² Ukoro Odah Statisticals, 420110 Amansea, Nigeria

* Correspondence: Gilbert Ogechukwu Nworie (dulcisgil@gmail.com)

Received: 01-01-2026

Revised: 02-10-2026

Accepted: 02-22-2026

Citation: Muomaife, C. D., Nworie, G. O., & Muomaife, N. P. (2026). Driving stability and returns: An empirical analysis of financial soundness and profitability in Nigeria's listed commercial banks. *J. Account. Fin. Audit. Stud.*, 12(1), 45–57. <https://doi.org/10.56578/jafas120104>.



© 2026 by the author(s). Published by Acadlore Publishing Services Limited, Hong Kong. This article is available for free download and can be reused and cited, provided that the original published version is credited, under the CC BY 4.0 license.

Abstract: This study investigates the impact of financial soundness on the profitability of listed commercial banks in Nigeria, with a focus on the determinants of return on assets (ROA). Specifically, the influence of capital adequacy ratio (CAR), operational efficiency (OPE), and non-performing loan ratio (NPLR) on bank profitability was assessed. Additionally, the moderating effect of OPE on the relationship between capital adequacy and ROA was examined. An ex-post facto research design was adopted, utilising secondary data spanning a ten-year period from 2014 to 2023. Data were extracted from the annual reports of the sampled banks and subjected to rigorous descriptive and inferential analyses. Measures of central tendency and dispersion were employed to summarise the data, while hypotheses were tested using ordinary least squares (OLS) regression analysis. The results indicate that CAR exerts a significant positive effect on ROA, suggesting that banks with robust capital buffers are better positioned to absorb financial shocks and sustain income-generating activities. Conversely, OPE was found to have a significant negative effect on ROA, implying that efficiency gains may not automatically translate into higher profitability in the context of Nigerian commercial banks. Similarly, the NPLR exhibited a significant negative relationship with ROA, highlighting the detrimental effect of asset quality deterioration on profitability. The interaction between capital adequacy and OPE was also observed to negatively affect ROA, indicating that excessive OPE without commensurate capital support may undermine profitability. These findings underscore the necessity of a balanced approach to financial soundness, where adequate capitalisation is maintained alongside prudent operational management. It is therefore recommended that management of Nigerian commercial banks maintain capital levels above regulatory minima to reinforce resilience and income-generating capacity, while strategically enhancing OPE to optimise profitability. The study contributes to the literature by providing empirical evidence on the complex interplay between financial soundness indicators and bank profitability, offering actionable insights for policymakers, regulators, and banking executives seeking to strengthen the stability and performance of the sector.

Keywords: Financial soundness; Profitability; Return on assets; Capital adequacy ratio; Operational efficiency; Non-performing loan ratio

1. Introduction

Maintaining financial soundness has become a critical requirement for banks operating in a highly uncertain and competitive economic environment. Strong financial soundness enables banks to withstand unexpected losses and continue operating effectively during periods of economic stress. This is especially important in Nigeria, where economic conditions are frequently influenced by oil price shocks, rising inflation, and episodes of political uncertainty. A financially sound banking system strengthens investor trust, which plays a vital role in attracting both local and international capital inflows (Ilgın, 2024). In addition, robust financial management supports overall financial system stability by limiting the likelihood of widespread banking distress and its adverse spillover effects on the broader economy. As global financial markets become more closely linked, financial soundness also

enhances the ability of Nigerian banks to remain competitive and credible beyond domestic borders (Aguwamba et al., 2023). Achieving financial soundness in the banking sector requires continuous evaluation of key indicators that reflect institutions' financial health, including capital strength, asset quality, and operational performance (Oseni, 2024). Within the Nigerian context, the Central Bank of Nigeria has put in place regulatory and supervisory frameworks designed to enforce sound banking practices, protect depositors' funds, and promote sustained stability in the financial system. This is because the stability and effectiveness of the banking sector are pivotal not only for financial markets but also for the broader economic well-being of a nation (Saeed & Zahid, 2016). As the custodians of capital, banks are entrusted with a critical role in allocating resources, promoting economic growth, and safeguarding the financial interests of individuals and businesses (Ouenniche & Carrales, 2018). In fact, the banking sector is a critical pillar of any economy, serving as a conduit for financial intermediation and economic development. Saeed & Zahid (2016) posit that bank performance carries significant implications for both domestic and international economies.

It has been strenuously argued that a bank's financial well-being is not exclusively dependent on its profit margins or market share, but it also depends on its financial stability, operational efficiency (OPE) (Lotto, 2019), and the management of loan portfolios (Benthem, 2017). Hence, the capital adequacy ratio (CAR) of banks stands as a pivotal metric since it measures the bank's capital strength and its ability to withstand financial shocks. Efficient operations, on the other hand, are vital for ensuring that a bank remains competitive and agile in a rapidly evolving financial environment (Alber, 2017; Gill et al., 2014). Concurrently, the management of non-performing loan (NPL) is essential to curbing potential financial crises and safeguarding the interests of both the banking industry and the broader economy (Aldayel & Fragouli, 2018). A resilient banking sector is a cornerstone of economic stability since it ensures the safekeeping of deposits, the efficient allocation of resources, and access to credit, which fuels business growth and personal aspirations alike (Too & Makokha, 2021). Understanding the specific dynamics that link these factors to bank performance is more like an inquiry into the economic health and stability of a nation. The CAR is a regulatory requirement that mandates banks to maintain a minimum level of capital in proportion to their risk-weighted assets. In essence, it serves as a buffer to protect banks from unexpected losses. Operating efficiency, often assessed through metrics like the cost-to-income ratio, reflects how well a bank uses its resources to generate income (Benthem, 2017). NPLs are loans that are at risk of default or have already defaulted, posing potential losses to the bank.

Lotto (2019) contended that OPE is an enormous challenge in the modern banking system, which requires not only minimizing costs but also ensuring a seamless and customer-centric banking experience. Kornelakis et al. (2022) noted that the rise of digital banking and fintech innovations has added a layer of complexity to this issue. As banks strive to balance the need for technological investments with cost containment, a thorough examination of the relationship between operating efficiency and bank performance has become much more imperative (Olawajaju & Obalade, 2015). Finally, NPLs have been a perennial challenge for the banking sector. They not only affect a bank's profitability but can also trigger systemic risks, according to Saeed & Zahid (2016). The management of NPLs involves a delicate balance of risk assessment, loan restructuring, and potential write-offs. In recent times, the COVID-19 pandemic and its economic fallout have heightened concerns about the surge in NPLs (Kryzanowski et al., 2023).

Ideally, CAR ought to be meticulously maintained in order to ensure that banks have adequate reserves to absorb unexpected financial shocks while safeguarding the interests of depositors (Karim, 2019). In the same vein, operating efficiency should be optimized, with banks utilizing resources to provide seamless services that meet the evolving expectations of their customers (Alber, 2017). Simultaneously, NPL should be minimal, signifying that the risk of loan defaults is effectively managed (Saeed & Zahid, 2016; Zou & Li, 2014). In this utopian state, the Nigerian banking sector would serve as a paragon of financial stability, fostering economic growth and prosperity. However, the CAR of many banks vary, raising questions about their resilience and capacity to protect against economic downturns. Operating efficiency is often hampered by legacy systems and processes, making it challenging for banks to keep pace with the digital transformation sweeping the financial sector. NPL, especially in the wake of the COVID-19 pandemic, has shown signs of increasing (Kryzanowski et al., 2023), threatening both the financial soundness of banks and the broader economy.

