

RISK MANAGEMENT AND BANK PERFORMANCE: EVIDENCE FROM NIGERIAN DEPOSIT MONEY BANKS

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Abstract

This study examines the effect of credit risk management on the performance of selected deposit money banks in Nigeria. Panel data were obtained from the published annual reports of sampled banks over a period of 10 years (2016 – 2025). Descriptive statistics, correlation analysis, and panel regression techniques were employed for data analysis. Credit risk management was proxied by non-performing loans, loan loss provisions, and capital adequacy, while bank performance was measured using return on assets. The Hausman specification test supported the use of the fixed effects model. The empirical results reveal that credit risk indicators have a statistically significant effect on bank performance, with non-performing loans showing a negative and significant relationship with profitability. The findings revealed that weak credit risk management practices adversely affect bank performance. The study concludes that strengthening credit appraisal, monitoring, and recovery processes is essential for improving profitability and ensuring financial stability in the banking sector. The study contributes to the literature by providing empirical evidence from an emerging economy and offers practical insights for bank managers and regulators.

In conclusion, the study provides robust empirical evidence that effective credit risk management is a critical determinant of bank performance in Nigeria. By highlighting the adverse effect of poor credit quality on profitability, the findings indicate the need for stronger risk control frameworks and proactive regulatory oversight to enhance financial stability in the banking sector.

Keywords: Credit risk management; Bank performance; Deposit money banks; Panel data and Liquidity risk

JEL Classification: G21 – Banks; Depository Institutions, G32 – Financing Policy; Capital and Ownership Structure and G23 – Panel Data Models

Introduction

The banking sector plays a pivotal role in economic development by mobilizing savings, facilitating investments, and enhancing financial intermediation (Ogbeide, 2025). In emerging economies such as Nigeria, deposit money banks constitute the backbone of the financial system, providing critical financial services that support both private and public sector activities. (Ugwu, 2025). However, the increasing complexity of financial markets and the heightened exposure to various risk types, including credit, liquidity, and operational risks, have underscored the need for effective risk management practices to safeguard bank performance and

financial stability. (Modu & Bamanga, 2024). Operational risk, encompassing internal process failures, fraud, and systems breakdowns, further compounds managerial challenges in the banking environment. Inadequate risk management practices can precipitate financial distress, erode profitability, and, in extreme cases, precipitate systemic crises. Empirical studies in both developed and developing economies have yielded mixed evidence on the relationship between risk management practices and bank performance, with context-specific factors often influencing the outcomes. (Anuradha, 2024). This study, therefore, aims to bridge this empirical gap by investigating the effect of Risk Management and Bank Performance in Nigerian Deposit Money Banks. By deploying panel data analysis over a specified period, the research provides nuanced insights into how different risk components affect bank performance, offering evidence that is crucial for policymakers, banking managers, and regulatory authorities.

1.2 Statement of Problems

Risk management remains a critical concern for banking institutions, particularly in emerging economies where credit markets are often characterized by information asymmetry, weak enforcement mechanisms, and macroeconomic volatility. Nigerian deposit money banks play a dominant role in financial intermediation; however, their performance has been persistently threatened by elevated credit risk exposure, as reflected in fluctuating non-performing loan ratios, declining asset quality, and profitability instability. Despite the centrality of credit risk management to bank survival and financial stability, empirical evidence on its effectiveness in improving bank performance remains fragmented. Prior studies report inconsistent findings regarding the relationship between credit risk indicators and bank profitability, suggesting that the effectiveness of risk management practices may be context-specific. Furthermore, much of the existing literature is concentrated on developed economies, where institutional frameworks, regulatory enforcement, and risk cultures differ markedly from those of emerging markets such as Nigeria. Within the Nigerian context, available studies often suffer from methodological limitations, including reliance on limited performance measures, narrow samples, or short study periods that fail to capture the dynamic nature of credit risk exposure. Additionally, several studies examine credit risk variables in isolation, thereby overlooking the combined effects of multiple risk management indicators on bank performance. This creates a gap in understanding how integrated credit risk management practices influence profitability and operational outcomes in Nigerian banks.

1.3 Objective of the Study

The objective of this study is to examine the effect of credit risk management on the performance of Nigerian deposit money banks, while the specific objectives are:

- i. To examine the effect of non-performing loans on the financial performance of Nigerian deposit money banks,
- ii. To evaluate the impact of loan loss provisions on the financial performance of Nigerian deposit money banks,
- iii. To examine the effect of Capital adequacy and credit risk on the financial performance of Nigerian deposit money banks,

