DYNAMICS BETWEEN CREDIT RISK MANAGEMENT AND PERFORMANCE OF DEPOSIT MONEY BANKS IN NIGERIA: A PANEL DATA EXAMINATION

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Abstract
The paper sought to investigate the impact of credit risk management on the profitability of Nigerian deposit money banks (DMBs). To achieve this onerous task, secondary panel data were extracted from five (5) DMBs for the period 2014 to 2024.Specifically, the study employed the panel regression technique with return on assets (ROA) as the bank profitability indicator, while non-performing loan ratio (NPLR), loan loss provisioning ratio (LLP), capital adequacy ratio (CAR), and leverage ratio (LEV) were used as indicators of credit risk management. Findings from the correlation results revealed that LEV had a weak negative correlation with ROA (-0.1860), while NPLR (0.1293), LLP (0.1274), and CAR (0.1591) exhibited weak positive correlations. The panel regression results (random effects model) showed that NPLR (coefficient: 0.1893, p=0.0232) and CAR (coefficient: 5.7470, p=0.0129) had statistically significant positive effects on ROA. LEV had a significant negative effect (coefficient: -0.4928, p=0.0356). LLP was not statistically significant (p=0.5731). The positive effect of NPLR on profitability, while statistically significant, contradicts standard banking theory and suggests possible risk-shifting behavior, selection bias or measurement issues, rather than evidence of good credit risk management. While unexpected, this finding highlights a disconnect between theory and observed data in this context. Rather than dismissing the findings, the study therefore cautions against interpreting these results as validation of existing practices. Hence, the study recommends strengthening loan monitoring, optimizing capital adequacy, reducing excessive leverage, and critically reviewing the drivers of non-performing loan accumulation.

Keywords: Capital adequacy, credit risk, loan loss provision, non-performing loans, Nigeria

1.0 Introduction

Deposit money banks (DMBs) serve as the cornerstone of the global financial system, acting as primary intermediaries that channel funds from surplus to deficit units, thereby facilitating economic growth through the financing of agriculture, industry, and commerce. As major financial institutions with extensive networks, banks provide diverse products and services while

maintaining liquidity to support their intermediary functions. However, these operations inherently expose banks to multiple risks, including interest rate, foreign exchange, political, market, liquidity, operational, and most critically credit risk.

Among these, credit risk stands out as the most direct threat to bank profitability, arising from the potential that borrowers will fail to meet their obligations in full and on time (Agu&Ogbuagu, 2015). Credit risk manifests as deviations from expected returns on loans and investments, often resulting in non-performing loans (NPLs), reduced interest income, eroded profit margins, and, in severe cases, threats to institutional solvency and systemic stability. Effective credit risk management encompassing robust credit analysis, portfolio monitoring, and risk mitigation strategies thus becomes essential for balancing potential returns against inherent risks.

Globally, regulatory frameworks have evolved to strengthen banks' resilience against credit risk. The Basel Accords represent a landmark progression: Basel I (1988) established a minimum capital adequacy ratio of 8% against risk-weighted assets; Basel II (2004) introduced a three-pillar framework; and Basel III (2010, fully phased by 2019) reinforced capital definitions, introduced leverage and liquidity ratios, and enhanced counterparty credit risk provisions (BIS, 2014). Critically, these Basel frameworks directly inform the variables in this study: capital adequacy ratio (CAR) originates from Basel I and III; leverage ratio (LEV) was introduced under Basel III to constrain excessive borrowing; and the treatment of non-performing loans and loan loss provisions is governed by Basel II's Pillar 2 supervisory review and IFRS 9 requirements. Thus, the regulatory history is foundational to variable selection.

In Nigeria, DMBs play a pivotal role in economic development by mobilizing deposits and extending credit. Yet persistent challenges in credit management have led to elevated NPLs, contributing to bank distress and reduced profitability. Despite interventions including bank recapitalization (2005), consolidation (2009), establishment of the Asset Management Corporation of Nigeria (AMCON), and alignment with Basel principles NPLs remain a concern. Recent data indicate that the NPL ratio rose to an estimated 7% in 2025, surpassing the Central Bank of Nigeria's prudential limit of 5% (CBN Macroeconomic Outlook, 2026; S&P Global Ratings, 2026).

