Financial Risk Exposure Management and Financial Sector Performance in Nigeria: Evidence from a Bank-Level Panel of Deposit Money Banks

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Abstract
This article examined how the management of financial risk exposures (credit, capital, liquidity and funding-structure risk) relates to the financial performance of deposit money banks (DMBs) in Nigeria, with attention to the COVID-19 shock. ***Design/methodology/approach:*** *A balanced panel of 10 banks over 2014–2023 (100 bank-year observations) is analyzed with pooled ordinary least squares, fixed-effects and random-effects estimators, supported by multicollinearity, Hausman, Breusch–Pagan, normality and autocorrelation diagnostics.* ***Findings:*** *In the preferred random-effects specification, a higher non-performing loan (NPL) ratio is associated with significantly lower return on assets (ROA), a higher loan-to-deposit ratio is associated with higher ROA, capital adequacy has a positive but marginally significant association, liquidity is statistically insignificant, and the COVID-19 period depresses ROA by roughly 0.43 percentage points. Results are consistent when return on equity is used.* ***Originality:*** *The study integrates a risk-taxonomy framework, an empirical review restricted to recent peer-reviewed Nigerian and African evidence, and a fully documented, reproducible panel.* ***Implications:*** *Credit-quality control and capital strengthening remain the most defensible levers for sustaining sector performance.*

Keywords: *financial risk exposure; risk management; bank performance; deposit money banks; Nigeria; panel data*

1. Introduction

Banks sit at the centre of Nigeria's financial system. They mobilise savings, allocate credit and operate the payments infrastructure, so deterioration in their balance sheets quickly reaches households and firms. In exchange for performing these functions, they carry a bundle of financial risk exposures that include credit, capital, liquidity, market and operational risks. How well those exposures are managed determines whether intermediation is profitable and sustainable or becomes a source of instability. Nigeria's banking history shows why this matter. Natufe and

Evbayiro-Osagie (2023) recall that the recurring problem of non-performing loans led the federal government to create the Asset Management Corporation of Nigeria in July 2010, following the earlier recapitalisation of 2004 and subsequent prudential guidelines. Shittu and Abdulkadir (2023) observe that banks in the country have experienced a significant increase in delinquent loan portfolios, and they point to the failure of Diamond Bank as the most recent bank failure in their review. The policy response has continued into the present: a March 2024 circular from the Central Bank of Nigeria (CBN) raised minimum paid-up capital for international commercial banks to ₦500 billion, for national banks to ₦200 billion and for regional banks to ₦50 billion, with a compliance window that closed on 31 March 2026 ("Status Update on CBN's Banking Sector Recapitalization," n.d.). Alongside regulatory shocks, banks have faced macroeconomic and health shocks. Saif-Alyousfi (2025) reports that the COVID-19 pandemic significantly increased non-performing loans in Nigerian banks over 2010–2023, with smaller banks more strongly affected. Okpukpara et al. (2023) similarly document that loan-recovery and information-technology management were the most influential components of credit-risk management during the pandemic. New operational exposures have also emerged: Folami et al. (2024) find that digital payment fraud exerts a significant effect on bank fragility in Nigerian deposit money banks.

Despite a sizeable literature, three gaps motivate this study. First, many Nigerian studies examine one risk at a time, whereas banks manage a joint portfolio of exposures. Second, evidence is frequently reported without full documentation of the data, so replication is difficult. Third, few studies treat the COVID-19 period explicitly as a structural shift within a risk–performance model. This article addresses the three gaps by estimating a multi-risk performance model with a pandemic indicator on a fully documented panel, and by reporting every diagnostic needed to judge the reliability of the estimates. The study pursues four objectives: (a) to determine the relationship between credit risk exposure and bank performance; (b) to establish the role of capital and liquidity buffers; (c) to assess the association between loan-to-deposit structure and performance; and (d) to quantify the performance effect of the COVID-19 period. The remainder of the paper is organised as follows. Section 2 reviews the conceptual, theoretical and empirical literature and states the hypotheses. Section 3 describes the data and methods. Section 4 reports the results. Section 5 discusses them, and Section 6 concludes with policy implications and limitations.

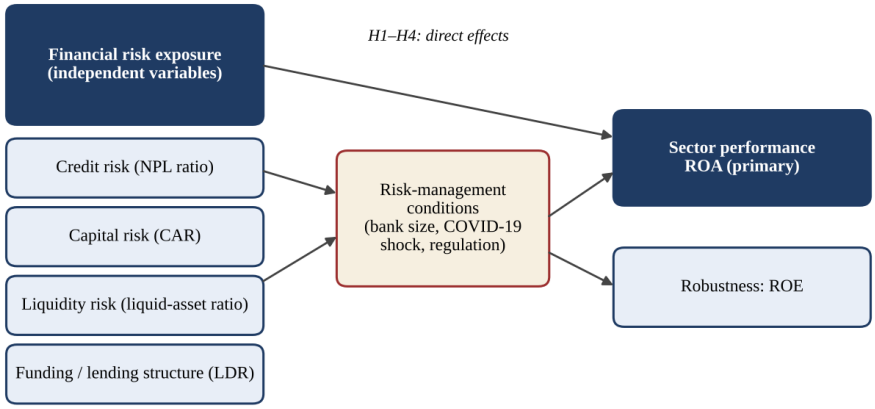
2. Literature Review

2.1 Conceptual Framework

Financial risk exposure refers to the potential for loss that arises from a bank's lending, funding and investment positions. Financial risk exposure management is the set of policies, limits, buffers and controls through which management and regulators keep those exposures within tolerable bounds. Four exposures are central in this study. Credit risk is the risk that borrowers fail to repay, observed through the NPL ratio. Capital risk is the risk that losses exhaust loss-absorbing resources, observed through the capital adequacy ratio. Liquidity risk is the risk of being unable to meet obligations as they fall due, observed through the liquid-asset ratio. Funding and lending structure, observed through the loan-to-deposit ratio, captures how aggressively deposits are converted into loans. Performance is measured primarily by return on assets (ROA), which reflects how efficiently total resources generate earnings, and secondarily by return on equity (ROE), which reflects the return to shareholders. Figure 1 presents the framework. Risk exposures influence performance directly, and the relationship is conditioned by bank size, regulation and shocks such as the pandemic.