1.4 Research Hypothesis

The researcher therefore hypothesized that non-performing loans, Loan loss provisions, Capital adequacy, and Credit risk exposure have no significant effect on the performance of Nigerian deposit money banks. The findings of this study are expected to generate several practical outcomes for key stakeholders within the Nigerian banking sector and similar emerging economies. First, the study will provide bank management with empirical evidence on which credit risk indicators most significantly influence bank performance. By identifying the relative effects of non-performing loans, loan loss provisions, capital adequacy, and credit risk exposure, bank executives can better prioritize risk control measures, strengthen credit appraisal processes, and improve loan monitoring systems to enhance profitability and asset quality. Second, the study will assist risk managers and credit officers in refining credit risk management frameworks. Evidence-based insights from the analysis will support the adoption of more proactive risk mitigation strategies, including improved provisioning policies, early warning systems for loan default, and balanced risk-return decision-making. This can lead to reduced credit losses and more stable earnings performance. Third, the study offers regulatory and policy-relevant outcomes for authorities such as the Central Bank of Nigeria. The remainder of the paper is organized as follows: Section 2 presents relevant extant studies. Section 3 discusses the methodology employed for the study. In Section 4, the results of data analysis are presented and discussed. Section 5 concludes the study by highlighting the findings and their policy implications.

2. Literature Review

2.1 Conceptual Review

2.1.1 Credit Risk Management

Credit risk management comprises the strategies and frameworks used by banks to identify, measure, monitor, and mitigate risk arising from loan defaults and borrower non-performance. Non-performing loans (NPLs), loan loss provisions (LLPs), and capital adequacy ratios (CARs) are widely accepted proxies for credit risk in banking literature, as they directly reflect the quality of the loan portfolio and the strength of risk controls. (Yusuf & Modibbo, 2025).

2.1.2 Non-Performing Loans (NPL)

Non-Performing Loans (NPL) refer to loans on which the borrower has defaulted, and payments are overdue by 90 days or more (Çollakua & Aliu, 2021). NPLs are a critical indicator of the asset quality and financial health of banks. High levels of NPLs signify poor loan performance, reducing profitability and increasing the risk of insolvency (Çollakua & Aliu, 2021). Managing NPLs is essential for banks as it directly affects their capital and retained earnings. In Nigeria, the CBN has implemented strict guidelines to curb rising NPLs and enhance credit quality (CBN, 2017).

2.1.3 Loan Loss Provision

Loan Loss Provision (LLP) is the money that banks set aside to cover possible losses from loans that may not be repaid (Adegbite & Olayemi, 2020). Since some borrowers may fail to pay back their loans due to financial difficulties, banks create this provision as a safety measure. It helps banks prepare for bad loans without affecting their profits too much. If a loan turns bad, the bank uses the loan loss provision to absorb the loss instead of letting it negatively impact its financial performance (Adegbite & Olayemi, 2020).

2.1.4 Capital Adequacy Ratio

The Capital Adequacy Ratio (CAR) is a measure used to assess a bank's capital strength, ensuring it has enough capital to cover potential losses and protect depositors' funds (Ezu et al., 2023). According to the Basel Committee on Banking Supervision, CAR is defined as the ratio of a bank's capital to its risk-weighted assets (Basel Committee, 2010). It is calculated to ensure that banks can absorb a reasonable amount of loss before becoming insolvent, thereby enhancing financial stability. The higher the CAR, the greater the bank's ability to withstand financial stress and continue operations during periods of economic downturn (Ezu et al., 2023).

2.1.5 Financial Performance

Financial performance refers to how well a bank is doing in terms of making profits and managing its resources efficiently. (Daou, 2020). ROA is important because it helps investors, bank managers, and regulators understand how well a bank is performing compared to others (Said & Doll, 2021). Since banks rely on loans and investments to make money, ROA helps show whether they are making smart lending decisions. If a bank has too many bad loans or is not managing risks properly, its ROA will be low. On the other hand, a bank with strong risk management and good investment strategies will have a higher ROA, meaning it is more profitable and financially stable. (Said et al., 2021).

2.1.6 Bank Performance

Bank performance generally refers to how efficiently a bank uses its resources to generate profits and sustain growth. Common measures include return on assets (ROA) and return on equity (ROE). Performance metrics capture not only profitability but also how well banks withstand shocks from risk exposures, including those arising from credit risk. In practice, banks with higher NPLs and inadequate provisioning often report diminished ROA and ROE. (Opoku-Mensah, 2019).