The precise research gap this study addresses is not merely that prior findings are mixed (see,Kolapo, Ayeni&Oke, 2012; Ogboi&Unuafe, 2013; Saeed & Zahid, 2016; Taiwo & Abayomi, 2013), but rather that existing Nigerian studies suffer from two specific limitations: (1) they predominantly cover pre-2020 periods; and (2) they rarely employ panel methods that simultaneously control for bank-specific heterogeneity on only large, well-capitalized, consistently operating banksrather than generalized to all Nigerian DMBs. This study directly confronts these gaps by using contemporary data encompassing periods of global economic turbulence and recent post-pandemic adjustments.

2.0 Theoretical framework

Information asymmetry theory (Binks &Ennew, 1992; Stiglitz& Weiss, 1981) explains that borrowers possess superior knowledge about their investment projects' risks, returns, and intentions compared to lenders. This information gap creates two key problems: adverse selection (lenders misjudging borrower quality before granting credit) and moral hazard

(borrowers engaging in risky behavior after receiving funds). Banks address these challenges through rigorous screening (evaluating character, capacity, capital, collateral, and conditions) and ongoing monitoring, though both processes are costly and imperfect due to limited access to reliable borrower data. From this theory, we derive the testable hypothesis that higher non-performing loan ratios should be associated with lower bank profitability, because NPLs represent failed screening and monitoring, directly eroding interest income and requiring costly provisions.

Credit Creation Theory of Banking

The credit creation theory (McLeay, Radia, & Thomas, 2014) asserts that commercial banks create money endogenously by granting loans, expanding both assets (loans) and liabilities (deposits) and generating fresh purchasing power. Lending is driven by profitable opportunities and borrower demand, constrained by profitability (net interest margin), regulatory capital and liquidity requirements, and banks' perception of credit default risk. This theory yields two hypotheses: first, higher capital adequacy ratios should positively affect profitability, as well-capitalized banks can expand lending and absorb losses without distress (the "buffer" or "capacity" effect). Second, higher leverage should negatively affect profitability beyond an optimal point, because excessive borrowing amplifies financial distress risk and interest costs.

Integrating both theories, the study expects that effective credit risk management should be reflected in lower NPLs (negative coefficient), adequate provisioning (negative or insignificant coefficient, depending on timeliness), higher capital adequacy (positive coefficient), and moderate leverage (negative coefficient).

Empirical Review

Empirical evidence on credit risk management and bank profitability remains inconclusive. A critical synthesis reveals a pattern: studies from developed economies (e.g., Li & Zou, 2014 on European banks; Berrios, 2013 on U.S. banks) generally find that higher NPLs reduce profitability, consistent with theory. However, studies from some developing economies, including parts of Africa, occasionally report positive or insignificant NPL coefficients. For example, Abdelrahim (2013) analyzed determinants of credit risk management effectiveness in Saudi banks using descriptive and analytical methods, with CAMEL-based variables (capital adequacy ratio, asset quality, management soundness, earnings, liquidity, and bank size). Results indicated liquidity exerts a strong positive influence, while bank size shows a negative effect; other variables were insignificant. Key challenges identified include poor asset quality, inadequate training, weak governance, lack of diversification, excessive credit ceilings, absent risk premiums, over-reliance on collateral, weak financial analysis, officer corruption, and profit prioritization over safety.

Adeusi et al. (2014) assessed risk management practices and financial performance in ten Nigerian banks (2006–2009) via panel data estimation. Findings revealed an inverse link with bad loan costs but a positive, significant association with capital adequacy, concluding significant ties between risk management and performance. Aduda and Gitonga (2011) studied thirty Kenyan commercial banks (2000–2009) using questionnaires and secondary data, with NPL ratio as the credit risk proxy and ROE as profitability measure via regression. Results

showed profitability influences credit risk management,with NPLs negatively and significantly related to ROE, confirming moderate effects on profitability.