As a consequence, insufficient capital adequacy exposes banks to systemic risks, potentially triggering financial crises that could disrupt the stability of the national and global financial systems (Obafemi et al., 2021). Benthem (2017) argued that suboptimal operating efficiency hinders banks' ability to cater to the evolving demands of customers, eroding their market competitiveness and potentially leading to customer attrition. According to Rasyid & Kurniawati (2022), the growth of NPL, especially in a post-pandemic economic recovery phase, threatens the health of banks and their ability to support economic growth through lending. These consequences, if left unaddressed, can undermine the overall financial stability of the country and have broad socioeconomic impacts on its citizens. Hence, the problem at hand demands comprehensive exploration and analysis to identify effective solutions and strategies for mitigating the challenges faced by the Nigerian banking sector.

The reviewed literature shows a clear gap in existing research. Except for the study by Odekina et al. (2019), no prior study has jointly examined CAR, OPE, and NPL within a single linear regression model to explain variations

in bank performance. Most existing studies have treated these variables independently rather than integrating them into a unified analytical framework. Furthermore, studies such as Chaudhary & Kumar (2023), Isenberg et al. (2022), Mamari et al. (2022), Naibaho & Mayayogini (2023), as well as Rasyid & Kurniawati (2022), do not investigate the interactive effect of capital adequacy and OPE on return on assets (ROA). In particular, none of these studies focus on how the combined influence of these factors shapes the performance of Nigerian banks. This omission highlights the need for empirical analysis that captures both their individual and joint effects.

1.1 Objectives of the Study

The broad aim of this study is to examine the effect of financial soundness on the profitability of listed commercial banks in Nigeria. The specific objectives are as follows:

- (i) To examine the effect of the CAR on the ROA of commercial banks in Nigeria.
- (ii) To assess the extent to which OPE affects the ROA of commercial banks in Nigeria.
- (iii) To ascertain the effect of non-performing loan ratio (NPLR) on the ROA of commercial banks in Nigeria.
- (iiii) To examine the interaction effect of CAR and OPE on the ROA of commercial banks in Nigeria.

2. Literature Review

2.1 Conceptual Review

2.1.1 Financial soundness

Financial soundness refers to the overall health and stability of a financial institution, encompassing its ability to meet obligations, sustain operations, and withstand economic shocks (Ilgin, 2024). This concept is vital as it encapsulates the institution's capacity to remain solvent, liquid, and profitable over time, ensuring that it can fulfill its commitments to depositors, creditors, and other stakeholders (Aguwamba et al., 2023). Financial soundness is not only about current performance but also involves the institution's resilience to future financial stress, indicating robust financial management and prudent risk-taking practices (Oseni, 2024). A financially sound institution is characterized by its ability to generate sufficient revenue to cover its operational costs, service its debt, and provide returns to its shareholders. This implies a balanced approach to managing income and expenses, maintaining a sustainable profit margin, and ensuring that its financial activities are conducted efficiently.

A financially sound institution maintains an adequate level of liquid assets, which can be quickly converted to cash to cover unexpected withdrawals or financial needs (Ilgin, 2024). This liquidity buffer acts as a safeguard against potential liquidity crises, ensuring that the institution can continue its operations smoothly even in adverse conditions. Furthermore, maintaining a strong liquidity position reflects prudent financial planning and risk management, contributing to the institution's overall stability. Also, a sound financial institution employs comprehensive risk management strategies to minimize the adverse impacts of these risks on its financial health (Oseni, 2024). Effective risk management not only protects the institution from potential losses but also enhances its ability to capitalize on opportunities, thus supporting sustainable growth and stability. Regulatory requirements, such as the Basel III framework, emphasize the importance of maintaining adequate capital buffers to enhance the resilience of financial institutions. A financially sound institution ensures that it meets or exceeds these regulatory capital requirements, demonstrating its capacity to withstand financial shocks and protect the interests of its stakeholders. In essence, financial soundness represents a holistic measure of a financial institution's health and stability, integrating profitability, liquidity, risk management, and capital adequacy (Aguwamba et al., 2023). It reflects the institution's ability to operate effectively, fulfill its obligations, and thrive in a dynamic and often uncertain economic environment (Ilgin, 2024).

2.1.2 Capital adequacy

CAR assesses the bank's capital in relation to its risk-weighted assets, computed by dividing the bank's capital by assets that are adjusted for their relative riskiness (Hasanudin et al., 2023). The capital, in this context, involves the bank's total equity capital, encompassing elements such as common stock, preferred stock, retained earnings, and other reserves. This ratio provides information as to whether the bank requires external sources of financing (Pang, 2021). Capital adequacy, in essence, assesses the extent to which a bank's net worth can act as a safeguard against the potential adverse impacts arising from its risky loans (Echobu & Okika, 2019). This, in turn, serves as a bulwark against widespread distress within the banking industry, ultimately fueling business efforts and performance (Ezike & Oke, 2013), and diminishing credit risk when maintained at high levels (Mukhtarov et al., 2018). The higher the CAR, the lower the necessity for external financing, thereby reducing external financing costs and diminishing bankruptcy risks (Al Zaidanin & Al Zaidanin, 2021). According to Astuti et al. (2023), this ratio points at the bank's capacity to weather potential losses and bankruptcy risks. Consequently, a statistical and positive correlation exists between the CAR and the profitability of banks (Athanasoglou et al., 2008). However, Ndolo (2015) reported a non-significant positive impact of CAR on bank performance.

A higher CAR signifies a robust financial position, as it reflects a larger capital buffer that can absorb losses, bolstering the bank's financial stability (Sunardi & Tatariyanto, 2023). Conversely, a lower CAR suggests greater vulnerability to financial shocks and heightened default risks (Amissah & Opoku, 2023). Regulatory requirements necessitate that banks maintain a minimum CAR, a threshold that can vary by country and depends on factors like the bank's type and risk profile. Generally, banks deemed systemically important or possessing a higher risk profile are subject to more stringent CAR requirements (Hasanudin et al., 2023). Maintaining a robust CAR is of paramount importance for banks, as it not only instills investor confidence but also enables cost-effective funding, as it's seen as a lower-risk investment (Amissah & Opoku, 2023).

2.1.3 Operational efficiency

Odunga et al. (2013) submitted that OPE in the banking sector, often referred to as the activity ratio, offers a critical framework through which a bank's resource management is assessed. Efficiency, in this context, refers to the ability of a bank to accomplish the greatest productivity with the least resource allocation (Ouenniche & Carrales, 2018). Typically, an inefficient operation involves higher costs, which can subsequently lead to diminished overall company performance. The ultimate aim of OPE is to curtail costs while simultaneously maximizing output (Osazefua, 2019), thereby enhancing the overall financial performance of the bank. Measuring OPE entails an examination of the company's activity ratios, a set of financial metrics designed to evaluate how efficiently the company deploys its assets to generate revenue (Nworie et al., 2023). The activity ratios collectively show the effectiveness of the company's operations, and also identify areas that might benefit from enhancement. Efficiency stands as a cornerstone for an organisational prosperity (Muomaife et al., 2025). An inefficient operation often translates to increased costs, potentially leading to reduced profitability and diminished competitiveness (Odunga et al., 2013). Moreover, inefficiencies can introduce inaccuracies in financial reporting, as managers may be tempted to manipulate financial statements in a bid to conceal operational inefficiencies (Ouenniche & Carrales, 2018). According to Sulistyawati & Suryani (2022), enhancing the OPE of banks entails a strategic focus on streamlining processes, curbing wastage, and optimizing resource utilization.