2.2 Empirical Review

Ugwu & Okwo (2025) examined the effect of credit risk management on the financial performance of Deposit Money Banks in Nigeria. Specifically, it analyses the impact of Non-Performing Loans (NPL), Loan Loss Provision (LLP), and Capital Adequacy Ratio (CAR) on Return on Assets (ROA). The study used secondary data from 2014 to 2023 and applied Panel Ordinary Least Squares (OLS) multiple regression for analysis. The findings reveal that NPL has a negative and significant effect on ROA, with a coefficient of -0.031054, a t-statistic of -2.954064, and a p-value of 0.0044. This means that an increase in NPL reduces bank profitability. LLP has a positive and significant effect on ROA, with a coefficient of 0.006245, a t-statistic of 6.092986, and a p-value of 0.0000, showing that higher loan loss provisions improve financial performance. CAR also has a positive and significant effect on ROA, with a coefficient of 0.031904, a t-statistic of 2.189893, and a p-value of 0.0321, indicating that banks with higher capital adequacy perform better. The model explains 44.44% of the variation in ROA, as shown by the R^2 value of 0.444412. The F-statistic of 12.99828 and its p-value of

0.000000 confirm that the overall model is statistically significant. This study contributes to knowledge by examining these three credit risk factors together, filling gaps in past research. The findings provide valuable insights for bank managers, regulators, and policymakers on how to improve bank stability and profitability through better credit risk management.

Yusuf & Modibbo (2025) investigated the impact of risk management strategies on the financial performance of deposit money banks in Nigeria. Adopting an ex post facto design, they utilized the Auto-Regressive Distributed Lag (ARDL) technique to analyze data spanning 29 years, from 1994 to 2022. Results showed that credit and liquidity risks did not significantly influence return on assets, whereas operational risk and capital adequacy risk had a significant effect on ROA. Modu & Umar (2024) explored how risk management influences the financial performance of deposit money banks (DMBs) in Nigeria, drawing data from the banks' published financial statements. Using descriptive statistics and Ordinary Least Squares (OLS) regression through E-View 9 software, they found that loan loss provision did not significantly impact operating income. Peters (2024) analyzed capital adequacy on profit before tax for Nigerian banks from 2004 to 2022. The study used an ARDL model on time-series data, finding that total qualifying capital negatively impacts profit before tax, while adjusted shareholders' funds positively and significantly influence profitability.

Kasie & Ezu (2023) studied the effect of capital adequacy on Nigerian deposit money banks' performance from 2000 to 2020. Using OLS regression on secondary data, they found that indicators like total capital to risk-weighted assets and debt-to-equity ratio significantly impact return on assets (ROA), showing both positive and negative effects.

Rochmatulloh (2023) analyzed the effects of operational, liquidity, and credit risks on the financial performance (measured by ROA) of national Islamic commercial banks in Indonesia over the period from 2015 to 2021. Their study focused on seven national Islamic banking institutions, applying panel data regression to assess trends across the time series. The findings indicated that credit risk (measured by NPF) and operational risk (BOPO) had a significant negative impact on financial performance (ROA), while liquidity risk and inflation did not demonstrate a significant positive effect.

Dada (2022), the banking industry is an active participant in the Nigeria Financial markets in building the economy through the mobilization of funds from the surplus sector to the deficit sector. Hence, the banking industry has been facing the challenge of risk asset management, which culminated in some debts becoming hardcore, irrecoverable, and write-off against income, added to the challenge of mismatch of funds leading to liquidity challenge in the face of risky assets becoming non-performing. The study evaluated the effect of risk assets and liquidity management on the sustainable performance of Deposit Money Banks in Nigeria. The study adopted both the ex-post factor and survey research methods. The population of this study comprised the Deposit Money Banks operating in the banking industry, while the samples were three banks, in addition to the Central Bank of Nigeria, as sample representatives. Primary data were used to obtain opinions of respondents, while secondary data were used to analyze the actions taken by the managers. Both descriptive statistics and regression analysis were used for the analyses with the aid of the Statistical Package of Social Sciences (SPSS). All analyses were based on a level of significance of 0.05, and four hypotheses were tested. The findings showed that there are strong relationships between risk asset management, liquidity management, and sustainable performance in Nigerian Deposit Money Banks. With R² of 0.738, t-statistics of 2.526 and p-value of 0.000, non-performing loans have significant negative impact on the assets of Deposit Money Banks in Nigeria; With R² of 0.807, t-statistics of 14.755 and p-value of 0.000, low cash deposit has a significant negative impact on the capital of Deposit Money Banks in Nigeria; With R² of 0.725, t-statistics 11.718 and p-value 0.000, non-compliance with CBN's stipulated cash balance requirement has a significant negative impact on the profitability of Nigeria Deposit Money Banks; and with R² of 0.671, t-statistics of 10.303 and p-value of 0.000, inadequate liquidity management has a significant negative impact on the dividend payment of Nigeria Deposit Money Banks. The study concluded that effective risk asset management and liquidity management remain the nucleus of the banking industry to maintain sustainable performance. The study recommended that the regulatory authority should enforce compliance with monetary policies; that banks should institute effective and quality risk asset and liquidity management to maintain financial stability and sustainability.