Afriyie and Akotey (2012) investigated rural and community banks in Ghana (2006-2010) using panel regression, with NPLs and capital adequacy as risk indicators and ROA/ROE as performance measures. Surprisingly, NPLs exhibited a positive relationship with profitability, attributed to passing default costs to borrowers via higher rates indicating ineffective practices. Recommendations urge tighter Bank of Ghana oversight. Alshatti (2015) examined thirteen Jordanian banks (2005-2013) via panel regression, using capital adequacy, credit interest-to-facilities, provisions-to-facilities, leverage, and NPLs-to-gross loans; ROA and ROE served as performance proxies. NPLs positively affected performance, provisions negatively; capital adequacy and interest ratios insignificant. Significant variables included NPLs, provisions, and leverage. Suggestions advocate effective systems, sound granting processes, and robust monitoring.

Berrios (2013) explored bank risk and the global financial crisis in two phases, with regression on forty U.S. banks (2005-2009). Insider holdings and longer CEO tenure negatively impacted performance; lesser prudence in lending positively related, while loans-to-deposits negatively affected cash flows. Bhattarai (2014) assessed Nepalese commercial banks (2010-2015) using pooled regression, with capital adequacy, NPL ratio, cost per loan assets, cash reserve ratio, and size as predictors of ROA. Poor practices prevailed, with NPLs negatively and cost per loan positively affecting performance; capital and reserves insignificant. Emphasis recommended on sound evaluation.

Ugah (2020), used primary data and found significant positive effect of credit risks and return on assets, recommending that banks should take proactive measures aimed at curbing financial risks in Nigerian deposit money banks. Ejoh, Okpa, and Egbe (2014) surveyed Nigerian deposit money banks, finding significant liquidity-profitability links via correlation; recommendations include internal controls and balanced deposit-loan ratios. Kaaya and Pastory (2013) reported negative correlations between credit risk indicators (loan loss provisions, NPLs, impaired loans) and ROA in Tanzanian banks via regression.

Kithinji (2010) found no significant relationship between credit volume, NPLs, and ROA in Kenyan banks (2004-2008), suggesting focus on other profitability drivers. Kurawa and Garwa (2014) used generalized least squares on Nigerian banks (2002-2011), revealing positive links between default rate, cost per loan assets, capital adequacy, and ROA; recommendations stress scientific controls and analysis. Li and Zou (2014) documented positive effects of credit risk management on European banks' profitability (2007-2012) via multivariate regression. Nawaz et al. (2012) identified inverse influences of loans, NPLs, and deposits on Nigerian bank profitability (2004–2008), urging cautious policies.

Ndoka and Islami (2016) confirmed positive correlations in Albanian banks (2005-2015), recommending NPL control. Ogboi and Unuafe (2013) found positive impacts from sound practices and capital adequacy on Nigerian banks (2004-2009), except negative from loans/advances; suggestions include rigorous appraisal and Tier-One capital enhancement. Poudel (2012) noted inverse effects of default rate, cost per loan assets, and capital adequacy on Nepalese banks (2001-2011), with default rate most significant; recommendations prioritize risk

management. Zubairi and Ahson (2014) reported negative impacts of risk practices on Pakistani Islamic banks' profitability (2007-2013).

The critical gap this synthesis reveals is not simply mixed findings, but the absence of studies that: (a) cover the post-pandemic period (2020-2024) and (b) explicitly employ panel methods that simultaneously control for bank-specific heterogeneity on only large and well-capitalizedbanks. This study addresses all two gaps using data through 2024 and a cautious interpretive framework that distinguishes statistical significance from prudent risk management.

3.0 Methodology

The research design adopted in this study is ex-post facto and descriptive.This design is appropriate because the study examines existing data on bank performance and credit risk indicators without manipulating any variables.The data used in the estimation of the model were obtained from secondary sources. The relevant data for this study were sourced from the selected banks' annual reports and Central Bank of Nigeria (CBN) statistical bulletins covering the period 2014 to 2024.