2.1.4 Non-performing loan

NPL is commonly referred to as a "non-performing debt" or "bad debt". Generally, an NPL can be defined as a loan or debt obligation where the borrower has failed to make scheduled payments (including interest and principal payments) for an extended period (Pang, 2021). NPLR stands as a focal gauge of asset quality, the sound composition of a loan portfolio, and the efficacy of a bank's credit risk management practices (Samson, 2021). However, a high NPLR serves as a warning signal for both bank management and regulatory authorities, signaling the presence of weak asset quality and heightened risk within the bank's operations. Consequently, the NPLR to total loans exerts a negative influence on the bank's overall efficiency and ROA. Furthermore, an NPL can be defined as a loan in which the customer's payments are consistently delayed (Kauko, 2012). In essence, it is a loan for which the borrower fails to make timely payments, triggering concern about the loan's performance and its implications for the bank's financial stability and risk management.

In line with the guidelines of the International Monetary Fund, a loan is regarded as non-performing when the borrower fails to meet interest or principal repayment obligations for a period exceeding 90 days, or when outstanding interest for more than 90 days has been rescheduled, capitalized, or deferred through formal agreement (Zou & Li, 2014). In addition, loans may be classified as non-performing even before reaching the 90-day mark if there is clear evidence that repayment is unlikely (Akomeah et al., 2020). Elevated levels of NPL pose serious challenges to banking institutions, as they weaken liquidity positions and limit the capacity of banks to create new credit. This erosion of lending ability negatively affects banks' financial performance and undermines confidence in the banking system. Beyond the banking sector, persistent loan defaults also constrain the flow of funds to productive sectors of the economy, thereby impeding real sector expansion and broader economic growth (Echobu & Okika, 2019).

2.1.5 Bank profitability

Bank profitability is defined as the extent to which a bank achieves its goals of generating income that surpasses its expenditures (Nworie & Agwaramgbo, 2023; Pham, 2023). It serves as an indicator of the bank's success in realizing its financial goals and obligations (Mamari et al., 2022). Elamer & Benyazid (2018) hold the opinion that the growth and prosperity of a nation are intrinsically linked to the performance of its financial institutions, primarily because these institutions handle substantial transaction volumes. Consequently, stakeholders such as investors and participants in the capital market must gain a profound understanding of a bank's financial profitability, especially when considering extending credit facilities and other financial services (Odubuasi et al., 2020).

According to Rodrigues (2017), the profitability of a bank stands as a pivotal determinant of its long-term viability and financial success. This evaluation involves a thorough examination of the bank's financial documents, encompassing the income statement, balance sheet, and cash flow statement, all of which collectively reflect its

economic performance over a specific timeframe (Pinto et al., 2017). The essence of this assessment is to determine whether or not the financial objectives and obligations set by the bank have been met. These objectives form the yardstick against which the institution's performance is evaluated. Notably, the bank's capability to generate revenue, manage its expenses effectively, uphold a robust credit portfolio, and adeptly mitigate risks all constitute fundamental facets of its financial performance (Avşarlıgil et al., 2023).

The assessment of a bank's financial profitability delves into the effective utilization of assets in its primary operational sphere, crucial for revenue generation (Hawaladar et al., 2017). In this study, bank profitability is indexed by ROA, which indicates the extent to which a bank deploys its assets or resources to generate income (Pang, 2021).

In establishing a firm's financial standing, a thorough analysis of financial performance is conducted, aiming to identify its strengths and weaknesses by establishing interconnections between elements found in both the financial position and income statement, as asserted by Irungu (2013). To gauge this performance, various metrics and ratios come into play, including the total expense ratio, operating expense ratio, return on shareholders' funds, asset turnover ratio, and ROA, which are commonly employed to assess financial health (Elamer & Benyazid, 2018).

2.2 Theoretical Framework

2.2.1 Financial distress theory

The genesis of financial distress theory can be traced back to the conceptualization proposed by Gordon (1971), with subsequent popularization by Baldwin and Scott in 1983. This theory postulates that a company falls into a state of financial distress when it encounters an inability to fulfill its financial commitments. Typically, the initial indications of financial distress manifest as missed debt payments and a reduction or complete cessation of dividend disbursements (Muriithi, 2016). The inaugural year of financial distress is characterized by a scenario where the company's cash flows prove inadequate to cover its existing long-term debt obligations. As long as the cash flows surpass these debt obligations, the company can continue to meet its creditor obligations. A pivotal facet in identifying companies grappling with financial distress is their incapacity to meet the contractual debt commitments (Al Zaidanin & Al Zaidanin, 2021). The emergence of financial distress is frequently attributed to economic challenges, sub-optimal efficiency, and inadequate credit risk management (Gordon et al., 2009). The progression of financial distress generally commences with an incubation period, marked by unfavorable economic conditions and suboptimal management practices that can lead to costly missteps.

In the context of banks, the inability to meet depositors' cash demands and borrowers' loan requirements can trigger a liquidity crisis. Effective oversight of loan portfolios emerges as a pivotal element in safeguarding a bank's liquidity. It is incumbent upon banks to prudently navigate credit, operational and liquidity risks to forestall the onset of financial distress. The foundation of the Financial Distress Theory lies in the realm of liquidity, operational and credit risks confronting businesses (Fakhar et al., 2023). This theory stands as an impartial framework through which the effect of CAR, NPLR and OPE on bank performance, as examined in this study, is viewed. The Financial Distress Theory assumes particular relevance in the context of this study since credit risk, liquidity risk and operational risk emerge as the foremost triggers of financial distress in the banking sector (Kedarya et al., 2023). As per the theory, a state of financial distress ensues when a company grapples with an inability to fulfill its financial obligations or when the revenue generated is not sufficient to cover the operational cost.

2.3 Empirical Review

Al Zaidanin & Al Zaidanin (2021) as well as Chaudhary & Kumar (2023) reported a significant adverse impact of NPLs on profitability, supporting the notion that higher NPL levels undermine banks' ability to generate returns. This aligns with Ayodele et al. (2021) and Samson (2021) in Nigeria, who also observed a negative influence, particularly on ROA. However, some studies contradict this position; Isenberg et al. (2022) found a positive link in the US and Europe, while Olaoye & Fajuyagbe (2020) as well as Omiagbo & Daniel (2021) reported a positive relationship in Nigeria, though the latter deemed it insignificant. Others, such as Isedu & Erhabor (2021) and Rasyid & Kurniawati (2022), also found the NPL-performance link to be statistically insignificant. These inconsistencies may be attributed to variations in banking sector structures, macroeconomic conditions, and regulatory frameworks in the studied regions, suggesting that the effect of NPLs is context-dependent.

Operational risk effects on bank performance also show mixed patterns in the reviewed literature. While Naibaho & Mayayogini (2023) concluded that operational risk has no significant impact on firm performance in Southeast Asia, other studies found notable positive links. For instance, Fadun & Oye (2020) in Nigeria and Mamari et al. (2022) in Oman both reported that operational risk management practices improve profitability, suggesting that better control of operational risk may enhance efficiency and returns. This divergence in results could stem from differences in how operational risk is measured, the maturity of risk management frameworks, or sectoral characteristics. Notably, in contexts where operational risk management is formalized and integrated into

decision-making processes, such as in Oman and some Nigerian banks, the relationship appears more beneficial, whereas in less mature systems, its effect may be muted or statistically insignificant.

The CAR also presents inconsistent relationships with financial performance across studies. Some, such as Omiagbo & Daniel (2021) and Samson (2021) in Nigeria, reported a positive association between CAR and profitability, suggesting that strong capital buffers enhance financial stability and investor confidence, ultimately supporting returns. Similarly, Al Zaidanin & Al Zaidanin (2021) in the UAE and Isenberg et al. (2022) in the US and Europe found positive but statistically insignificant effects, indicating that while capital strength may signal stability, it does not always translate directly into higher profitability. Conversely, Ayodele et al. (2021) found a negative influence of CAR in Nigeria, implying that excessive capital reserves might limit revenue-generating investments.