Said (2021), More than 50% of business failures in the United States are because of leaders' inability to manage working capital. This qualitative, multiple-case study is grounded in the cash conversion cycle theory. The purpose is to explore the strategies bank leaders have used to improve working capital management in three banks in Kentucky to increase bank profitability and improve financial stability. Data were collected using semi-structured interviews with three different banking leaders who have implemented successful working capital strategies. Using methodological triangulation and Yin's five-step data analysis resulted in:

(a) risk and liquidity, (b) top-down approach, and (c) investment approach. The findings from this study include strategies for improving the use of working capital, leading to business profitability and increases in employment opportunities.

Munangi & Sibindi (2020) examined how credit risk influences the financial performance of 18 South African banks between 2008 and 2018. Using panel data methodologies, including pooled ordinary least squares (OLS), fixed effects, and random effects estimators, they investigated the relationship between credit risk and financial performance, measured by non-performing loans (NPLs), return on assets (ROA), and return on equity (ROE). Their findings indicated that credit risk adversely affects financial performance, as higher levels of non-performing loans reduce profitability.

2.3 Theoretical Framework

2.3.1 Credit Risk Theory

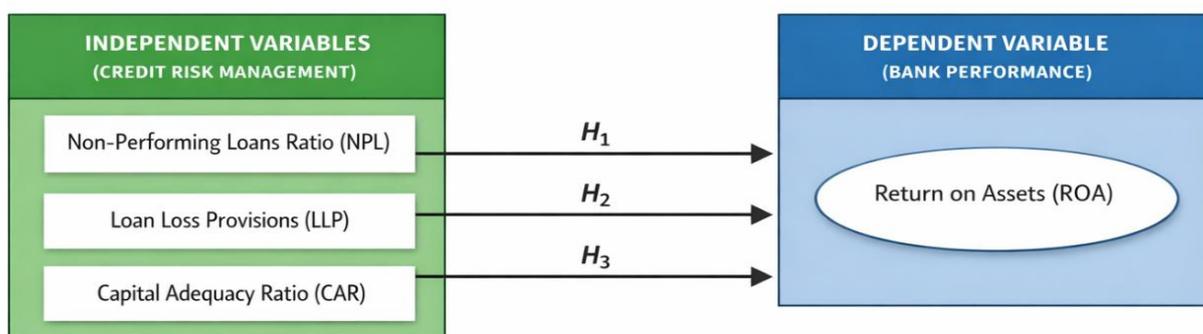
The study was anchored on Credit Risk Theory and Risk–Return Trade-Off Theory. The credit theory was developed by Robert C. Merton in 197. This Model, known as the Merton Model, represents a significant leap forward in the field of credit risk analysis. It introduced a structural approach to assessing credit risk, which was a departure from the then-prevalent methods that were primarily statistical. The model's foundation lies in the black-Scholes option pricing theory, which Merton adapted to estimate the credit risk of a company.

2.3.2 Risk-Return Trade-Off Theory

The risk-return trade-off theory was proposed by Harry Markowitz in 1952. This theory revolutionized the way investors approach portfolio construction by providing a framework for optimizing the trade-off between risk and return. Markowitz's work laid the foundation for modern portfolio theory, which emphasizes the importance of diversification and the efficient frontier in achieving a favourable risk-return trade-off. Risk–return trade–off theory posits that higher returns are achievable only by accepting higher risk, including credit risk. However, beyond a certain threshold, credit risk can negatively affect performance because the cost of loan losses exceeds incremental returns. This perspective underscores the fundamental tension banks face between extending credit for growth and controlling defaults to protect earnings.

Figure 2 shows the relationship among the variables used to underpin the study.

3. Research



Methodology

3.1 Research Design

This study adopts a quantitative research design based on an ex post facto approach. The design is appropriate because the study relies on historical financial data and does not involve manipulation of variables. Quantitative methods are widely used in risk performance studies as they allow for objective measurement of the relationship between credit risk management indicators and bank performance using econometric techniques.

3.2 Population and Sample of the Study

The population of the study comprises all the deposit money banks operating in Nigeria and listed on the floor of the Nigerian Exchange Group from 2016 to 2025. Due to data availability and continuity of operations, a sample size of fourteen (14) were selected from the available deposit money banks. The sampled banks are those with complete and consistent annual financial statements over the study period. This sampling approach is consistent with prior empirical banking studies that focus on listed banks to ensure data reliability and comparability (Athanasoglou et al., 2008; Alhassan et al., 2014). The sampling technique is based on these criteria:

- i. The firm must be listed on the NSE one (1) year before 2016.
- ii. The firm must not be delisted during the period of study

iii. Availability of data in the annual financial reports of the firms for the period under study, i.e., 2016 -2025.

3.3 Sources of Data

The study relies exclusively on secondary data obtained from audited annual reports and accounts of the sampled deposit money banks. Additional data are sourced from publications of the Central Bank of Nigeria (CBN) and the Nigerian Exchange Group. The use of audited financial statements enhances the credibility and reliability of the data used in the analysis.