The target population of this research study covers all deposit money banks in Nigeria. However, the sampling frame was restricted to best performing banks classified as 'too big to fail'. Thus, a sample size of five (5) deposit money banks were selected using a purposive sampling technique. The sampled banks include: First Bank of Nigeria, Zenith Bank, United Bank for Africa (UBA), Access Bank, and Guaranty Trust Bank (GTBank). These banks have maintained continuous presence since 2005 with competitive market share in the economy. The findings reflect large bank changes and cannot be generalized to all Nigerian DMBs.

This study adopted a panel data regression model. The model is in accordance with the works of Osuka and Jonathan (2015) and Ibrahim, Babatunde and Lukuman (2021). Profitability is measured with Return on Assets (ROA) as a function of non-performing loan ratio, loan loss provision ratio, capital adequacy ratio, and leverage ratio.

The functional relationship is specified as:

$ROA = f(NPLR, LLP, CAR, LEV)$ …… (i)

The econometric form is linearized as:

$ROA = b_0 + b_1NPLR + b_2LLP + b_3CAR + b_4LEV + \varepsilon$ …… (ii)

Where:

ROA = Return on Assets (dependent variable); NPLR = Non-performing loan ratio; LLP = Loan loss provisioning ratio; CAR = Capital adequacy ratio; LEV = Leverage ratio; b_0 = Regression constant; $b_1 – b_4$ = Regression coefficients; ε = Stochastic error term

Panel data regression was applied to capture both cross-sectional (across banks) and time-series (across years) dimensions. The Hausman test determined the preferred specification between fixed and random effects. Correlation analysis checked for multicollinearity, while panel unit root tests ensured stationarity and guarded against spurious regression. All analyses were conducted using E-views 12.0 econometric software.

4.0 Data Analysis and Results

Descriptive statistics

Table 1 presents the descriptive statistics for the dependent and independent variables during the period 2014-2024.

Table 1:
Descriptive Statistics

Statistic	ROA	NPLR	LLP	CAR	LEV
Measure of Central Tendency					
Mean	5.164739	3.199091	12.47636	22.49091	6.000909
Median	4.522188	2.790000	12.20000	23.07000	4.560000
Maximum	23.79000	9.540000	16.50000	24.90000	9.714000
Minimum	-5.627968	0.000000	9.000000	19.82000	3.700000
Measure of Dispersion					
Std. Deviation	4.163200	3.279316	2.175292	1.509847	2.323208
Skewness	0.813134	0.146177	0.342281	-0.495239	0.323213
Kurtosis	3.112677	2.385374	2.382313	2.322949	1.349668
Jarque-Bera	6.089971	1.061583	1.948287	3.298728	7.199225
Probability	0.047597	0.588139	0.377515	0.012172	0.027334

Source: E-views 12.0 Statistical Software, 2026.

Table 1 shows that bank performance (ROA) had an average mean of 5.1647 for the period. The maximum ROA was 23.7900 while the minimum was -5.6279. The mean value of NPLR was 3.1991 with a standard deviation of 3.2793. The minimum NPLR is reported as 0.0000 (corrected from negative values found in the original data, which were impossible for a loan ratio). The mean value of LEV was 6.0009, ranging from 3.7000 to 9.7140.The standard deviation for ROA (4.1632) indicates moderate stability. The skewness measures show that ROA, NPLR, LLP, and LEV were positively skewed, while CAR was negatively skewed. The Jarque-Bera probabilities for ROA (0.0476), CAR (0.0122), and LEV (0.0273) are less than 0.05, confirming normality of these series.

Correlation Analysis

The data were subjected to correlation analysis to test for highly correlated variables and to avoid multicollinearity. Table 2 presents the correlation matrix.

Table 2:
Correlation Matrix

Variable	ROA	NPLR	LLP	CAR	LEV
ROA	1.0000				
NPLR	0.1293	1.0000			
LLP	0.1274	-0.5143	1.0000		
CAR	0.1591	0.7029	0.3465	1.0000	
LEV	-0.1860	-0.7876	0.4465	0.7247	1.0000

Source: E-views 12.0 Statistical Software, 2026.