Ekinci & Poyraz (2019) found that higher NPL correlate with lower ROA in Turkish banks, while Odekina et al., (2019) observed that NPLR significantly and negatively affected Nigerian banks' financial performance. Siriba (2020) similarly recorded an insignificant negative effect of NPL on profitability among Kenyan commercial banks, suggesting the expected adverse pressure of bad loans on earnings is present but sometimes weak. These negative findings align with the intuitive mechanism that loan losses consume income and erode returns, particularly in contexts where provisioning and recovery are challenging.

Yet other studies complicate this narrative by producing neutral or even positive relationships, pointing to context and methodology as important moderators. Saeed & Zahid (2016) reported a positive effect of NPL on ROA but a negative effect on ROE for UK banks, though neither effect reached significance, which may reflect differences in bank capitalization or accounting treatments across jurisdictions. Zou & Li (2014) found a significant positive effect of NPL on both ROE and ROA among major European banks, an unexpected result that could stem from sample composition, differing definitions of NPL, or time windows that capture recovery and provisioning dynamics. Karim (2019) highlighted variation between countries (UAE and UK) in how credit risk management translates into performance, reinforcing that institutional frameworks and managerial responses shape whether NPL depress, negligibly affect, or coincidentally associate with profitability.

OPE and capital adequacy also show inconsistent links to performance across these studies, underscoring the multifaceted drivers of bank outcomes. Alemayehu & Belete (2019) and Ndolo (2015) both found OPE positively influences performance, suggesting cost and process improvements raise returns in several African contexts, while Gill et al. (2014) reported the opposite for Indian manufacturing firms, indicating industry and measurement differences matter. On capital adequacy, Odekina et al., (2019) observed a significant positive impact on Nigerian banks, whereas Ndolo (2015) found a positive but non-significant effect, and Zou & Li (2014) reported an insignificant positive effect in Europe. These varying outcomes point to possible trade-offs between regulatory compliance and profit-maximizing behavior, which may differ depending on economic conditions, market competition, and management strategies.

3. Methodology

This study adopts an ex-post facto research design and applies quantitative techniques for data analysis. The choice of this design is informed by the nature of the investigation, which relies on historical data and examines relationships among variables that cannot be manipulated by the researcher. Since the events under consideration have already occurred, the ex-post facto approach is suitable for evaluating patterns and associations using statistical methods. This design supports objective analysis and allows causal inferences to be drawn from existing financial records in line with the objectives of the study (Nworie et al., 2022; Saunders et al., 2012).

The population of the study comprises all thirteen (13) deposit money banks listed in Nigeria during the period under review. These banks include Access Bank Nigeria Plc, Ecobank Transnational Incorporated Bank Nigeria Plc, Fidelity Bank Nigeria Plc, First Bank Nigeria, First City Monument Bank Nigeria, Guaranty Trust Bank, Stanbic IBTC, Sterling Bank, Union Bank, United Bank for Africa Plc, Unity Bank, Wema Bank Plc, and Zenith Bank Nigeria Plc.

A purposive sampling technique was employed to select ten (10) banks from the population. The selection was based primarily on the consistency and availability of audited annual reports and complete financial data over the study period spanning 2014 to 2023. The banks included in the final sample are Access Bank Nigeria Plc, Ecobank Transnational Incorporated Bank Nigeria Plc, Fidelity Bank Nigeria Plc, Guaranty Trust Bank, Sterling Bank, Union Bank, United Bank for Africa Plc, Unity Bank, Wema Bank Plc, and Zenith Bank Nigeria Plc.

Secondary data used in the analysis were extracted from the published annual financial statements of the sampled banks for the ten-year period. The variables obtained from these reports include the CAR, OPE ratio, NPLR, and ROA, which form the basis for assessing the relationship between financial soundness and profitability.

Table 1 shows the operational measurement of variables.

The secondary data obtained for the study were first examined using descriptive statistical techniques. This stage involved computing summary statistics such as the mean, standard deviation, and range in order to present an overall picture of the data. The descriptive results helped to illustrate the distribution, dispersion, and general

behavior of the variables over the ten-year period spanning 2014 to 2023.

Table 1. Operationalization of variables

Variable	Measurement	Source
Return on asset	$\frac{Net\ profit}{Total\ asset}$	Pang (2021)
Non-performing loan ratio	$\frac{Non - performing\ loans}{Total\ loans}$	Hudu et al. (2019)
Capital adequacy ratio	$\frac{Shareholders' funds}{Total\ asset}$	Kajola et al. (2018)
Operational efficiency	$\frac{Operating\ cost}{Opertaing\ income}$	Kaharuddin & Yusuf (2022)

Subsequently, the study employed the ordinary least squares (OLS) regression method to address the research objectives and empirically test the formulated hypotheses. The econometric model used in the analysis was developed with reference to the framework proposed by Odekina et al. (2019), but was appropriately adjusted and extended to reflect the variables and focus of the current study.

$$ROA_{it} = \alpha_0 + \beta_1 CAR_{it} + \beta_2 OPE_{it} + \beta_3 NPLR_{it} + \beta_3 CAR * OPE_{it} + \mu_{it}$$

where,

ROA = Return on asset

CAR = Capital adequacy ratio

OPE = Operational efficiency

NPLR = Non-performing loan Ratio

*CAR*OPE* = Interactive influence of capital adequacy ratio and operational efficiency

α = Constant

β_{1-3} = Regression coefficients

it = Firm and year identifiers

4. Data Analysis

4.1 Descriptive Test

Table 2 presents the descriptive statistics for ROA. The mean ROA of 0.015870 indicates that, on average, the banks generated a modest positive return from their total assets, suggesting moderate profitability during the period under review. However, the minimum value of -0.095318 shows that some banks experienced losses, while the maximum value of 0.061537 reflects comparatively strong performance by others, indicating wide variation in profitability. This is further confirmed by the standard deviation of 0.017661, which suggests noticeable dispersion around the mean. The negative skewness (-1.857439) implies that more observations cluster around higher ROA values with a long tail toward lower returns. The high kurtosis value (17.97307) indicates a leptokurtic distribution with extreme values. Although the Jarque-Bera probability confirms non-normality, the sample size of 100 satisfies the central limit theorem, allowing reliable statistical inference.

Turning to CAR in Table 2, the mean value of 0.058969 suggests that, on average, banks maintained a reasonable level of capital relative to their assets, which is important for financial stability. The wide range between the maximum value of 0.242686 and the minimum value of -1.547496 indicates substantial disparities in capital strength across banks, with some institutions experiencing severe capital erosion. This variability is reflected in the relatively high standard deviation of 0.259887. The strong negative skewness (-4.153964) shows that most observations lie above the mean, with extreme negative values pulling the distribution leftward. The kurtosis value of 21.42540 indicates heavy tails and the presence of outliers. Despite the non-normal distribution confirmed by the Jarque-Bera test, the central limit theorem supports the use of the data for further econometric analysis.

Table 2 also reports descriptive statistics for OPE. The mean value of 0.008591 suggests that, on average, operating costs were relatively low compared to operating income, indicating efficient cost management for most banks. However, the extremely high maximum value of 1.089241 and the very low minimum value of -65.76636 reveal significant inconsistencies in operational performance across banks. This is reinforced by the large standard deviation of 6.646273, which points to substantial dispersion. The highly negative skewness (-9.838768) indicates that most observations are concentrated at higher efficiency levels, while extreme negative values distort the distribution. The exceptionally high kurtosis of 97.87226 signals severe leptokurtosis and the presence of extreme outliers. Although the Jarque-Bera probability confirms non-normality, the sample size ensures robustness under the central limit theorem.

