KASU Journal of Accounting Research and Practice (KAJARAP)

Volume 10, Number 2, December, 2025 ISSN: 2360-8889

https://journals.kasu.edu.ng/index.php/accounting

RISK MANAGEMENT AND FINANCIAL PERFORMANCE OF LISTED DEPOSIT MONEY BANKS IN NIGERIA

Sadiq Ademola Raji[1], Olasumbo Maryam Bello-Olatunji[2], Adesoji Aderemi Oke[3], Fareedah Adeneye Ogunsami[4]

[1,2,3,4]Department of Accounting and Finance, College of Management and Social Science, Fountain University, Osogbo

Orcid Id: 0000-0002-4142-5721, 0009-0008-8428-769X, 0000-0002-2133-6799 and 0009-0003-9744-6841

Abstract

The study examined the impact of risk management on the financial performance of listed Nigerian deposit money banks. Secondary data were sourced specifically from audited financial statements of the selected sampled banks covering 2019–2023. The analysis employed panel regression general least square method (GLM) and descriptive correlation techniques. The findings indicated that the capital adequacy ratio had a positive and significant effect on financial performance. Whereas the non-performing loan ratio exerted a negative but insignificant outcome. In the same vein, the current ratio demonstrated a negative and insignificant effect; the net interest margin reflected a positive and significant influence. While the loan-to-deposit ratio showed a positive though insignificant impact. In contrast, the gearing ratio demonstrated a negative and insignificant effect. Overall, the findings suggest that non-performing loan ratios, current ratios, and gearing ratios adversely affect financial performance. While capital adequacy ratios, net interest margins, and loan-to-deposit ratios improve the financial performance of listed Nigerian deposit money banks. Therefore, the study recommends that these institutions maintain a strong capital base that supports risk absorption during recessions in addition to meeting regulatory requirements. This increases financial resiliency and investor confidence.

Keywords: market risk, credit risk, liquidity risk, operational risk, financial performance

1. Introduction

In the shadow of uncertainty, risk management serves as a safeguard for financial stability. The processes that an organization uses to handle uncertainties are referred to as risk management by (Wajid et al., 2022). These processes include the identification, assessment, monitoring, and control of uncertainties. Risk results from uncertainty about how economic actions will turn out. The objective of effective risk management is to logically guarantee that business enterprises. goals are met while minimizing risk associated with their business operations.

Controlling risks is a crucial strategy for maximizing the advantages of risky situations while reducing negative effects of exposure (Babatunde et al., 2022). Risk management is the idea that an event's probability of happening can be decreased or its

effects can be prevented. Potential risks stem from diverse factors, including environmental hazards, project inefficiencies, regulatory responsibilities, credit defaults, and accidental events, financial market uncertainties, and hostile actions. In this study, financial risk management is categorized into four segments which include financial risk, market risk, credit risk and liquidity risk.

Financial risk management refers to a structured approach to identifying, evaluating, and controlling financial risks. According to Stephen et al. (2017), the management of financial risk is a series of four (4) procedures which include identifying occurrences into several general markets such as credit, operational, and other risk categories into individual sub-category; assessing challenges that use risk and data models; promptly measuring and disclosing the risk evaluations; and allowing senior management to control these risks. Financial risk management seeks to lessen vulnerability to financial risks.

Market risk forms a significant dimension of financial risk regulation, concentrating on losses that can arise from fluctuations in exchange rates, shifts in interest rates, and variations in stock market prices (Liu, 2024). Market Risk entails the uncertainties in the external environment. It refers to the uncertainty resulting from variations in market conditions, which affects the bank's returns. Another source of market risk is when banks take financial instruments that are subject to fluctuations in market prices as security for loans (Paul et al., 2020).

Credit Risk Management represents a crucial component of financial institutions' operations within the banking sector. Credit risk refers to the likelihood that borrowers may default on their obligations is one of the hazards that it addresses (Khan et al., 2023). Therefore, efficient oversight of credit risk is crucial for ensuring the sustained resilience and profitability of financial institutions, safeguarding overall financial system stability, and encouraging efficient allocation of capital in the economy (Chang et al., 2024). Effective management of credit risk is fundamental to enhancing the operational performance of commercial banks (Siriba, 2020).

Liquidity risk management refers to the identification, assessment, and regulation of potential threats concerning the ability of the organization to fulfill its immediate financial requirements. According to Babatunde et al. (2022), it entails making sure a business has sufficient funds or liquid assets to cover its short-term financial obligations, including debt repayment, operating costs, and supporting ongoing projects.

Risk management is critical to improving organizational performance and resilience. According to various studies, good risk management methods can improve an organization's financial success and overall performance (Ahmed et al., 2022). It may be challenging to achieve desired financial performance if financial institutions, particularly deposit money banks, do not adequately manage their financial risk, claim (Ahmadu et al., 2020). The high degree of financial risk relates to banking operations has an impact concerning the financial results of the banking sector (Onsongo et al., 2020).

According to Central Bank of Nigeria (1990), inadequate risk management was the cause of the failure of many Nigerian banks in the past. There are numbers of largescale Nigerian deposit money banks that have been scaling down their operations due to poor performance, the poor performance has been partly associated with financial risks. Lack of liquidity resulting from loan issuance without proper analysis and attention to regulations is one of these issues facing deposit money banks in Nigeria.

Ahmadu et al. (2020) and the Central Bank of Nigeria (CBN) found that banks, particularly those in the international category, had a high degree of financial risk mismanagement, which led to a drop in their financial results. Nigerian deposit money banks, particularly those classified as international quoted deposit money banks, continue to see substantial decrease in their financial performance caused by improper execution of these financial risk management frameworks.

The aim of this research is to investigate the impact of risk management on the financial performance of listed deposit money banks in Nigeria while controlling for bank. Other specific objectives include:

i. Analyse the relationship between financial risk and financial performance of listed deposit money banks in Nigeria.
ii. Investigate the relationship between market risk and financial performance of listed deposit money banks in Nigeria.
iii. Evaluate the effect of credit risk and financial performance of listed deposit money banks in Nigeria.
iv. Determine the effect of liquidity risk on financial performance of listed deposit money banks in Nigeria.

In accordance with the specified research objectives, the following hypotheses are formulated:

H_{01}: financial risk does not significantly influence the financial performance of listed deposit money banks in Nigeria.

H_{02}: market risk has no significant relationship with the financial performance of listed deposit money banks in Nigeria.

H_{03}: credit risk does not influence the financial performance of listed deposit money banks in Nigeria.

H_{04}: liquidity risk has no significant relationship with financial performance of listed deposit money banks in Nigeria.

2. Literature Review

Conceptual Review

Concept of Risk Management

Risk management is the systematic approach to recognizing, analyzing, and mitigating potential hazards, legal, and financial risks. risk to an organization's operations, earnings, and capital. This concept comprises of creating a system for detecting, assessing, and quantifying specific occurrences as well as preventing and decreasing the probability that they will take place.