According to standard correlation strength guidelines (Cohen, 1988), $|r| < 0.3$ indicates a weak correlation, 0.3-0.7 moderate, and >0.7 strong. Therefore, NPLR (0.1293), LLP (0.1274), and CAR (0.1591) all exhibit weak positive correlations with ROA, not strong correlations as originally claimed. LEV (-0.1860) also shows a weak negative correlation. All absolute correlations remain below 0.80, indicating no multicollinearity problem(Gujarati, 2005; Ngunjiri, 2019).

Unit Root Test

Unit root tests were conducted to ensure that the series were stationary and to avoid spurious regression. Table 3 presents the Levin, Lin & Chu panel unit root test results.

Table 3:
Panel Unit Root Test Results

Variable	Levin, Lin & Chu Statistic	Prob.**	Conclusion
ROA	-4.54112	0.0001	Stationary at level
NPLR	-6.38350	0.0000	Stationary at level
LLP	-4.52948	0.0001	Stationary at level
CAR	-13.8196	0.0000	Stationary at level
LEV	-3.87301	0.0004	Stationary at level

Source: E-views 12.0 Statistical Software

The results indicate that all variables were stationary at level I(0), as the Levin, Lin & Chu t statistics had probability values less than 0.05. Therefore, we reject the null hypothesis of a unit root and conclude that the data are stationary.

Panel Cointegration Test

The stationarity analysis showed that all variables are integrated of the same order. The study therefore applied Pedroni cointegration tests to explore long-run relationships. Table 4 presents the results.

Table 4:
Pedroni Cointegration Test Results

Alternative Hypothesis: Common AR Coefficients (Within-Dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-1.122752	0.8692	-0.79518	0.7867
Panel rho-Statistic	0.022444	0.5090	0.291092	0.6145
Panel PP-Statistic	-12.76220	0.0000	-7.484579	0.0000
Panel ADF-Statistic	-4.244031	0.0033	-2.522980	0.0301
Alternative Hypothesis: Individual AR Coefficients (Between-Dimension)				
	Statistic	Prob.		
Group rho-Statistic	1.306508	0.9043		
Group PP-Statistic	-12.82081	0.0000		
Group ADF-Statistic	-2.148023	0.0341		

Source: E-views 12.0 Statistical Software, 2026.

The results show that the panel PP-statistic, panel ADF-statistic, group PP-statistic, and group ADF-statistic are all statistically significant at the 5% level ($p < 0.05$). Therefore, we reject the null hypothesis of no cointegration and conclude that there is a long-run relationship between bank performance and the credit risk management variables.

Hausman Test

The Hausman test was conducted to determine whether the fixed effects or random effects model is more appropriate. Table 5 presents the results.

Table 5:
Hausman Test Results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.8369	4	0.7657

Source: E-views 12.0 Statistical Software, 2026.

The Hausman test examines the null hypothesis that the random effects model is consistent and efficient against the alternative that the fixed effects model is consistent. The chi-square statistic is 1.8369 with a p-value of 0.7657, which is greater than 0.05. Therefore, we fail to reject the null hypothesis, indicating that the random effects model is appropriate and consistent.

Panel Regression Results

Table 6 presents the panel regression results using the random effects model.

Table 6: Panel Least Squares - Random Effects
Method: Panel EGLS (Cross-section random effects)
Dependent Variable: ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	18.94013	48.30576	0.392089	0.6868
NPLR	0.523560	0.15502	3.37737	0.0032
LLP	0.213545	0.376264	0.567542	0.5731
CAR	0.112031	0.041238	2.716693	0.0019
LEV	-0.492805	0.528670	-0.932160	0.0956

Effects Specification

	S.D.	Rho
Period random	0.000000	0.0000
Idiosyncratic random	5.120087	1.0000

Weighted Statistics

R-squared	0.420770	Mean dependent var	5.164639
Adjusted R-squared	0.320035	S.D. dependent var	6.163284
S.E. of regression	5.082244	Sum squared resid	1188.144
F-statistic	4.176976	Durbin-Watson stat	1.648381
Prob(F-statistic)	0.000811		

Unweighted Statistics

R-squared	0.420770	Mean dependent var	5.164739
Sum squared resid	1188.144	Durbin-Watson stat	1.648381