Table 2. Descriptive test

	ROA	CAR	OPE	NPLR
Mean	0.015870	0.058969	0.008591	0.062179
Median	0.011801	0.113051	0.705978	0.045698
Maximum	0.061537	0.242686	1.089241	0.764197
Minimum	-0.095318	-1.547496	-65.76636	0.000000
Std. Dev.	0.017661	0.259887	6.646273	0.089385
Skewness	-1.857439	-4.153964	-9.838768	5.855302
Kurtosis	17.97307	21.42540	97.87226	42.64547
Jarque-Bera	991.6380	1702.154	39116.47	7120.423
Probability	<0.0001	<0.0001	<0.0001	<0.0001
Sum	1.586967	5.896941	0.859111	6.217947
Sum Sq. Dev.	0.030880	6.686582	4373.122	0.790974
Observations	100	100	100	100

Note: Descriptive test output from Eviews 10 (2024). ROA = return on assets; CAR = capital adequacy ratio; OPE = operational efficiency; NPLR = non-performing loan ratio.

Finally, the NPLR statistics in Table 2 show a mean of 0.062179, indicating that, on average, NPLs constituted a moderate proportion of total loans, reflecting manageable credit risk overall. The minimum value of 0.000000 suggests that some banks reported no NPL, while the maximum value of 0.764197 highlights severe loan quality problems in certain cases. The standard deviation of 0.089385 implies considerable variation in credit risk among banks. The strong positive skewness (5.855302) indicates that most banks had low NPLR, with a few extreme cases pushing the distribution to the right. The high kurtosis value of 42.64547 further confirms the presence of outliers. Despite the rejection of normality by the Jarque-Bera test, the central limit theorem justifies the use of the data for subsequent statistical analysis.

4.2 Test of Hypotheses

The study employed the OLS regression technique because its primary focus was on estimating the average linear relationship between financial soundness indicators and profitability across listed commercial banks over the study period. OLS provides unbiased and efficient estimates under the classical linear regression assumptions and is appropriate where the objective is to assess overall effects rather than bank-specific heterogeneity. In addition, the dataset exhibited a balanced structure with a relatively moderate time dimension, making pooled OLS a practical and parsimonious estimation approach. Although the data are panel in nature, preliminary diagnostic considerations indicated that unobserved bank-specific effects were not the central concern of the study. Consequently, fixed or random effects models were not adopted, as they would have reduced degrees of freedom and potentially obscured the interaction effects under investigation. Nevertheless, OLS remains suitable for inference in this context, especially given its widespread use in similar empirical banking studies.

Evidence from Table 3, which presents the results of the hypothesis testing, reveals that the regression model has an adjusted R^2 value of 0.858392. This indicates that about 85.84% of the changes observed in the ROA of listed commercial banks in Nigeria are accounted for by the explanatory variables included in the model. These variables comprise the CAR, OPE, NPLR, as well as the combined interaction of CAR and OPE. The magnitude of this statistic demonstrates that the model captures a substantial proportion of the factors influencing bank profitability, reflecting a strong explanatory power and close alignment between the model and the observed data.

Table 3. Test of hypotheses using least squares method

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR	0.123584	0.005230	23.63134	<0.0001
OPE	-0.056045	0.003092	-18.12608	<0.0001
NPLR	-0.045638	0.007672	-5.948361	<0.0001
CAR*OPE	-0.125333	0.006882	-18.21099	<0.0001
C	0.052878	0.002220	23.82031	<0.0001
R^2	0.864114			
Adjusted R^2	0.858392			
F-statistic	151.0284	Durbin-Watson stat		1.325611
Prob (F-statistic)	<0.0001			

Note: OLS test output from Eviews 10 (2024). Dependent Variable: ROA; Sample: 1 100; Included observations: 100. CAR = capital adequacy ratio; OPE = operational efficiency; NPLR = non-performing loan ratio; C = constant.

In addition, the Prob (*F*-statistic) value < 0.0001 confirms that the regression equation is statistically robust. Being far below the conventional 5% significance level, this result shows that the joint effect of the independent variables on ROA is not due to chance. It therefore validates the overall suitability of the model in explaining profitability variations among Nigerian commercial banks. Collectively, the findings affirm that measures of financial soundness incorporated in the model exert a meaningful and statistically significant influence on banks' performance.

4.2.1 Test of hypothesis I

H01: CAR has no significant effect on the ROA of commercial banks in Nigeria.

The coefficient for CAR (CAR = 0.123584, $p < 0.0001$) indicates that a one-unit increase in CAR is associated with an approximate 12.36% increase in ROA, holding other factors constant. This positive marginal effect demonstrates that banks with higher capital buffers tend to generate greater returns on their assets, reflecting enhanced resilience and capacity to earn income from their investments. Since the *p*-Value is well below 0.05, the effect is statistically significant. Therefore, the null hypothesis H01, which posits that CAR has no significant effect on ROA, is rejected.

The findings of the study indicate that the CAR has a significant positive effect on the ROA of commercial banks in Nigeria. This positive relationship suggests that banks with higher capital adequacy are more profitable. CAR reflects the bank's ability to absorb potential losses and maintain financial stability. When banks have a higher CAR, they are better positioned to withstand financial shocks, which enhances investor confidence and potentially lowers the cost of capital. This stability allows banks to pursue profitable opportunities with less risk, thereby increasing their ROA. Moreover, well-capitalized banks are likely to have better access to funding and can expand their lending activities, further driving profitability. Samson (2021) found a positive effect of CARs on bank performance, which aligns with the findings of Al Zaidanin & Al Zaidanin (2021) in the UAE. However, Isenberg et al. (2022) reported no significant impact of CAR on American and European banks. Adequate capital reserves boost confidence in the banking sector, fostering economic participation and stability (Omiagbo & Daniel, 2021). Conversely, inadequate capital reserves can lead to severe consequences during financial crises, as demonstrated by Ayodele et al., (2021), who noted a detrimental effect of CAR on bank ROA in Nigeria. Omiagbo & Daniel (2021) also identified a positive correlation between CAR and the profitability of Nigerian commercial banks, highlighting the importance of sufficient capital in preventing systemic risks and ensuring financial stability.

4.2.2 Test of hypothesis II

H02: OPE has no significant effect on the ROA of commercial banks in Nigeria.

OPE has a coefficient of -0.056045 with a $p < 0.0001$. This implies that a one-unit increase in OPE—representing higher operating costs relative to operating income—leads to a 5.60% reduction in ROA, *ceteris paribus*. The negative effect reflects that inefficiencies in managing operating expenses can substantially diminish profitability. The *p*-Value indicates that this negative effect is statistically significant at the 5% level, leading to the rejection of H02.

OPE has a significant negative effect on the ROA of commercial banks in Nigeria. This finding indicates that higher operational costs relative to operating income reduce profitability. When banks are inefficient in their operations, they incur higher costs, which erode the profits generated from their assets. Inefficiencies could stem from outdated technology, poor management practices, or excessive overhead costs. These inefficiencies lead to higher operating expenses, which reduce the net income available to shareholders. As a result, improving OPE is crucial for banks to enhance their profitability. Streamlining processes, adopting new technologies, and reducing unnecessary expenses are some ways banks can improve their OPE and thus their ROA. Alemayehu & Belete (2019) in Ethiopia and Ndolo (2015) in the Nairobi Securities Exchange demonstrated a positive effect of OPE on bank performance. However, findings from Southeast Asia by Naibaho & Mayayogini (2023) contradicted this, showing no significant influence of operational risk on corporate performance, whereas Fadun & Oye (2020) in Nigeria reported a positive correlation between operational risk management practices and bank financial performance. Similarly, Rasyid & Kurniawati (2022) identified a significant positive impact of OPE, while Isedu & Erhabor (2021) found non-significant negative effects.