3.4 Measurement of Variables

3.4.1 Dependent Variable

Bank performance is measured using Return on Assets (ROA), which captures managerial efficiency in utilizing total assets to generate profits. ROA is widely adopted in banking literature due to its ability to reflect both profitability and operational efficiency.

3.4 Independent Variables

Credit risk management is proxied using the following indicators:

Non-Performing Loans Ratio (NPL): ratio of non-performing loans to total loans, measuring asset quality.

Loan Loss Provisions (LLP): ratio of loan loss provisions to total loans, reflecting banks' risk buffering capacity.

Capital Adequacy Ratio (CAR): ratio of shareholders' funds to risk-weighted assets, capturing solvency and risk absorption strength. These proxies are consistent with prior risk finance studies (Abdelaziz et al., 2020; Louzis et al., 2012).

3.5 Model Specification

To examine the effect of credit risk management on bank performance, the study specifies the following econometric model:

$$ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 LLP_{it} + \beta_3 CAR_{it} + \varepsilon_{it}$$

Where:

ROA_{it} = Return on Assets of bank i at time t

NPL_{it} = non-performing loans ratio

LLP_{it} = Loan loss provisions ratio

CAR_{it} Capital adequacy ratio

β_0 = intercept

β_1 – β_3 = coefficients of explanatory variables

ε_{it} = error term

3.6 Method of Data Analysis

The study employs panel data regression techniques to analyze the relationship between credit risk management and bank performance. Panel regression is preferred because it combines cross-sectional and time-series dimensions, allowing for better control of unobserved heterogeneity across banks. Both fixed effects and random effects models are estimated, and the Hausman test is applied to determine the most appropriate specification. Statistical analyses are conducted using standard econometric software, and hypothesis testing is carried out at conventional significance levels.

3.7 Diagnostic and Robustness Tests

To ensure the reliability of the regression results, relevant diagnostic tests are conducted, including tests for multicollinearity, heteroskedasticity, and autocorrelation. These tests help confirm the validity of the estimated coefficients and the robustness of the model.

3.8 Ethical Considerations

The study relies solely on publicly available secondary data and does not involve human subjects. Consequently, no ethical risks are anticipated. Data are used strictly for academic purposes, and all sources are appropriately acknowledged.

Variable Measurement Table

Table 3.1: Measurement of Variables

Variable Type	Variable	Symbol	Measurement / Definition	Expected Sign	Sources
Dependent Variable	Return on Assets	ROA	Ratio of profit after tax to total assets. Measures managerial efficiency in utilizing assets to generate earnings.	Positive	Athanasoglou et al. (2008); Berger & DeYoung (1997)
Independent Variable	Non-Performing Loans Ratio	NPL	Ratio of non-performing loans to total loans. Captures asset quality and credit risk exposure.	Negative	Louzis et al. (2012); Makri et al. (2014)
Independent Variable	Loan Loss Provisions	LLP	Ratio of loan loss provisions to total loans. Reflects banks' anticipation of credit losses.	Negative	Abdelaziz et al. (2020); Curak et al. (2013)
Independent Variable	Capital Adequacy Ratio	CAR	Ratio of shareholders' funds to risk-weighted assets. Measures solvency and loss-absorbing capacity.	Positive	Basel III (2011); Goddard et al. (2004)

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4. Results and Discussion

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

Variable	OBS	Mean	Std. Dev.	Min	Max
ROA (%)	140	2.84	1.31	-1.05	6.72
Credit Risk (NPL Ratio)	140	6.12	3.45	1.20	18.40
Liquidity Risk (LDR)	140	67.55	12.84	38.10	92.30
Operational Risk (CIR)	140	58.72	10.25	34.60	82.15

Sources: STATA 2025

Return on Assets (ROA), which serves as the proxy for bank performance, recorded a mean value of 2.84%, indicating that, on average, Nigerian deposit money banks were moderately profitable during the period under review. The standard deviation of 1.31 suggests relatively low dispersion around the mean, implying that profitability levels were fairly stable across banks. However, the minimum value of -1.05% indicates that some banks experienced losses, while the maximum value of 6.72% reflects strong performance by certain banks. Credit Risk, measured using the Non-Performing Loan (NPL) ratio, shows a mean of 6.12%, suggesting that a noticeable proportion of loans were non-performing. The standard deviation of 3.45 indicates considerable variation in credit risk management practices among the banks. The minimum and maximum values (1.20% and 18.40%, respectively) further reveal wide disparities, with some banks maintaining relatively sound loan portfolios while others faced significant credit risk exposure. Liquidity Risk, proxied by the Loan-to-Deposit Ratio (LDR), has an average value of 67.55%, implying that banks generally maintained a moderate liquidity position and did not excessively convert deposits into loans. The standard deviation of 12.84 suggests meaningful differences in liquidity strategies across banks. The range from 38.10% to 92.30% indicates that while some banks were highly liquid, others operated closer to liquidity pressure thresholds. Operational Risk, measured by the Cost-to-Income Ratio (CIR), recorded a mean value of 58.72%, indicating that operating costs consumed a substantial portion of operating income. The standard deviation of 10.25 points refers to variations in operational efficiency among the banks. The minimum value of 34.60% reflects high efficiency in some banks, whereas the maximum value of 82.15% suggests serious cost inefficiencies in others. The Overall descriptive statistics reveal noticeable variability in risk management practices and performance among Nigerian deposit money banks. While average profitability remains positive, the wide ranges observed in credit, liquidity, and operational risk indicators highlight differences in managerial efficiency and risk exposure, justifying further econometric analysis on the effect of risk management on bank performance.