Managing risks has undergone several phases of development and is currently extremely beneficial in the implementation of policies aimed at reducing potential losses. Identifying, analyzing, and evaluating risks is just one of the many steps in the intricate risk management process. Other steps include putting particular Techniques for preventing or minimizing losses into place and making decisions about the best financial treatment to reduce unavoidable losses.

Risk management serves to protect organizations from prospective threats and losses that may jeopardize continuity. This covers financial impairments, reputation degradation, and employee-related hazards. Effective risk management periodically

examines and identifies risk; reducing unpredictable events can have negative effects on the organization.

Risk is the probability or uncertainty of an outcome having a negative effect on people. It entails exposure to possible danger, hurt, or damage, which is often evaluated by the possibility of an event happening and its possible consequences. According to (Zhu et al., 2023), risk is a key idea in uncertain decision-making, especially in situations with significant stakes and potentially severe outcomes. According to Abdrahamane et al. (2017) macroeconomic factors are causing banks' performance to fluctuate. Although, the risks which an organization may be exposed vary in kind and severity, depending on several elements like its size, complexity, activity volume and nature of business.

Concept of Credit risk

Credit risk is possibility that a debtor will not repay a loan or meet their financial obligations to a lender. It's a financial loss that can disrupt a lender's cash flow and increase collection costs. According to (Antony & G, 2023; Khan et al., 2023). It stands for the possibility that borrowers won't fulfill their loan commitments, which can have a big impact on a bank's cash flow and general financial stability. Financial institutions and financial markets frequently encounter this kind of risk.

Concept of Market risk

Market risk is the possibility that an individual or other entity will lose money as a result of elements that impact the overall performance of investments in the financial market. This risk can be described as the potential for businesses to suffer financial losses due to continuous fluctuations in the value of the assets they own. These fluctuations can be caused by any number of factors, including Interest rate fluctuations, commodity prices, foreign exchange rates, securities, and other market variables.

Concept of Liquidity risk

Liquidity is the capacity of a bank to finance asset growth and pay bills on time, without suffering intolerable losses (Wuave, Yua, & Yua, 2020). This risk can have severe consequences for a company, including bankruptcy or insolvency if not managed effectively, it involves making certain that a business has enough money or liquid assets to cover its immediate financial needs, such as paying off debts, meeting operational expenses, and funding ongoing projects (Babatunde et al., 2023).

Concept of Operational Risk

Operational risk is described as the possibility of suffering a loss as a result of either external occurrences or insufficient or unsuccessful internal procedures, people, or systems failures (Thair & Adib, 2022). Okeke et al. (2018) state that operational risk is defined as losses brought on by insufficient or flawed external events, internal systems, personnel, and procedures.

Theoretical Review

There are a variety of theories that are useful for understanding the correlation between distinct risk management and financial performance. These theories include Extreme value theory (L.Tippett,1902–1985), Modern portfolio theory (Harry Markowitz 1952),Trade- off theory (Kraus & Litzenberger, 1973), Finance Distress Theory (Graham & Dodd, 1934), and Liquidity preference theory Keynes (1936).

Extreme value theory explains the concept and methodology for assessing the probabilities (also known as risks) associated with extreme events. This theory is the area

of statistics that deals with probability distributions by ensuring that the boundary points of the medians are included in the analysis.

Trade-off Theory in finance refers to a concept used to explain the ideal capital structure for a company. Liquidity Preference Theory explains the determination of interest rate. Investments with significant risk are typically preferred by investors, all other things being equal. Modern portfolio theory is a mathematical model for putting together group of securities so that, given a certain scale of risk, the expected return is maximized. Financial Distress Theory states that financial difficulties arise when a company's, assets, or index's price group of a market's assets is dropping with the risk suddenly value collision.

Empirical Review

Empirically, Simamora and Oswari (2019) examined the financial performance of banks listed on the Indonesian Stock Exchange in relation to credit risk, operational risk, and liquidity risk. The research relied on secondary data obtained from the financial statements (2009–2017) of five out of Ethiopia's forty-three licensed banks. The explanatory variables included credit risk (measured by the non-performing loan ratio), liquidity risk (measured by the loan-to-deposit ratio), and operational risk (measured by the operating expense to operating income ratio). The dependent variable, financial performance, was proxied by ROA. The findings indicated that both operational risk and liquidity risk exerted significant effects on financial performance, according to multiple linear regression analysis of the data. Financial performance, however, was found to be unaffected by credit risk.

Kioko (2019) assessed the financial implications of risk exposures on Kenyan commercial banks listed on the Nairobi Stock Exchange. It covered a five-year period from 2014 to 2018. The independent variables included credit risk, market risk, liquidity risk, and operational risk, while financial performance, proxied by net earnings, was the dependent variable. The target population comprised all 44 commercial banks, with a sample of 11 banks listed on the Nairobi Stock Exchange. A descriptive research design was adopted. Secondary data were sourced from publicly available financial statements and annual reports of the sampled banks. Multiple regression analysis was employed for data evaluation. The collected data was entered into an Excel data collection tool after being encoded using SPSS. The analysed data's mean, standard deviations, and tabulations were displayed. The study's findings showed that credit risk, market risk, and operating risk all significantly impacted financial performance, even though liquidity risk had the biggest negative impact.

Jacob et al. (2020) reviewed the financial results and credit risk management of seven listed banks in Ghana during a ten-year span, from 2007 to 2016. The analysis revealed that managing credit risk had a favorable and significant impact on banks' financial performance after applying regression analysis to the collected data.

Alian (2023) investigated how operational risk management influences the financial performance of commercial banks in Cameroon. A structured questionnaire was employed to gather the necessary information from 250 respondents using an approach to survey research, and analysis was done using a structured model. This study uses three (3) selected mainstream commercial banks. The results of the analysis indicate that risk management has a strong and positive impact on the financial performance of the selected institutions.

3. Methodology

To provide evidence in support of existing theories and to evaluate and confirm theoretical explanations of how and why events take place, the study adopted a quantitative research design. This approach was used to establish facts and test prior hypotheses. The research utilized secondary data, drawing from the annual reports of ten (10) selected deposit money banks listed on the Nigeria Exchange Group (NGX) using stratified sampling technique.

These reports, covering statements of financial position from 2019 to 2023, served as a source of information on risk management, financial performance, and the operations of deposit money banks. Deposit money banks include United Bank for Africa PLC, Fidelity Bank PLC, Stanbic Bank PLC, Wema Bank PLC, Zenith Bank PLC, ECO Bank, First Bank of Nigeria, Access Bank PLC, First City Monument Bank PLC, and Sterling Bank PLC.

The model of the study

ROA = f (RM, BS) …….equ (1).

This study divides the risk managment into market risk (MR), credit risk (CR), liquidity risk (LR), operational risk (OR) due to the fact that the study aims to investigate the impact of individual risk or DMB performance in Nigeria.