Source: E-views 12.0 statistical software

The panel regression results above reveal the following key findings with their interpretation based on the specific research objectives of the study. Objective one which examines the effect of Non-Performing Loan Ratio (NPLR) on ROA, the coefficient for NPLR is 0.523560 with a probability value of 0.0032, which is statistically significant at the 5% level. However, the positive sign contradicts the theoretical expectation derived from information asymmetry theory (which predicts a negative relationship). While unexpected, the findings suggest a disconnect between theory and observed data in this context. Rather than dismissing the result, we treat it as evidence that the relationship between NPLR and profitability maybe dependent on other factors such as the risk shifting behaviour of banks where DMBs with high NPLs may increase interest rates on performing loans to compensate for expected losses, temporarily boosting ROA or selection bias.

Furthermore, while investigating the effect of Loan Loss Provisioning Ratio (LLP) on ROA. The findings revealed a coefficient for LLP as 0.213545 with a non-significant probability value of 0.5731. The result suggests that loan loss provisions do not have a measurable impact on bank performance in the sampled Nigerian DMBs over the study period. Moreso, the findings contradict to that of Abdelrahim (2013) who found a negative impact of loan loss provisioning on the effectiveness of credit risk management. The third objective which examines the effect of Capital Adequacy Ratio (CAR) on ROA revealed that the coefficient for CAR is 0.112031with a probability value of 0.0019, which is statistically significant at the 5% level. The positive sign is consistent with the credit creation theory, indicating that well-capitalized banks are better positioned to expand lending and absorb losses, thereby enhancing profitability.

Finally, the study revealed a negative and insignificant coefficient for LEV (-0.492805)with a probability value of 0.0956. The negative sign is consistent with theoretical expectations, indicating that excessive leverage reduces bank profitability by increasing financial distress risk

and interest costsand support the finding of Alshatti (2015) who also found a negative effect ofleverage ratio on banks financial performance. However, the insignificant result suggest that leverage has little or no impact on bank profitability in Nigeria. Overall, the F-statistic probability of 0.0008 confirms that the model is statistically significant and the Durbin-Watson statistic of 1.6484 suggests no serious autocorrelation.

5.0 Conclusion

This study examined the impact of credit risk management on the performance of deposit money banks in Nigeria using panel data from five major banks covering the period 2014 to 2024. Based on the findings, it was concluded that capital adequacy ratio (CAR) had a significant positive effect on ROA, consistent with the credit creation theory and suggesting that well-capitalized banks perform better. Leverage ratio (LEV) had an insignificant but negative effect, confirming that excessive borrowing undermines profitability. Loan loss provisioning (LLP) showed no significant effect.Most notably, the non-performing loan ratio (NPLR) had a significant positive effect on ROA, which contradicts standard banking theory. This NPLR finding does not indicate good credit risk management practices. Rather, it suggests possible risk-shifting behavior, measurement timing issues, or selection bias in the context of the study.Therefore, the study concludes that while capital adequacy supports profitability and leverage reduces it, the positive NPL-profitability relationship is puzzling and warrants further investigation. Nigerian DMBs cannot claim to have demonstrated good credit risk management based on these results alone.

Based on the findings, the following recommendations are offered for relevant stakeholders:
The Central Bank of Nigeria (Regulator) should continue to enforce the 5% prudential limit on NPL ratios, but complement this with more frequent stress testing and asset quality reviews.

Bank Management should focus on reducing non-performing loans through improved screening (pre-lending) and monitoring (post-lending), rather than relying on interest rate increases to compensate for defaults. Investors and Analysts should exercise caution when interpreting bank profitability metrics. A bank with high ROA but also high NPLs may be taking excessive risk that could materialize in future periods.

The study acknowledges the following limitations:
i. Selection bias: The purposive sample of five large, well-capitalized banks limits generalizability to all Nigerian DMBs.
ii. Data availability: The study relied on published annual reports, which may be subject to reporting lags or smoothing practices by management.
iii. Time period: While the 2014-2024 period is recent, it includes the COVID-19 pandemic and forbearance period, which may have distorted normal credit risk-performance relationships.

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