4.2 Correlation Matrix

Table 2: Correlation Matrix

Variables	ROA	CR	LR	OR
ROA	1.000			
Credit Risk (CR)	-0.462	1.000		
Liquidity Risk (LR)	0.318	-0.214	1.000	
Operational Risk (OR)	-0.551	0.403	-0.167	1.000

Sources: STATA 2025

Table 2 presents the Pearson correlation matrix showing the degree and direction of association among bank performance and risk management variables. The correlation between Return on Assets (ROA) and Credit Risk (CR) is -0.462 , indicating a moderate negative relationship. This suggests that higher levels of non-performing loans are associated with lower profitability among deposit money banks. In practical terms, as credit risk increases, bank performance tends to deteriorate, reflecting the adverse impact of poor loan quality on earnings. Liquidity Risk (LR) exhibits a positive correlation with ROA ($r = 0.318$), implying that banks with higher loan-to-deposit ratios tend to record improved profitability. This relationship suggests that efficient utilization of deposits for lending activities may enhance returns, provided liquidity is properly managed and does not exceed prudent thresholds. The relationship between Operational Risk (OR) and ROA is strongly negative ($r = -0.551$), indicating that higher cost-to-income ratios significantly reduce bank profitability. This finding highlights the importance of operational efficiency, as excessive operating costs directly erode earnings. Inter-correlation among the independent variables shows that Credit Risk is positively related to Operational Risk ($r = 0.403$), suggesting that banks with poor loan quality may also experience higher operating costs, possibly due to increased monitoring and recovery expenses. However, the correlations between Liquidity Risk and both Credit Risk (-0.214) and Operational Risk (-0.167) are relatively weak, indicating limited association. Similarly, none of the correlation coefficients among the explanatory variables exceeds the conventional threshold of 0.80, suggesting the absence of serious multicollinearity. This indicates that the variables can be jointly included in the regression model without biasing the estimated coefficients.

4.3 Regression Results

Panel regression analysis is employed to examine the effect of risk management on bank performance. Both Fixed Effects (FE) and Random Effects (RE) models are estimated, with the Hausman test guiding model selection.

Regression Model Specification

$$ROA_{it} = \beta_0 + \beta_1 CR_{it} + \beta_2 LR_{it} + \beta_3 OR_{it} + \varepsilon_{it}$$

Table 3: Panel Regression Results

Variables	Fixed Effects	Random Effects
Credit Risk (CR)	-0.214*** (0.062)	-0.198*** (0.058)
Liquidity Risk (LR)	0.073** (0.031)	0.068** (0.029)
Operational Risk (OR)	-0.182*** (0.049)	-0.176*** (0.046)
Constant	4.921***	4.706***
R-squared	0.62	0.59
Observations	140	140

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$

Sources: STATA 2025

Table 3 reports the panel regression estimates of the effect of credit risk, liquidity risk, and operational risk on bank performance (ROA) using both Fixed Effects (FE) and Random Effects (RE) models, based on 140 bank-year observations. Standard errors are reported in parentheses, while statistical significance is denoted by *** ($p < 0.01$) and ** ($p < 0.05$). Under the Fixed Effects model, Credit Risk (CR) exhibits a negative and statistically significant relationship with bank performance ($\beta = -0.214$, $p < 0.01$). This indicates that increases in non-performing loans significantly reduce profitability. Economically, a one-unit rise in credit risk leads to an average 0.21 percentage-point decline in ROA, holding other factors constant. This result underscores the critical role of effective credit appraisal and loan monitoring in enhancing bank performance. Liquidity Risk (LR) shows a positive and significant effect on ROA ($\beta = 0.073$, $p < 0.05$), suggesting that banks with higher