The mathematical model in equ (1) is non subdivided into:

ROA=f (CADR, NPLR, BS)……equ 1(a)

ROA=f (LDR, CR, BS)……equ (1b)

ROA = f (NIM, GER, BS)……equ (1c)

ROA = f (CIR, OER, BS)…….equ (1d)

Two variables of the equation of the selected RM is used as expressed econometrically:

ROA= $\beta o + \beta_1 CADR + \beta_2$NPLR+$\beta_3$BS+μ- - - - - - - - - - (1)

ROA = β_0 + β_1 LDR + β_2 CR+ β_3BS + μ - - - - - - - - - - - - (2)

ROA= β_0 + β_1 NIM + β_2 GER + β_3 BS +μ - - - - - - - - - - - -(3)

ROA = β_0+β_1 CIR +β_2 OER +β_3 BS +μ- - - - - - - - - - - - - - - (4)

Variable Measurement

Table 1

Variable Description

VARIABLES	TYPE OF VARIABLES	MEASUREMENTS	SOURCE
Return on Asset (ROA)	Dependent	Profit before taxes and interest divided by total assetss	(Schmidt, 2023)
Capital adequacy ratio (CAR)	Independent	Total equity/ total asset	(Ukinameme & Ozekhome, 2020)
Non-performing loan	Independent	Non-performing loan / total loan	(Kingu et al., 2018)
Loan-to-deposit ratio (LDR)	Independent	Total loans/ total deposit	(Ajibola & Olowoloju, 2017)
Current ratio	Independent	Current asset/ current liability	(Mohammed & Al-okdeh, 2022)
Net interest margin	Independent	Net interest income/ Total assets	(Tan & Floros, 2018)
Cost income ratio	Independent	Operating expenses/ Operating income × 100	(Kioko el al., 2019)
Operating expenses ratio	independent	Total Operating expenses/Total revenue×100	(Paul & Musiega, 2020).
Gearing ratio (GER)	Independent	Total debt/Total assets	(Kassi et al., 2019)
Bank Size	Control	Log of total asset	(Adusei & Obeng, 2019)

Source: Author's Computation (2025)

4. Results and Discussion

Descriptive Statistics

Table 2

Descriptive Result

Source: Author's computation (2025)

	ROA	NPLR	LDR	NIM	CADR	CR	BS	GER	CIR	OER
Mean	0.046739	0.040320	0.594152	0.149465	0.342091	3.058251	7.239751	0.722389	-0.627994	-15.38491
Median	0.019758	0.037450	0.549000	0.034104	0.100778	1.082266	7.103987	0.899222	-0.602211	-0.216569
Maximum	0.325814	0.099000	0.986180	2.043173	0.996181	58.27257	9.985011	3.818524	0.425754	6.587817
Minimum	-0.060986	0.010000	0.379000	0.003054	0.057629	0.036771	0.255273	0.015523	-2.143290	-266.9278
Std. Dev	0.075733	0.020434	0.166196	0.374955	0.391581	8.328695	1.486640	0.589273	0.454781	49.82525
Skewness	2.214026	1.038515	0.843386	3.455126	0.900161	6.070287	-0.969323	2.605551	-0.623908	-3.514615
Kurtosis	7.615849	3.813075	2.701992	15.47478	1.852964	40.32403	6.635519	16.34433	4.353914	15.57141
Jarque-Bera	85.23690	10.36489	6.112511	423.6911	9.493439	3209.326	35.36531	427.5557	7.062771	432.1886
Probability	0.000000	0.005614	0.047064	0.000000	0.008680	0.000000	0.000000	0.000000	0.029264	0.000000

Source: Author's computation (2025)

Means indicates the average of each variable's value. Which means for Return on asset (ROA), Non-performing loan ratio (NPLR), Loan to deposit Ratio (LTDR), Net interest margin (NIM), Capital adequacy ratio (CADR), Current ratio (CR), Bank size (BS), Gearing ratio (GER), Cost income ratio (CIR) and Operating Expenses Ratio (OER) which are 0.046739, 0.040320, 0.594152, 0.149465, 0.342091, 3.058251, 7.329751, 0.722389, -0.627994 and -15.38491 respectively.

Median indicates the middle number of the variables after the data have been arranged in ascending and descending order, the median for ROA, NPLR, LTDR, NIM, CADR, CR, BS, GER, CIR and OER for the deposit money banks selected over a timeframe from 2019-2023 using the panel data are 0.019758, 0.019758, 0.037450, 0.549000, 0.034104,0.100778,1.082266,7.103987,0.899222, -0.602211and -0.216569 respectively.

Maximum shows the highest of each of the variables in the analysis while one the other hand minimum shows the lowest values, in the regression below, the maximum for ROA, NPLR, LDR, NIM, CADR, CR, BS, GER, CIR and OER which are 0.325814, 0.099000, 0.986180, 2.043173, 0.996181, 58.57257, 9.985011, 3.818524, o.425754 and

6.587817 respectively and the minimum for each variables are-0.060986, 0.010000, 0.379000, 0.003054, 0.057629, 0.036771, 1.255273, 0.015523, -2.143290 and -266.9278 respectively.

Standard deviation is used to measure the variation which exist from the mean above; when the standard deviation is small, it indicates that the data points cluster tightly around the mean but if it is higher data shows that data are spread by a wide area of values. Standard shows that there is spread of data over a range amount. It can also function as a gauge of uncertainty or exposure to risk.

The spread of samples series; ROA, NPLR, LTDR, NIM, CADR, CR, BS, GER, CIR and OER are 0.075733, 0.020434, 0.166196, 0.374955, 0.391581, 8.328695, 1.486640, 0.589273, 0.454781 and 49.82525 respectively. The result shows that ROA, NPLR, LTDR, NIM, CADR, CR, BS, GER, CIR and OER have low standard deviation respectively.

Skewness using descriptive statistics for ROA, NPLR, LTDR, NIM, CADR, CR, BS, GER, CIR and OER are 2.214026, 1.038515, 0.843386, 3.455126, 0.900161, 6.070287, -0.969323, 2.605551, -0.623908 and -3.514615 respectively. This indicates the sharing of the series across the mean. The result shows that ROA, NPLR, LDR, NIM, CADR, CR, GER are positive respectively but BS, CIR and OER indicates a negative skewness.

Kurtosis measures the peakedness on the probability distribution in the event that the kurtosis coefficient appears to be above three (3), this indicates that the peak is high, but if it tends to be Less than three (3), it indicates that there is a low peak. The kurtosis of the value using descriptive analysis using ROA, NPLR, LTD, NIM, CADR, CR, BS, GER, CIR, and OER with the coefficient of 7.615849, 3.813075, 2.701992, 15.47478, 1.85294, 40.32403, 6.635519, 16.34433, 4.353914 and 15.57141 respectively indicate a high peak.