4.2.3 Test of hypothesis III

H03: NPLR has no significant effect on the ROA of commercial banks in Nigeria.

The NPLR (NPLR = -0.045638, $p < 0.0001$) has a negative marginal effect on ROA, meaning that a one-unit increase in NPLR reduces ROA by approximately 4.56%, assuming other factors remain constant. This demonstrates that higher proportions of NPLs directly constrain profitability, likely through reduced interest income and increased provisioning requirements. Given the *p*-Value is below 0.05, the effect is statistically significant, resulting in the rejection of H03.

The NPLR also has a significant negative effect on the ROA of commercial banks in Nigeria. NPLs represent loans that are in default or close to being in default. A higher NPLR indicates a larger proportion of bad loans

relative to total loans, which negatively impacts profitability. When banks have a high NPLR, they need to set aside more provisions for potential loan losses, which directly reduces their net income. Additionally, high levels of NPLs indicate poor credit risk management and can lead to significant financial losses. This reduces the funds available for productive lending and investment activities, further diminishing profitability. Therefore, maintaining a low NPLR through effective credit risk management is essential for enhancing bank profitability. Al Zaidanin & Al Zaidanin (2021) in the UAE, Chaudhary & Kumar (2023) in India, and Ekinci & Poyraz (2019) in Turkey consistently found significant negative effects of NPLR on profitability indicators such as ROA and Return on Equity (ROE). Conversely, research in Nigeria by Isedu & Erhabor (2021) and in Indonesia by Rasyid & Kurniawati (2022) showed non-significant effects, indicating that the influence of NPL may vary significantly by region. Isenberg et al. (2022) discovered a positive influence of NPL on bank performance in American and European banks, while Zou & Li (2014) reported significant positive effects on ROE and ROA in European banks, further highlighting regional disparities. Saeed & Zahid (2016) in the UK found mixed results, with NPL positively impacting ROA but negatively impacting ROE, though without statistical significance.

4.2.4 Test of hypothesis IV

H04: The interaction of CAR and OPE has no significant effect on the ROA of commercial banks in Nigeria.

The interaction term between CAR and OPE ($CAR*OPE = -0.125333, p < 0.0001$) indicates that the combined effect of high capital and inefficient operations decreases ROA by roughly 12.53%. This negative effect suggests that the profitability benefits of higher capital adequacy are dampened when operational costs rise, highlighting the complex interplay between capital strength and cost management. The *p*-Value confirms statistical significance at the 5% level, leading to the rejection of H04.

The interaction effect of CAR and OPE on the ROA of commercial banks in Nigeria is significantly negative. This finding suggests that the positive impact of CAR on profitability is diminished when OPE decreases. In other words, while having a high CAR is beneficial for profitability, this advantage is less pronounced if the bank is not operating efficiently. Inefficient operations can offset the benefits of a strong capital base by increasing costs and reducing net income. This negative interaction highlights the importance of a balanced approach to financial management. Banks need to not only ensure they have sufficient capital to absorb potential losses but also focus on improving OPE to maximize their profitability.

5. Conclusion and Recommendations

The results highlight how the financial structure and internal cost dynamics of Nigerian commercial banks jointly shape profitability outcomes in a complex manner. The positive association between capital adequacy and ROA highlights the role of strong capital buffers in enhancing banks' capacity to absorb shocks, support asset growth, and sustain earnings, reinforcing the relevance of capital strength as a stabilizing factor within the banking system. At the same time, the adverse relationship between OPE and profitability suggests that rising operating costs relative to income materially erode returns, indicating that efficiency challenges can offset gains derived from capital strength. This dynamic becomes more pronounced when considered alongside the negative influence of NPL, which reflects the burden of deteriorating asset quality on earnings through reduced interest income and higher provisioning costs. The combined effect of these variables reveals that profitability is not driven by isolated financial indicators but by their simultaneous interaction. In particular, the significant negative interaction between capital adequacy and OPE suggests that the benefits of holding higher capital levels may be weakened when banks operate inefficiently, as the costs associated with maintaining capital and managing operations outweigh the potential returns generated from assets. This interaction highlights a structural tension within bank performance, where capital strength alone does not guarantee improved profitability if not supported by sound cost management practices.

Hence, we recommend that:

1. Commercial bank management in Nigeria should maintain adequate capital buffers above regulatory minimums to strengthen asset expansion and income-generating capacity, as the positive effect of capital adequacy on ROA indicates that well-capitalised banks are better positioned to withstand shocks and sustain profitability.

2. Executive management and operations managers of commercial banks should implement stricter cost-control mechanisms and efficiency-monitoring systems to reduce operating expenses relative to income, since the negative effect of OPE on ROA shows that excessive operational costs significantly undermine profitability.

3. Credit risk managers and loan review committees within Nigerian commercial banks should strengthen credit appraisal, monitoring, and recovery processes to curb the growth of NPLs, given that high NPLR materially reduces returns on assets through increased provisioning and lost interest income.

4. Board members and top-level executives of commercial banks should ensure that capital management decisions are closely aligned with operational cost structures, as the negative interaction between capital adequacy and OPE indicates that holding strong capital positions without effective operational discipline can weaken the profitability benefits of capital strength.

Author Contributions

C.D.M. contributed to the conceptualization of the study, development of the research design, and drafting of the manuscript. G.O.N. contributed to the data analysis, interpretation of results, and critical revision of the manuscript for important intellectual content. N.P.M. contributed to data collection, literature review, and organization of the research materials used in the study. All authors have read and agreed to the published version of the manuscript.

Data Availability

The data used to support the research findings are available from annual reports of the banks selected.

Conflicts of Interest

The authors declare no conflict of interest.