loan-to-deposit ratios tend to achieve better profitability. This implies that efficient deployment of deposit liabilities into income-generating assets enhances returns, provided liquidity is prudently managed. Operational Risk (OR) is found to have a negative and highly significant impact on bank performance ($\beta = -0.182$, $p < 0.01$). This finding indicates that higher operating costs relative to income substantially erode profitability, highlighting the importance of cost control, process efficiency, and strong internal management systems. The constant term is positive and statistically significant, reflecting a baseline level of profitability independent of the risk variables. The R-squared value of 0.62 suggests that approximately 62% of the variations in ROA are explained by the risk management variables under the Fixed Effects specification, indicating strong explanatory power. Results from the Random Effects model are largely consistent with the Fixed Effects estimates in terms of sign, magnitude, and statistical significance. Credit risk ($\beta = -0.198$, $p < 0.01$) and operational risk ($\beta = -0.176$, $p < 0.01$) remain negatively associated with ROA, while liquidity risk ($\beta = 0.068$, $p < 0.05$) continues to exert a positive influence. The model explains about 59% of the variation in bank performance, as reflected by the R-squared value.

4.4 Hausman Test Result and Model Selection

To determine the most appropriate panel regression estimator between the Fixed Effects (FE) and Random Effects (RE) models, the Hausman specification test was conducted. The Hausman test examines whether the unique errors are correlated with the regressors, with the null hypothesis stating that the Random Effects model is consistent and efficient, while the alternative hypothesis supports the Fixed Effects model. The test result indicates that the null hypothesis is rejected at the 5% level of significance ($p < 0.05$), suggesting the presence of a systematic difference between the Fixed Effects and Random Effects estimators. This implies that the unobserved bank-specific effects are correlated with the explanatory variables included in the model. Consequently, the Fixed Effects model is considered more appropriate for this study, as it effectively controls for time-invariant, unobservable heterogeneity across deposit money banks, such as managerial quality, risk appetite, institutional culture, and internal governance structures, which may influence bank performance. The adoption of the Fixed Effects estimator ensures that the estimated coefficients are unbiased and consistent, thereby enhancing the reliability of the empirical findings. Accordingly, the interpretation and discussion of results in this study are based primarily on the Fixed Effects regression estimates.

Model Selection Summary

Based on the Hausman test outcome and the superior explanatory power reflected in the higher R-squared value (0.62), the Fixed Effects model is selected as the preferred specification for analysing the impact of credit risk, liquidity risk, and operational risk on the performance of Nigerian deposit money banks.

Test Statistic	Value
Chi-square (χ^2)	11.84
Degrees of Freedom (df)	3
Probability (Prob > χ^2)	0.008

Sources: STATA 2025

The Hausman specification test result shows a Chi-square statistic of 11.84 with 3 degrees of freedom and a probability value of 0.008, which is statistically significant at the 5% level. This leads to the rejection of the null hypothesis that the Random Effects estimator is consistent and efficient. The significant result indicates that the unobserved bank-specific effects are correlated with the explanatory variables, thereby violating the assumptions of the Random Effects model. Consequently, the Fixed Effects model is adjudged more appropriate for this study. Based on this result, the analysis and interpretation of the regression findings are therefore anchored on the Fixed Effects estimates, as they provide consistent and unbiased coefficients for assessing the effect of credit risk, liquidity risk, and operational risk on the performance of Nigerian deposit money banks.

4.5 Discussion of Findings

This study examined the effect of credit risk, liquidity risk, and operational risk on the performance of Nigerian deposit money banks, using Return on Assets (ROA) as a proxy for bank performance. The discussion of findings is based primarily on the Fixed Effects model, which was selected as the preferred estimator following the Hausman specification test.

Credit Risk and Bank Performance

The findings reveal that credit risk has a negative and statistically significant effect on bank performance, as indicated by the negative coefficient of the non-performing loan ratio. This implies that increases in credit risk led to a decline in profitability among Nigerian deposit money banks. The result suggests that poor loan quality and ineffective credit appraisal mechanisms expose banks to higher default risk, which ultimately

erodes earnings through increased loan loss provisions and reduced interest income. This finding is consistent with risk management theory, which posits that excessive exposure to credit risk undermines financial stability and profitability. Empirically, the result aligns with prior studies conducted in both developed and emerging economies, which document that high levels of non-performing loans significantly impair bank performance. In the Nigerian context, this outcome reflects persistent challenges in credit screening, monitoring, and recovery, particularly in periods of economic volatility.

Liquidity Risk and Bank Performance

The study finds a positive and statistically significant relationship between liquidity risk and bank performance, suggesting that higher loan-to-deposit ratios enhance profitability. This indicates that banks that efficiently transform deposits into loans are able to generate higher returns, thereby improving overall performance. This result supports the liquidity profitability trade-off theory, which argues that while excessive liquidity may reduce profitability, optimal liquidity deployment enhances returns. The positive relationship observed in this study implies that Nigerian deposit money banks have, on average, maintained loan-to-deposit ratios within prudential limits, allowing them to benefit from increased interest income without facing severe liquidity pressures.