Jarque-bera is a test for determining the goodness of fit of a data distribution in order to ensure that the skewness and kurtosis are normally distributed. It is employed to test the variable's hypothesis and make sure it is regularly distributed. When the probability value falls below the significance threshold in the Jarque-Bera test, the null hypothesis assumes that both skewness and kurtosis are equal to zero, one rejects the null hypothesis, as well as if we accept.

From table 2, the Jarque- Bera test for ROA, NPLR, LDR, NIM, CADR, CR, BS, GER, CIR and OER are 85.23690, 10.36489, 6.112511, 423.6911, 9.493439, 3209.326, 35.3653, 427.5557, 7.062771 and 432.1886 respectively. The P-value for each variable is 0.000000, 0.005614, 0.047064, 0.000000, 0.008680, 0.000000, 0.000000, 0.000000, 0.029264 and 0.000000 respectively. It points out that the regression residual is distributed normally.

Correlation Result

Table 3

Correlation Matrix

	ROA	NPLR	LDR	NIM	CADR	CR	BS	GER	CIR	OER
ROA	1.000000									
NPLR	-0.083382	1.000000								
LDR	0.045112 5	-0.513140	1.000000							
NIM	0.863200	-0.211590	0.505981	1.000000						
CADR	0.516078	0.122919	0.186660	0.371945	1.000000					
CR	0.032379	0.021964	0.133522	0.031653	0.348386	1.000000				
BS	-0.024510	-0.075573	-0.004502	-0.022 59	-0.21779	0.078854	1.000000			
GER	-0.333242	-0.098637	-0.239944	-0.05822	-0.42981	-0.04175	0.220764	1,000000		
CIR	0.309675	-0.450158	0.541595	0.443995	0.135856	0.377859	0.178621	0.066252	1.000000	
OER	-0.881535	0.221406	-0.553666	-0.935 91	-0.301707	0.026940	0.076689	0.311583	-0.400654	1.000000

Source Author's Computation (2025)

Table 3 presents the outcomes of the correlation analysis among the variable (either positive or negative values). It also explains the relationship's strength (whether it is either strong or weak). A positive relationship shows since the other variable tends to climb as the first one does as well as the negative implies that when one variable moves higher, the other variable moves lower. That is, between 0 (no relationship) and 1 (perfect relationship) values are interpreted.

Regression Analysis

The study's variables that explain and the regression outcome of the explained variable, as measured by ROA (NPLR, CADR, NIM, CADR, CR, BS, GER, CIR, and OER) are discussed in this section. The outcomes of the random and fixed effect models

are presented first, followed by the Hausman specification test, so that the most appropriate model can be chosen from the two possibilities available.

Table 4

Fixed Effect and Random Effect Regression Result (Model 1)

Dependent Variable: ROA

	Fixed effect regression				**Random effect regression**			
Variable	Co-efficient	Std. Error	t-statistics	Prob.	Co-efficient	Std. Error	t-statistics	Prob.
C	-0.083728	0.025498	-3.283760	0.0022	-0.81112	0.034177	-2.373273	0.0219
CADR	0.080583	0.021244	3.793237	0.0005	0.084255	0.020223	4.166217	0.0001
NPLR	0.142951	0.242822	0.588706	0.5596	0.110255	0.239544	0.460269	0.6475
BS	0.013417	0.003147	4.263326	0.0001	0.013064	0.003117	4.191888	0.0001
R-squared	0.932240				0.442267			
Adjusted R-Squared	0.910263				0.405893			
F-statistics	42.42023				12.15891			
Prob(F-statistics	0.000000				0.000006			
Durbin-Watson stat	1.465446				1.222162			

Source: Author's computation (2025)

The equation was used to express the model linearly from table 4. Based on the regression output, the intercept (α) is -0.08, implying that when all explanatory variables (CADR, NPLR, and BS) are held constant, ROA takes the value of -0.08, indicating a negative baseline effect. For the slope parameters, the β1 coefficient is 0.08, signifying a positive association. Similarly, the β2 coefficient of 0.14 indicates a favorable relationship, while the β3 coefficient of 0.01 also demonstrates a direct positive linkage.

Based on the t-statistic, the critical value t(α/2, n–k) is obtained at the 5% significance level to assess whether each variable is statistically significant. The decision rule states that the null hypothesis is accepted when the tabulated t-value exceeds the calculated t-value. In this study, since t-tab > t-cal for t(0.025, 104) = 2.013, the null hypothesis is accepted; otherwise, it would be rejected.

In the case of the F-test, the critical value Fα(k–1, n–k) is determined at the 5% significance level to evaluate the statistical significance of the variables. The decision rule states that if F-stat exceeds F-critical, the null hypothesis is rejected; otherwise, it is not rejected. In this regression, with α = 5% (0.05), k = 4 (number of parameters), and n = 50 (sample size), the F-statistic for the fixed effects model is 42.42023, for the random effects

model is 12.15891, while the critical F-value from the distribution table, F0.05(3, 46), equals 2.58.

The regression accounts for a substantial portion of the variation in the model, the null hypothesis is rejected, leading to the conclusion that ROA is influenced by CADR, NPLR, and BS in the sampled listed deposit money banks, as indicated by the F-statistic < F0.05(4,46), (42.42023 > 2.58) for the fixed effect, and F0.05(4,46) (12.15891 > 2.58) for the random effect.

The overall hypothesis is evaluated through the probability value of the F-statistic (P-value), which implies that the null hypothesis is rejected whenever the P-value falls below the significance threshold. Accordingly, the null hypothesis is dismissed since the P-value for the fixed effect (0.000000) and random effect (0.000006) in our regression result are less than the 5% level of significance for both fixed (0.000000>0.05) and random (0.000006>0.05). It shows that the dependent variables are affected simultaneously.

The R-squared statistic provides a measure of the explanatory power or goodness of fit of the model. An R^2 value of 1 denotes a perfect regression outcome. In this analysis the coefficient of determination (R^2) for the fixed effects specification is 0.932240, whereas that of the random effects specification is 0.442267. This indicates that about 93.22% and 44.22% of the variability in the dependent variable are explained by the independent variables. Conversely, 6.78% (100 – 93.22) and 55.78% (100 – 44.22) of the variation are attributed to random error. The closer the R-squared approaches 1, the stronger and more reliable the model's fit

Adjusted R^2 serves as an improved measure of the coefficient of determination, correcting for the number of explanatory variables included in the regression to yield a more reliable indicator of fit. The fixed effects model records an adjusted R^2 of 0.910263 (91.10%), whereas the random effects model records 0.442267 (44.22%).

The Durbin–Watson (DW) test is employed to identify the presence of autocorrelation within the dataset. It examines the extent of correlation across successive observations. As indicated in the results table, the DW statistic for the fixed effects model is 1.465446, whereas for the random effects model it is 1.222162. The tabulated DW values are 1.65 (upper bound) and 1.41 (lower bound). Since the computed DW values fall within this range, the presence of autocorrelation is confirmed.