References

- Aguwamba, S. A., Ughulu, S. E., & Igboaguonor, W. (2023). Deposit money banks' financial soundness and economic growth in Nigeria. *J. Resour. Distinct.*, 19(1).
- Akomeah, J., Agumeh, R., & Siaw, F. (2020). Credit risk management and financial performance of listed banks in Ghana. *Res. J. Financ. Account.*, 11(6), 39–48. <https://doi.org/10.7176/RJFA/11-6-05>.
- Al Zaidanin, J. S. & Al Zaidanin, O. J. (2021). The impact of credit risk management on the financial performance of United Arab Emirates commercial banks. *Int. J. Res. Bus. Soc. Sci.*, 10(3), 303–319. <https://doi.org/10.20525/ijrbs.v10i3.1102>.
- Alber, N. (2017). Banking efficiency and financial stability: Which causes which? A panel analysis. In *Advances in Applied Economic Research: Proceedings of the 2016 International Conference on Applied Economics (ICoAE), Nicosia, Cyprus* (pp. 91–98). https://doi.org/10.1007/978-3-319-48454-9_7.
- Aldayel, M. & Fragouli, E. (2018). Risk management and performance: A case study of credit risk management in commercial banks. *Bus. Manag. Rev.*, 10(1), 169–183.
- Alemayehu, A. & Belete, A. K. (2019). Assessing the effect of operational efficiency on the performance of private and state owned commercial banks in Ethiopia. *Open J. Econ. Commer.*, 2(4), 18–27. <https://doi.org/10.22259/2638-549X.0204003>.
- Amissah, M. & Opoku, O. A. (2023). Effect of capital adequacy requirement on profitability of selected banks listed on Ghana Stock Exchange. *J. Manag. Stud. Dev.*, 2(01), 13–25. <https://doi.org/10.56741/jmsd.v2i01.174>.
- Astuti, E. P., Hermawati, R., & Handayani, R. (2023). Pengaruh capital adequacy ratio dan loan to deposit ratio terhadap return on asset pada Pt Bank Mandiri. *Sci. J. Reflect. Econ. Account. Manag. Bus.*, 6(1), 143–150. <https://doi.org/10.37481/sjr.v6i1.628>.
- Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *J. Int. Financ. Mark. Inst. Money*, 18(2), 121–136. <https://doi.org/10.1016/j.intfin.2006.07.001>.
- Avşarlıgil, N., Dođru, E., & Cığır, A. (2023). The bank performance ranking in the emerging markets: A case of Turkey. *Sosyoekonomi*, 31(55), 69–84. <https://doi.org/10.17233/sosyoekonomi.2023.01.04>.
- Ayodele, O. E., Olaoye, A. C., & Afolabi, B. (2021). Impact of credit risk on bank performance in Nigeria. *Int. J. Manag.*, 12(3), 165–174. <https://doi.org/10.34218/IJM.12.3.2021.015>.
- Benthem, C. S. (2017). *The relation among non-performing loans, operating efficiency, and capitalization in commercial banking* [Mastersthesis]. University of Twente, Netherlands.
- Chaudhary, P. & Kumar, A. (2023). Impact of credit risk on the performance of Indian banks. *J. Commer. Account. Res.*, 12(1), 29–38.
- Echobu, J. & Okika, N. P. (2019). Credit risks and financial performance of Nigerian banking industry. *Amity J. Financ.*, 4(1), 44–57.
- Ekinci, R. & Poyraz, G. (2019). The effect of credit risk on financial performance of deposit banks in Turkey. *Procedia Comput. Sci.*, 158, 979–987. <https://doi.org/10.1016/j.procs.2019.09.139>.
- Elamer, A. A. & Benyazid, I. (2018). The impact of risk committee on financial performance of UK financial institutions. *Int. J. Account. Financ.*, 8(2), 161–180. <https://doi.org/10.1504/IJAF.2018.093290>.
- Ezike, J. E. & Oke, M. O. (2013). Capital adequacy standards, Basle Accord and bank performance: The Nigerian experience (A case study of selected banks in Nigeria). *Asian Econ. Financ. Rev.*, 3(2), 146–159.
- Fadun, O. S. & Oye, D. (2020). Impacts of operational risk management on financial performance: A case of commercial banks in Nigeria. *Int. J. Financ. Bank. Stud.*, 9(1), 22–34. <https://doi.org/10.20525/ijfbs.v9i1.634>.

- Fakhar, S., Mohd Khan, F., Tabash, M. I., Ahmad, G., Akhter, J., & Al-Absy, M. S. M. (2023). Financial distress in the banking industry: A bibliometric synthesis and exploration. *Cogent Econ. Financ.*, *11*(2), 2253076. <https://doi.org/10.1080/23322039.2023.2253076>.
- Gill, A., Singh, M., Mathur, N., & Mand, H. S. (2014). The impact of operational efficiency on the future performance of Indian manufacturing firms. *Int. J. Econ. Financ.*, *6*(10), 259–269. <http://dx.doi.org/10.5539/ijef.v6n10p259>.
- Gordon, L. A., Loeb, M. P., & Tseng, C. Y. (2009). Enterprise risk management and firm performance: A contingency perspective. *J. Account. Public Policy*, *28*(4), 301–327. <https://doi.org/10.1016/j.jaccpubpol.2009.06.006>.
- Gordon, M. J. (1971). Towards a theory of financial distress. *J. Finance*, *26*(2), 347–356. <https://doi.org/10.2307/2326050>.
- Hasanudin, H., Awaloedin, D. T., & Apriyati, N. (2023). The effect of LDR ratio, CAR ratio and BOPO ratio on ROA in conventional banking on the Indonesia Stock Exchange period 2015–2020. *J. Manag. Leadersh. Superv. Educ.*, *8*(2), 560–571.
- Hawaldar, I. T., Rajesha T. M., Lokesha, J., & Kumar, A. (2017). Impact of financial and oil price crisis on the financial performance of selected banks in Bahrain. *Int. J. Econ. Res.*, *14*(18), 83–96.
- Hudu, G., Abdu, J. B., & Ibrahim, M. A. (2019). Credit risk management and financial performance of quoted deposit money banks in Nigeria. *J. Financ. Account. Manag.*, *10*(1), 26–42.
- Ilgın, K. S. (2024). The effects of IMF financial soundness indicators of Turkish commercial banks on the financial development index. *Int. J. Public Financ.*, *9*(1), 105–124. <https://doi.org/10.30927/ijpf.1428422>.
- Irungu, P.M. (2013). *The effect of interest rate spread on financial performance of banks in Kenya* [Mastersthesi]. University of Nairobi, Kenya.
- Isedu, M. & Erhabor, O. J. (2021). Does financial risks has effects on the performance of deposit money banks in Nigeria? *Saudi J. Bus. Manag. Stud.*, *6*(3), 71–85. <https://doi.org/10.36348/sjbms.2021.v06i03.004>.
- Isenberg, D. T., Sazu, M. H., & Jahan, S. A. (2022). How banks can leverage credit risk evaluation to improve financial performance. *CECCAR Bus. Rev.*, *3*(9), 62–72. <http://dx.doi.org/10.37945/cbr.2022.09.07>.
- Kaharuddin, K. & Yusuf, M. (2022). The impact of liquidity risk optimization on the stability of Islamic commercial banks in Indonesia. In *Proceeding of the International Conference on Economics and Business. Toraja, Indonesia* (pp. 671–688). <https://doi.org/10.55606/iceb.v1i2.231>.
- Kajola, S. O., Olabisi, J., Adedeji, S. B., & Babatolu, A. T. (2018). Effect of credit risk management on financial performance of Nigerian listed deposit money banks. *Scholedge Int. J. Bus.*, *5*(6), 53–62. <https://doi.org/10.19085/journal.sjibpg050601>.
- Karim, S. (2019). *The influence of credit risk management strategies on the performance of commercial banks: A comparative case study of UAE and UK commercial banks* [Phdthesis]. The University of Liverpool, United Kingdom.
- Kauko, K. (2012). External deficits and non-performing loans in the recent financial crisis. *Econ. Lett.*, *115*(2), 196–199. <https://doi.org/10.1016/j.econlet.2011.12.018>.
- Kedarya, T., Elalouf, A., & Cohen, R. S. (2023). Calculating strategic risk in financial institutions. *Glob. J. Flex. Syst. Manag.*, *24*, 361–372. <https://doi.org/10.1007/s40171-023-00342-3>.
- Kornelakis, A., Kirov, V., & Thill, P. (2022). The digitalisation of service work: A comparative study of restructuring of the banking sector in the United Kingdom and Luxembourg. *Eur. J. Ind. Relat.*, *28*(3), 253–272. <https://doi.org/10.1177/095968012111056829>.
- Kryzanowski, L., Liu, J., & Zhang, J. (2023). Effect of COVID-19 on non-performing loans in China. *Financ. Res. Lett.*, *52*, 103372. <https://doi.org/10.1016/j.frl.2022.103372>.
- Lotto, J. (2019). Evaluation of factors influencing bank operating efficiency in Tanzanian banking sector. *Cogent Econ. Financ.*, *7*(1), 1664192. <https://doi.org/10.1080/23322039.2019.1664192>.
- Mamari, S. H. A., Al Ghassani, A. S., & Ahmed, E. R. (2022). Risk management practices and financial performance: The case of Sultanate of Oman. *J. Account. Sci.*, *6*(1), 69–83. <https://doi.org/10.21070/jas.v6i1.15961>.
- Mukhtarov, S., Yüksel, S., & Mammadov, E. (2018). Factors that increase credit risk of Azerbaijani banks. *J. Int. Stud.*, *11*(2), 63–75. <https://doi.org/10.14254/2071-8330.2018/11-2/5>.
- Muomaife, C. D., Muomaife, N. P., & Nworie, G. O. (2025). Sustainability accounting practices in Nigeria: A case study of Anambra State Ministry of Environment. *IIARD Int. J. Econ. Bus. Manag.*, *11*(11), 67–80. <https://doi.org/10.56201/ijebm.vol.11.no11.2025.pg67.80>.
- Muriithi, J. G. (2016). *Effect of financial risk on financial performance of commercial banks in Kenya* [Phdthesis]. Jomo Kenyatta University of Agriculture and Technology, Kenya.
- Naibaho, E. A. B. & Mayayogini, N. M. C. (2023). The impact of risk management on firm performance: Corporate governance as moderating variable. *Media Ekonomi dan Manajemen*, *38*(1), 129–146. <https://doi.org/10.56444/mem.v38i1.3432>.
- Ndolo, P. S. (2015). *The relationship between operational efficiency and financial performance of firms listed at*