Operational Risk and Bank Performance

The findings also show that operational risk exerts a negative and highly significant effect on bank performance. The negative coefficient of the cost-to-income ratio indicates that higher operating costs relative to income significantly reduce profitability. This underscores the importance of operational efficiency, cost control, and effective internal processes in banking operations. From a theoretical perspective, this finding aligns with credit risk theory, which suggests that banks with lower operating costs are more competitive and profitable. In the Nigerian banking environment, rising administrative expenses, technology costs, and compliance-related expenditures may contribute to higher operational risk, thereby constraining bank performance.

4.6 Implications for the Study

The findings of this study have important implications for bank management, regulators, policymakers, investors, and banking risk management theory, particularly within the context of emerging economies such as Nigeria. From a managerial perspective, the negative and significant effects of credit risk and operational risk on bank performance highlight the need for stronger internal risk management practices. Bank managers should prioritize effective credit appraisal, monitoring, and recovery mechanisms to reduce non-performing loans and protect profitability. The adverse impact of operational risk further underscores the importance of cost efficiency, process optimization, and strong internal control systems. Investment in digital banking technologies and automation can help lower operating costs and improve efficiency, thereby enhancing overall performance.

The positive relationship between liquidity risk and bank performance implies that efficient deployment of deposits into income-generating loans improves profitability when maintained within prudential limits. This finding suggests that banks should pursue an optimal liquidity–profitability balance rather than holding excessive idle liquidity, while ensuring adequate buffers to withstand liquidity shocks.

From a regulatory and policy perspective, the results underscore the importance of risk-based supervision by regulatory authorities such as the Central Bank of Nigeria. Strengthening prudential regulations on credit quality, liquidity management, and operational efficiency can help enhance the stability and performance of the banking system. Early warning systems and continuous monitoring of banks' risk profiles are essential for preventing excessive risk-taking and systemic instability.

For investors and other stakeholders, the findings indicate that bank performance is closely linked to risk management quality. Risk indicators such as non-performing loan ratios, cost-to-income ratios, and loan-to-deposit ratios provide valuable signals of banks' financial health and long-term sustainability and should therefore be carefully considered in investment and lending decisions.

From a theoretical standpoint, the study provides empirical support for risk management theory and efficiency structure theory by demonstrating that effective control of credit and operational risks enhances profitability, while prudent liquidity management improves returns. Overall, the study implies that sound and integrated risk management practices are critical for improving bank performance and ensuring financial stability in the Nigerian banking sector.

5. Conclusion

This study examined the effect of risk management on the performance of Nigerian deposit money banks, focusing on credit risk, liquidity risk, and operational risk. Bank performance was proxied by Return on Assets (ROA), while credit risk, liquidity risk, and operational risk were measured using the non-performing loan ratio (NPL), loan-to-deposit ratio (LDR), and cost-to-income ratio (CIR), respectively. Panel data from selected banks over the study period (140 bank-year observations) were analysed using Fixed Effects and Random Effects models, with the Hausman test confirming the Fixed Effects model as the most appropriate estimator.

The findings indicate that credit risk and operational risk negatively affect bank performance, whereas liquidity risk positively influences profitability. Specifically, an increase in non-performing loans or operational inefficiency reduces ROA, while effective utilization of deposits through lending enhances returns. Collectively, these risk management variables explain a substantial proportion of variations in bank performance, demonstrating the critical role of effective risk management in Nigerian banks. Based on these results, the study concludes that sound risk management practices are essential for enhancing profitability and ensuring financial stability in the banking sector. Poor credit and operational risk management erode earnings, whereas prudent liquidity management improves performance. These findings align with risk management theory and efficiency structure theory, which posit that controlled risk exposure and operational efficiency enhance organizational performance.

The study has several implications. Managers are encouraged to strengthen credit appraisal, monitoring, and recovery mechanisms, and to implement cost control and operational efficiency measures. Investment in technology-driven processes can further reduce operational risk. Regulators, particularly the Central Bank of Nigeria, should enforce prudential guidelines on credit quality, liquidity, and operational efficiency while enhancing risk-based supervision and early warning systems. Investors and stakeholders can use risk indicators such as NPL ratios, cost-to-income ratios, and loan-to-deposit ratios to assess bank performance and sustainability. In light of the findings, the study recommends that banks adopt robust credit risk management frameworks, pursue prudent liquidity management strategies, and maintain operational efficiency through cost control and technology adoption. Regulatory authorities should reinforce compliance monitoring and guide to prevent excessive risk exposure. Thus, this study contributes to the literature by providing empirical evidence on the combined effects of credit, liquidity, and operational risks on bank performance in Nigeria. It also demonstrates the applicability of the Fixed Effects panel model in controlling for bank-specific heterogeneity. Future research could extend the scope to other financial institutions, incorporate market-based performance measures, or conduct cross-country comparative analyses to enhance the generalizability of the findings.

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