Table 5

Fixed Effect and Random Effect Regression Result (Model 2)

Dependent Variable: ROA

	Fixed effect regression				**Random effect regression**			
Variable	Co-efficient	Std. Error	t-statistics	Prob.	Co-efficient	Std. Error	t-statistics	Prob.
C	0.016961	0.039848	0.425653	0.6728	-0.004719	0.044662	-0.105650	0.9163
LDR	-0.128359	0.060196	-2.132358	0.0397	-0.074146	0.055989	-1.324294	0.1919
CR	-0.00008	0.000498	0.164501	0.8702	0.00008	0.000497	0.052833	0.9581
BS	0.014613	0.003652	4.001747	0.0003	0.013182	0.003589	3.672840	0.0006
R-squared	0.912692				0.218344			
Adjusted R-Squared	0.884375				0.167366			
F-statistics	32.23213				4.283132			
Prob(F-statistics	0.000000				0.009520			
Durbin-Watson stat	1.722173				1.203048			

Source: Author's computation (2025)

From table 5, the model is linearly represented by the following equation. Based on the coefficient, the constant term (α) is 0.01, which implies that when all the variables (LDR, CR, and BS) are held constant, ROA equals 0.01. This suggests that ROA will vary negatively up to the extent of 0.01 when other variables remain unchanged. The coefficient β1 is 0.12, signifying a positive association. Similarly, β2 is 0.00, indicating a positive linkage, while β3 is 0.01, also confirming a positive relationship.

Regarding the T-statistic, to determine whether the variables are statistically significant, At the 5% significance level, the critical value t(α/2, n–k) is determined as t(0.025, 46) = 2.013. Given that the computed t-statistics are smaller than the critical value, the null hypothesis for each variable is retained.

The rule is: if t-tabulated > t-calculated, accept the null hypothesis; otherwise, reject it. For the F-statistic, significance is tested using Fα (k-1, n-k) at a 5% level. This helps validate the overall hypothesis. The null hypothesis (H_0) is rejected if F-stat > F-critical. In our regression, the F-statistic is 32.23213 for the fixed effect and 4.283132 for the random effect, with F-critical = 2.58.

Since both calculated values exceed the critical value, the null hypothesis is rejected. Thus, ROA depends on LDR, CR, and BS for the sampled deposit money banks, as the regression accounts for a significant portion of the variation.

The probability value of the F-statistic (P-value) is employed to evaluate the joint hypothesis, with the decision rule being that H_0 is rejected when the P-value falls below the significance threshold. In this study, the fixed effects model records a P-value of 0.000000 and the random effects model a P-value of 0.009520, both less than 5%. Hence, the null hypothesis is rejected, indicating that the explanatory variables collectively affect the dependent variable.

R-squared measures the explanatory capacity or goodness of fit of the regression model, with a maximum of 1 denoting a perfect relationship between observed and predicted values. The results indicate an R^2 of 0.912692 for the fixed effects model and 0.218344 for the random effects model. Thus, the independent variables explain approximately 91.26% of the dependent variable's variability in the fixed model and 21.83% in the random model. The remaining 8.74% and 78.17% are unexplained, signifying a weak fit in the random effects specification. Generally, the closer R^2 approaches 1, the stronger the model fit.

The Adjusted R-squared represents an improved form of the standard R^2, as it incorporates the number of explanatory variables in the model, thereby offering a more precise measure of fit than the unadjusted statistic. The adjusted R^2 is 0.884375 (88.43%) for the fixed effect and 0.167366 (16.73%) for the random effect, as presented above.

The Durbin–Watson measure is used to evaluate serial correlation within the data, by assessing the bounds of the residual distribution. Based on the results presented, the DW value equals 1.722173 for the fixed effects specification and 1.203048 for the random effects specification. The DW reference table provides upper and lower bounds of 1.65 and 1.47, respectively. Since the computed values fall within this interval, it indicates the presence of autocorrelation in the model.

Table 6

Fixed Effect and Random Effect Regression Result (Model 3)

Dependent Variable: ROA

	Fixed effect regression				**Random effect regression**			
Variable	Co-efficient	Std. Error	t-statistics	Prob.	Co-efficient	Std. Error	t-statistics	Prob.
C	-0.035435	0.0212268	-1.666128	0.1041	0.022285	0.015579	1.430485	0.1593
NIM	0.069171	0.018030	3.836434	0.0005	0.168965	0.008499	19.88073	0.0000
GER	0.014083	0.009156	1.538149	0.1325	-0.035900	0.005471	-6.562475	0.0000
BS	0.008517	0.003046	2.796190	0.0082	0.003472	0.002152	1.613122	0.1136
R-squared	0.942897				0.806806			
Adjusted R-Squared	0.924377				0.794206			
F-statistics	50.91282				64.03422			
Prob(F-statistics	0.000000				0.000000			
Durbin-Watson stat	1.804473				1.452427			

Source: Author's computation (2025)

From table 6, the model is linearly represented through the following equation. The constant term (α) has a value of –0.03, which implies that when all variables (NIM, GER, and BS) are held constant, ROA equals –0.03 and will decrease by the same magnitude in the absence of changes in the predictors. The coefficient β1 is 0.06, indicating a positive association; β2 is 0.01, likewise showing a positive linkage; and β3 is 0.00, also reflecting a positive connection.

Regarding the t-statistic, to determine whether each variable is statistically significant, we compute t (α/2, n–k) at the 5% significance level, which guides whether to reject or accept the null hypothesis. The t-tabulated for the t-stat > t (0.05/2, 50 - 4), t(0.025, 46) = 2.013. Since the t-tab > Tcal, one accepts the null hypothesis for each variable. If the t-tab Tcal, accept the null hypothesis, otherwise reject the null hypothesis. Assume βs zero for all slopes, the t-table value would be applied to draw conclusions for each variable.

Under that F-stat, it helps to bond hypothesis. If the F-stat >Fcal, The null hypothesis is rejected if the test statistic exceeds the critical value; otherwise, it is retained. For this case, with a significance level of 5% (α = 0.05), k = 4 parameters, and n = 50 observations, the F-statistic for the fixed effect in our regression is 50.91282, the F-statistic for the random effect is 64.03422, and the F-cal is F0.05(5-1,50-4).

According to the F-stat table, the critical value obtained is 2.58. Thus, since the f-stat < F0.05(4,46), (50.91282 < 2.58) for the fixed effect and F0.05(4,46), (64.03422< 2.58) for the random. The null hypothesis is rejected, leading to the conclusion that ROA is determined by NIM, GER, and BS among the listed deposit money banks within the sample, as the regression demonstrates substantial explanatory power.

The P-value of the F-statistic is utilized to evaluate the joint hypothesis, with the null hypothesis dismissed whenever the P-value falls below the chosen significance threshold. In the result for the regression P-value for the fixed effect is 0.000000 and the random effect is 0.000000 which is less than 5% level of significance (0.000000> 0.05) fixed and (0.000000 >0.05) random, we tend to reject the null hypothesis. It indicates that there is jointly effect on the dependent variables.