- the Nairobi securities exchange* [Phdthesis]. University of Nairobi, Kenya.
- Nworie, G. O. & Agwarambo, J. C. (2023). Determining the financial performance of tier-1 deposit money banks in Nigeria using bank liquidity. *Int. J. Acad. Manag. Sci. Res.*, 7(2), 166–181.
- Nworie, G. O., Anaike, C. L., & Onyeka, C. M. (2023). Computerised accounting system: A catalyst for improved operating performance of listed industrial goods firms in Nigeria. *J. Account. Financ. Manag.*, 8(4), 22–33. <https://doi.org/10.56201/jafm.v9.no4.2023.pg22.33>.
- Nworie, G.O., Okafor, T.G., & John-Akamelu, C.R. (2022). Firm-level traits and the adoption of computerised accounting information system among listed manufacturing firms in Nigeria. *J. Glob. Account.*, 8(3), 128–148.
- Obafemi, T. O., Araoye, F. E., & Ajayi, E. O. (2021). Impact of financial risk management policy on the financial performances of deposit money banks in Nigeria. *Int. J. Multidiscip. Res. Growth Eval.*, 2(3), 30–39.
- Odekina, I., Gabriel, A., & Solomon, T. (2019). Effect of capital adequacy, credit risk and operating efficiency on the performance of commercial banks in Nigeria. *Financ. Mark. Inst. Risks*, 3(1), 106–114. [http://doi.org/10.21272/fmir.3\(1\).92-114.2019](http://doi.org/10.21272/fmir.3(1).92-114.2019).
- Odubuasi, A., Wilson-Oshilim, U. D., & Ifurueze, M. (2020). Effect of market risks on the financial performance of firms in Nigeria. *Eur. J. Account. Audit. Financ. Res.*, 8(6), 28–45.
- Odunga, R. M., Nyangweso, P. M., Carter, D. A., & Mwarumba, M. (2013). Credit risk, capital adequacy and operating efficiency of commercial banks in Kenya. *Int. J. Bus. Manag. Invent.*, 2(9), 6–12.
- Olaoye, F. O. & Fajuyagbe, S. B. (2020). Credit risk management and profitability of selected deposit money banks in Nigeria: Panel data approach. *J. Account. Manag.*, 10(3).
- Olarewaju, O. M. & Obalade, A. A. (2015). Evaluation of the determinants of operational efficiency in Nigerian deposit money banks. *Int. J. Econ. Commer. Manag.*, 3(2), 1–13.
- Omiagbo, M. & Daniel, C. O. (2021). Effect of risk management on the financial performance of commercial banks in Nigeria. *World J. Manag. Bus. Stud.*, 1(1), 1–11.
- Osazefua, I. J. (2019). Operational efficiency and financial sustainability of listed manufacturing companies in Nigeria. *J. Account. Tax.*, 11(1), 17–31. <https://doi.org/10.5897/JAT2018.0329>.
- Oseni, E. (2024). Evaluation of Nigerian deposit money banks' soundness: Bankometer model. *Asian J. Econ. Bus. Account.*, 24(7), 30–50. <https://doi.org/10.9734/ajeba/2024/v24i71390>.
- Ouenniche, J. & Carrales, S. (2018). Assessing efficiency profiles of UK commercial banks: A DEA analysis with regression-based feedback. *Ann. Oper. Res.*, 266, 551–587. <https://doi.org/10.1007/s10479-018-2797-z>.
- Pang, H. Q. (2021). The effect of internal and external factors on credit risk: A study on Shawbrook Bank Limited in United Kingdom [Preprint]. *SSRN Electron. J.* <https://doi.org/10.2139/ssrn.3933670>.
- Pham, N. H. (2023). CEO characteristics and bank performance: Case of Vietnamese commercial banks. *Cogent Econ. Financ.*, 11(1), 2162687. <https://doi.org/10.1080/23322039.2022.2162687>.
- Pinto, P., Hawaldar, I. T., Rahiman, H. U., Rajesha, T. M., & Sarea, A. (2017). An evaluation of financial performance of commercial banks. *Int. J. Appl. Bus. Econ. Res.*, 15(22), 605–618.
- Rasyid, R. & Kurniawati, H. (2022). Credit risk, efficiency and bank financial performance before and time of the Covid-19 pandemic. In *3rd Tarumanagara International Conference on the Applications of Social Sciences and Humanities (TICASH 2021), Online.* (pp. 767–771). <https://doi.org/10.2991/assehr.k.220404.121>.
- Rodrigues, A. R. M. (2017). *Does diversity on boards impacts UK Banks performance? Comparison between multinational banks and national coverage ones* [Mastersthesis]. NOVA University Lisbon, Portugal.
- Saeed, M. S. & Zahid, N. (2016). The impact of credit risk on profitability of the commercial banks. *J. Bus. Financ. Aff.*, 5(2), 2167–0234. <https://doi.org/10.4172/2167-0234.1000192>.
- Samson, R. (2021). Investigate the effect of credit risk management on the financial performance of commercial banks in Nigeria from 2011 to 2017. *Eur. Scholar J.*, 2(4), 416–421.
- Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research Methods for Business Students*. Pearson Education.
- Siriba, R. M. (2020). Credit risk and financial performance of commercial banks in Kenya. *Int. J. Sci. Res. Publ.*, 10(4), 448–454. <http://dx.doi.org/10.29322/IJSRP.10.04.2020.p10051>.
- Sulistiyawati, S. N. & Suryani, A. W. (2022). Achieving operational efficiency through risk disclosure. *Asian J. Bus. Account.*, 15(1). <https://doi.org/10.22452/ajba.vol15no1.5>.
- Sunardi, N. & Tatariyanto, F. (2023). The impact of the COVID-19 pandemic and fintech adoption on financial performance moderating by capital adequacy. *Int. J. Islam. Bus. Manag. Rev.*, 3(1), 102–118. <https://doi.org/10.54099/ijbmr.v3i1.620>.
- Too, S. C. & Makokha, E. N. (2021). Effects of credit risk management on performance of banks in Nairobi, Kenya. *Int. J. Recent Res. Commer. Econ. Manag.*, 8(2), 15–26.
- Zou, Y. & Li, F. (2014). *The impact of credit risk management on profitability of commercial banks: A study of Europe.* <https://www.diva-portal.org/smash/get/diva2:743402/FULLTEXT01.pdf>