R-squared is commonly termed the coefficient of determination, serves as an indicator of the model's explanatory strength regarding the dependent variable. A value equal to 1 reflects a perfect fit. The analysis reveals R^2 values of 0.942897 for the fixed effects specification and 0.806806 for the random effects specification, indicating that the predictors account for 94.28% and 80.68% of the variability in the dependent variable, respectively. The unexplained proportions are 5.72% and 19.32%. A higher R^2 approaching unity suggests superior model adequacy.

Adjusted R-squared, which modifies the R-squared to correct for the inclusion of multiple predictors, offers a more accurate representation of the model's explanatory strength. The computed values are 0.924377 (92.43%) for the fixed effect and 0.794206 (79.42%) for the random effect.

The Durbin–Watson test is employed to detect the presence of autocorrelation, evaluating the distribution of residuals across upper and lower limits. As indicated in the table, the Durbin–Watson statistic records 0.804473 for the fixed effects model and 1.452427 for the random effects model. The DW table provides critical upper and lower values of 1.70 and 1.55, respectively. Since the computed DW values fall within this range, it indicates the presence of autocorrelation.

Table 7

Fixed Effect and Random Effect Regression Result (Model 4)

	Fixed effect regression				**Random effect regression**			
Variable	Co-efficient	Std. Error	t-statistics	Prob	Co-efficient	Std. Error	t-statistics	Prob
C	-0.067703	0.028676	-2.360973	0.0236	-0.032665	0.026123	-1.250421	0.2175
CIR	-0.022093	0.017976	-1.229024	0.2268	-0.008389	0.012977	-0.646421	0.5212
OER	-0.000466	0.000191	2.434845	0.0198	-0.001129	0.000123	-9.149825	0.0000
BS	0.012901	0.003469	3.718971	0.007	0.007840	0.003083	2.543052	0.0144
R-squared	0.918504				0.577468			
Adjusted R-Squared	0.892073				0.549912			
F-statistics	34.75088				20.95587			
Prob(F-statistics	0.000000				0.000000			
Durbin-Watson stat	1.574652				1.359006			

Source: Author's computation (2025)

As presented in table 7, the model is represented in a linear form. From the estimated coefficients, the intercept (α) is -0.06, indicating that when all variables (CIR, OER, and BS) are held constant, ROA equals -0.06, reflecting a decline of -0.06 in the absence of changes in the predictors. The coefficient of β1 is -0.02, signifying a negative association, while β2 (-0.00) also demonstrates a negative link. Conversely, β3 (0.01) illustrates a positive connection.

For the T-statistics, in assessing whether each variable is statistically significant, the estimated t-statistics are evaluated against the critical value t(α/2, n–k) at the 5% significance level. The null hypothesis is dismissed if the calculated statistic is greater than the corresponding tabulated value. The t-tabulated for the t-stat > t (0.05/2, 50 - 4), t (0.025, 46) = 2.013. Since the t-tab > Tcal, one accepts the null hypothesis for each variable. If the t-tab Tcal, accept the null hypothesis, otherwise reject the null hypothesis. Assume βs zero for all slopes, Hence, the decision for each variable is guided by comparing with the tabulated t-value.

The F-stat is applied to assess the validity of the hypothesis. The null hypothesis is dismissed if F-stat exceeds Fcal; if not, it is accepted. In our analysis, the fixed effect F-statistic is 34.75088, and the random effect is 20.95587, compared to an F-critical of F0.05(5–1, 50–4) at α = 5% (0.05), where k = 4 (parameters) and n = 50 (observations).

According to the F-distribution reference table, the derived result equals 2.58. Thus, since the f-statistic < F0.05(4,46), (34.75088 < 2.58) for the fixed effect and F0.05(4,46), (20.95587 < 2.58) for the random, Since the regression explains a sizable portion of the model, we likely to reject the null hypothesis and infer that ROA depends on CIR, OER, and BS listed deposit money institutions and the supplied sample.

The joint hypothesis is evaluated through the probability value of the F-statistic, where the null hypothesis is rejected whenever the P-value falls below the chosen significance level. In this study, both the fixed effects and random effects models yield P-values of 0.000000, which are both below the 5% level of significance (0.000000>0.05) for the fixed effect and (0.000000>0.05) for the random effect, we typically reject the null hypothesis. It shows that the dependent variables are affected together.

The R-squared provides statistical data regarding the quality of information fits. R-squared for the fixed effect is 0.918504 and for the random effect is 0.577468, meaning that about 91.85% of the proportion of variability in the dependent variable accounted for by the independent variables is measured by R-squared. A value of 1 denotes a perfect regression outcome. In this analysis, 42.26% of the variation for the random effects model and 8.15% for the fixed effects model are attributed to the error term, indicating weak model adequacy. The nearer the R-squared approaches unity, the stronger the explanatory power of the model.

The adjusted R-squared represents a corrected form of the coefficient of determination, incorporating the number of regressors in the model to yield a more reliable indication of fit. In this analysis, the adjusted R^2 for the fixed effects specification is 0.918504 (91.85%) and 0.577468 (57.74%) for the random effect.

The Durbin–Watson statistic is employed to examine whether serial correlation exists in the residuals, by referencing the upper and lower limits of the observations. As presented in the table, the fixed effects model records a value of 1.574652, while the random effects model yields 1.359006. The DW table provides upper and lower bounds of 1.65 and 1.38 for the fixed effect, respectively. Since the computed values lie within these limits, it indicates the presence of autocorrelation.

Table 8

Hausman Test Result

Correlated Random Effects - Hausman Test

Test Summary	Chi-Sq.Statistic	Chi-Sq.d.f.	Prob	
Cross-section random	1.452569	3	0.6933	Model 1
Cross-section random	6.872772	3	0.0761	Model 2
Cross-section random	63.678196	3	0.0000	Model 3
Cross-section random	24.850787	3	0.0000	Model 4

Source: Author's computation (2025)

Model 1: To verify model specification, the Hausman procedure evaluates whether random effects are correlated with the independent variables, thereby determining the appropriateness of the random effects model versus the fixed effects alternative. Table 8 presents a chi-square value of 1.4526 and a p-value of 0.6933, exceeding the 5% threshold. The rule of decision asserts that a p-value below 0.05 warrants rejection of the null

hypothesis, favoring fixed effects. Given that the p-value is higher than 0.05, the null is upheld, implying that the random effects framework is valid for this estimation.

Model 2: The Hausman procedure once more evaluates the validity of adopting the random effects specification. As indicated in Table 4.4.1, the chi-square statistic is 6.8728 with a corresponding p-value of 0.0761, which exceeds the 5% significance level. Based on the decision rule—rejecting the random effects model when the p-value falls below 0.05—the random effects model remains acceptable in this case. we find that since 0.0761 > 0.05, the evidence does not support rejecting the random effects assumption. Hence, the random effects specification remains valid for Model 2.

Model 3: The Hausman statistic is 63.6782 with a p-value of 0.0000, clearly below the 5% threshold. Following the decision criterion, since the p-value falls under 0.05, the null hypothesis of no correlation between the random effects and the regressors is rejected. Consequently, the random effects estimator is unsuitable, and the fixed effects model is deemed more appropriate for Model 3.

Model 4: the chi-square value is 24.8508 with a corresponding p-value of 0.0000, which falls below the 5% threshold. According to the Hausman test guideline, this result leads to rejecting the null hypothesis, indicating that the random effects approach is inappropriate. Therefore, the fixed effects specification is preferred for Model 4.

FIG 1-4: Heteroskedasticity effect result

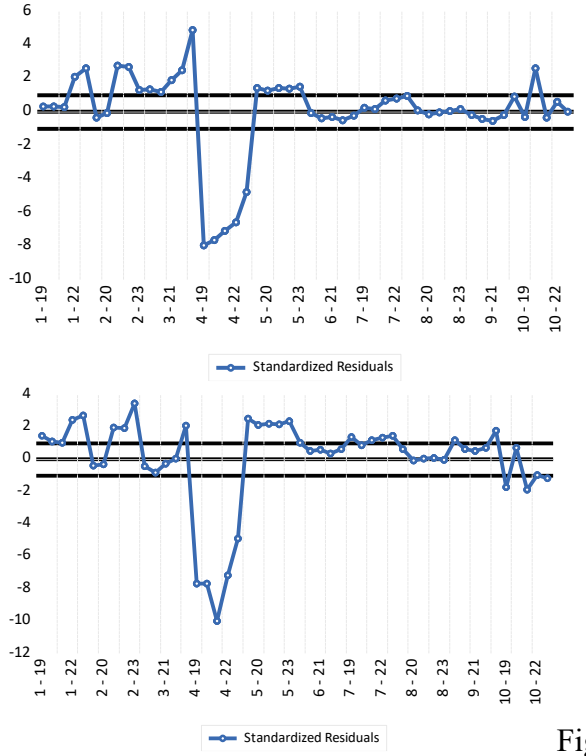


Fig 1

Fig 2

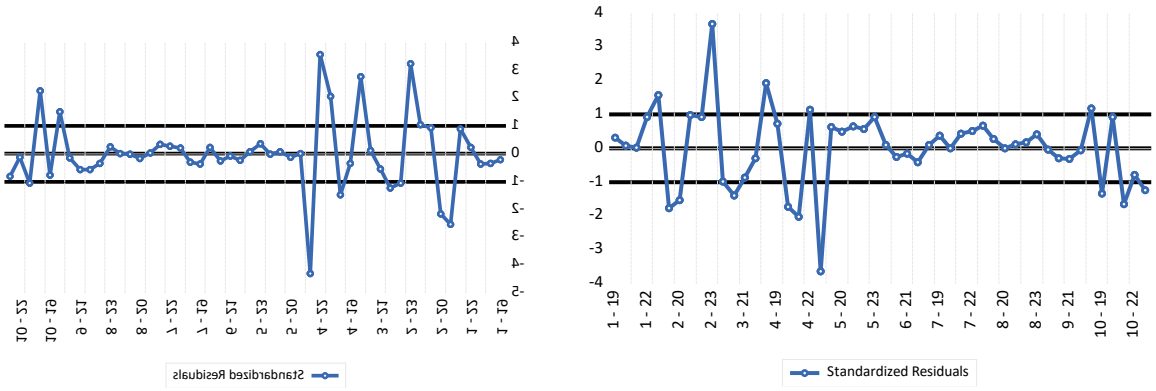


fig 4
Fig3

Heteroskedasticity testing was undertaken to assess the suitability of the regression model used in the study. A visual approach is used to employ the standardized residual graph which was plot to compare the results for the prefer regression result cross section random effect. Table 4.6 above shows that there is outlier in the variables.

Table 9

Generalized Linear Model Test (Newton-Raphson /Marquardt steps)

Model 1: Dependent variable: ROA

Variable	Coefficient	Std.error	Z-statistics	Prob
C	0.00052	0.054036	0.010210	0.9919
CADR	0.106829	0.024679	4.328734	0.0000
NPLR	-0.536898	0.462893	-1.159875	0.2461
BS	0.004322	0.006470	0.668039	0.5041
	Model 2			
C	-0.068092	0.061294	-1.110895	0.2666
LDR	0.207155	0.060465	3.426025	0.0006
CR	-0.000243	0.001210	-0.200707	0.8409
BS	-0.001037	0.006720	-0.154319	0.8774
	Model 3			
C	0.026535	0.023087	1.149353	0.2504
NIM	0.171128	0.012339	13.86875	0.0000
GER	-0.038198	0.00084048	-4.746288	0.0000
BS	0.003069	0.003185	0.963497	0.3353
	Model 4			
C	-0.002635	0.030029	-0.087744	0.9301
CIR	-0.011010	0.012841	-0.857456	0.3912
OER	-0.001387	0.000116	-1.199064	0.0000
BS	0.002918	0.003610	0.808265	0.4189

Source: Author's computation (2025)

From the coefficient results of model 1, the constant term (α) is 0.00052, which implies that when all explanatory variables (CADR, NPLR, and BS) are held constant, ROA equals 0.00052. This suggests that ROA increases positively by 0.00052 when all variables remain unchanged. The coefficient of β1 is 0.106829, indicating a positive association; β2 is -0.536898, reflecting a negative relationship; while β3 is 0.00432, again showing a positive association.

With respect to the probability values of the Z-statistic (P-values), According to the decision criterion, the null hypothesis is rejected whenever the P-value falls below the significance threshold. For C, NPLR, and BS, the P-values (0.9919, 0.2461, and 0.5041) exceed 0.05, rendering them statistically insignificant; hence, the null hypothesis is retained. In contrast, CAR and BSIZE both show P-values of 0.0000, which are below 0.05, making them statistically significant and warranting rejection of the null hypothesis.

From the coefficient results of model 2, The constant term (α) is -0.068092, signifying that when LDR, CR, and BS are kept constant, ROA equals -0.068092, implying a negative effect of that magnitude when the variables remain unchanged. The coefficient of β1 is 0.207155, showing a positive effect; β2 is -0.000243, showing a negative effect; and β3 is -0.001037, also showing a negative effect.

Regarding significance testing, the P-values of C, CR, and BS are 0.2666, 0.8409, and 0.8774 respectively, which are higher than 0.05, and therefore insignificant, meaning the null hypothesis is retained. However, the P-value of LDR is 0.0006, which is below 0.05, making it statistically significant, and the null hypothesis is rejected.

From the coefficient results of model 3, the constant term (α) is 0.026535, indicating that holding NIM, GER, and BS constant, ROA equals 0.026535, reflecting a positive impact at that level. The coefficient of β1 is 0.171128 (positive), β2 is -0.038198 (negative), while β3 is 0.003069 (positive). In terms of statistical significance, the P-values of C and BS are 0.2504 and 0.3353, greater than 0.05, rendering them insignificant and leading to acceptance of the null hypothesis. On the other hand, the P-values of NIM and GER are both 0.0000, below the 0.05 threshold, making them statistically significant, hence the null hypothesis is rejected.

Discussion of Findings

This research examined the effect of risk management attributes on the financial performance of Nigerian deposit money banks between 2019 and 2023. This study is using GLM results to make decision because it is superior to the result from the regression analysis of fixed and random effects.

The non-performing loans ratio has a negative but negligible influence on financial performance consistent with prior expectations. The findings further revealed a robust positive association between banks' profitability and their net interest margin. However, the loan-to-deposit ratio shows a positive and statistically significant effect on the financial outcomes of listed Nigerian deposit money banks, diverging from the study's initial assumption.

Capital adequacy ratio (CADR) exerts a substantial and favorable impact on the financial outcomes of Nigerian listed deposit money banks, in line with the initial expectation. Conversely, bank size exhibits a negative but negligible effect on financial performance, also consistent with the prior assumption.

Net interest margin reveals a favorable and statistically significant impact on the financial outcomes of Nigerian listed deposit money banks, contrary to the initial

expectation. The gearing ratio shows an adverse and significant effect on financial performance, likewise diverging from the a priori expectation.

Operating expenses ratio shows a significant adverse unfavorable influence on the financial performance of Nigeria's listed deposit money banks, in accordance with the initial forecast. Similarly, the cost–income ratio records a negative but statistically negligible effect on financial results, conforming with the A priori expectation.

5. Conclusion and Recommendation

Based on the study's findings, the Gearing Ratio (GER) exhibits a negative but statistically insignificant effect on the financial performance of Nigerian listed deposit money banks. Likewise, the Non-Performing Loan Ratio (NPLR) records an adverse yet insignificant influence on performance. In contrast, the Loan-to-Deposit Ratio (LDR) shows a positive and statistically meaningful impact on financial outcomes, while the Capital Adequacy Ratio (CADR) presents a favorable and substantial contribution.

Similarly, the Net Interest Margin (NIM) demonstrates a positive and significant association with financial performance, whereas the Current Ratio (CR) reflects a negative but statistically negligible relationship. These outcomes suggest that deposit money banks should reinforce their financing capacity to improve firm value and overall performance.

The study concludes that the Non-Performing Loan Ratio, Current Ratio, and Gearing Ratio adversely affect financial performance, while the Capital Adequacy Ratio, Loan-to-Deposit Ratio, and Net Interest Margin positively enhance the financial performance of Nigerian listed deposit money banks.

Based on these findings, the following recommendations are proposed: This research study suggests that there is need for further empirical studies that can help to identify the factor to examine Nigerian listed deposit money banks' financial performance. In addition, we also encourage that further research could be conducted on the same topic using another sector and could also use other sectors and increasing the sample size and number of years in the future. Therefore, other sectors can be used to analyze risk management.

This study focused on only two explanatory variables linked to the financial performance of Nigerian listed deposit money banks; future research could incorporate additional variables and extend the analysis to countries beyond Nigeria, for this study ten banks was use for the period of 10 years uses eight variables to measure risk management and financial performance.

Reference

Abdrahanmane, K., XI, L., Alpha, B. B., & Kargbo, M. (2017). An Empirical study on Government Regulation, Bank Risk and Bank Performance: Case of Mali. *Journal of Management Policies and Practices,* 5(1), 1-8.

Ahmadu, A., Abdulkarim, G., & Sulaiman, A. S. (2020). Financial risk and financial performance of listed deposit money banks in Nigeria. *Dutse International Journal of Social and Economic Research*, 4(2), 1-12. Year 2021

Ahmed, W., Arshad, A., Shah, A. A., & Iqbal, M. (2022). The effect of managerial ability on relationship between risk taking ability of a firm and its financial performance in Pakistan. *Pakistan Journal of Humanities and Social Sciences,* 10(4).

Alian, V. N. I., Egute, M. A., Nchise, E. N. (2023). Assessing the impact of operational risk management on financial performance of selected mainstream commercial banks in Cameroon. *International Journal of Research in Commerce and Management Studies*. 2020;2(2):1-16.

Babatunde, A. S., Zhang, D. & Babalola, E. O. (2022). Research on operational risk management in first bank of Nigeria. *Asian Journal of Probability and Statistics*, 17(2), 1-27.

Chang, V., Hall, K., Xu, Q. A., Akinloye, S. H., & Benson, V. (2024). Prediction of bank credit worthiness through credit risk analysis: an explainable machine learning study. Annals of Operations Research.

Jacob, A, Raymond, A., Siaw, F. (2020). Credit risk management and financial performance of listed banks in Ghana. *Research Journal of Finance and Accounting,11*(6):39-48.

Kioko, C. M., Olweny, T., & Ochieng, L. (2019). Effect of financial risk on the financial performance of commercial banks in Kenya listed on the Nairobi Stock Exchange. *The Strategic Journal of Business & Change Management,* 6(2), 1936 –1952.

Liu, R. (2024). Application for machine learning methods in financial risk management. *Highlights in Science, Engineering and Technology, 88*, 775–78.

Onsongo, S. K., Muathe, S. M. A., & Mwangi, L.W. (2020). Financial risk and financial performance: Evidence and insights from commercial and services listed companies in Nairobi securities exchange, Kenya. *International Journal Financial Studies*, *8,* 51-65 2021.

Paul, S., & Musiega, M. (2020). Effect of Credit Risk Management Practices on Financial Performance of Micro-Finance Institutions in Nairobi. *International Journal of Recent Research in Social Sciences and Humanities,* 7(3), 22-39.

Simamora, R. J., Oswari, T. (2019). The effects of credit risk, operational risk and liquidity risk on the financial performance of banks listed in Indonesian stock exchange. *International Journal of Economics, Commerce and Management,* *7*(5), 182-193.Retrieved from ***http://ijecm.co.uk/wp content/uploads/2019/05/7510.pdf***

Siriba, R. M. (2020). Credit risk and financial performance of commercial banks in Kenya. *International Journal of Scientific and Research Publications*, *10*(4), 448-454.

Stephen, M. W., Joel, G. W., & James, M. N. (2017). The effect of financial risk management on the financial performance of commercial banks in Kenya. *International Journal of Finance and Banking Research, 3*(5), 70-81.

Wajid, A., Ali, A., Metla, M. R. (2021). The effect of liquidity risk management on financial performance of commercial banks in Pakistan. *Munich Personal RePEc Achieve Number 112418*; 2021.

Zhu, T., Yang, X., Haugen, S., & Liu, Y. (2023). A multi-dimensional approach for analyzing risk-related decision problems to enhance decision making and prevent accidents.