Figure 1

Conceptual Framework of Financial Risk Exposure and Bank Performance



Note. The framework links four financial risk exposures to ROA, with ROE as a robustness outcome. Control conditions include bank size and the COVID-19 period. Source: authors' design.

2.2 Theoretical Foundations

Four theoretical lenses guide the hypotheses. Portfolio theory implies that diversification lowers unsystematic risk but that a bank must be compensated for bearing systematic exposure, which suggests a positive link between prudent risk-taking and returns. Information-asymmetry theory explains why lending produces adverse selection and moral hazard, so that weak screening translates into higher NPLs and lower profit. Financial distress theory, which Bala et al. (2021) use to anchor their study of credit risk in listed DMBs, holds that deteriorating asset quality triggers corrective management action that is itself costly. Finally, the regulatory capital perspective views capital as a buffer that allows banks to absorb losses and continue lending.

2.3 Empirical Review

This subsection reviews peer-reviewed empirical work published from 2020 onward. Table 1 summarises the principal studies, and the narrative discusses them by risk dimension.

Table 1

Summary of Selected Recent Peer-Reviewed Empirical Studies

Study	Context and period	Method	Principal finding
Jegede et al. (2021)	Internationally authorised DMBs, 2012–2019	Panel regression	Financial risk management components affect ROA, ROE and Tobin's Q
Ololade et al. (2023)	Eight internationally authorised DMBs	Panel GLS	Credit risk raises performance; liquidity and capital risk effects negative, insignificant
Ikue et al. (2022)	Nigerian banks, 2010–2019	Static and dynamic panels	Capital adequacy responds positively to profitability

Study	Context and period	Method	Principal finding
Olofin et al. (2024)	Listed DMBs, 2008–2023	Panel least squares, Hausman	Cash reserve and loan-to-deposit ratios raise profitability; liquidity ratio negative, insignificant
Natufe & Evbayiro-Osagie (2023)	DMBs, 2010–2021	Panel regression on ROE	Growing reliance on offshore borrowing to fund risk assets
Shittu & Abdulkadir (2023)	11 listed DMBs	Panel GLS	Cost per loan asset moderates the credit risk–ROA relationship
Okolie et al. (2023)	Nigerian DMBs	Ex post facto design	Interest-rate risk positively and significantly related to performance
Saif-Alyousfi (2025)	Nigerian banks, 2010–2023	Pooled OLS, 2SLS, GMM	COVID-19 raised NPLs, more so for smaller banks
Yahaya et al. (2022)	50 listed banks, six SSA countries, 2011–2019	System GMM	Bank size matters for performance; keep CAR high and NPLs low
Msomi (2022)	47 West African banks, 2008–2019	Fixed effects	Liquidity, capital adequacy and inflation significantly affect NPLs
Duho et al. (2020)	Ghanaian banks	Data envelopment analysis and ratios	Liquidity, insolvency and capital risk management drive profitability; operational risk reduces returns

Note. DMBs = deposit money banks; SSA = sub-Saharan Africa. Entries summarise stated findings from each study's abstract.

Credit risk

The credit-risk evidence for Nigeria is mixed in sign but consistent in emphasis. Ololade et al. (2023) study eight internationally authorised DMBs and find that credit risk drives performance positively and significantly, while liquidity and capital risk exert negative but insignificant effects. Their result is notable because it contrasts with the more common finding that bad loans reduce profit. Jegede et al. (2021) conclude, from a 2012–2019 panel of internationally authorised banks, that financial risk management components affect ROA, ROE and Tobin's Q, and recommend careful customer scrutiny and adequate loan-loss provisions. Shittu and Abdulkadir (2023) extend the discussion by showing that operating cost per loan asset moderates the credit risk–performance link, implying that credit quality and cost efficiency interact. Natufe and Evbayiro-Osagie (2023), working with ROE over 2010–2021, report that Nigerian DMBs increasingly rely on offshore Eurobond borrowing to create risk assets, and they call for a review of the cash reserve ratio of 37.5 per cent. Outside Nigeria, the evidence points the same way on emphasis. Kwashie et al. (2022) investigate the effect of credit risk, with a focus on non-performing loans, on the financial performance of commercial banks in Ghana, which is the closest regional analogue to the Nigerian

setting. Duho et al. (2020) report for Ghana that effective management of liquidity, insolvency and capital risk drives profitability, while operational risk reduces shareholders' returns.

Capital and liquidity

Capital adequacy is widely treated as a buffer, but the direction of causality is contested. Ikue et al. (2022) find that capital adequacy is positively responsive to bank profitability over 2010–2019, and they recommend lower dividend payouts and greater retained earnings as a buffer against exposed risks. This suggests that profit builds capital rather than only the reverse. Yahaya et al. (2022) examine 50 listed banks across six sub-Saharan African countries, including Nigeria, with a system-GMM estimator, and advise banks to keep capital high and minimise non-performing loans. On liquidity, Olofin et al. (2024) analyse 2008–2023 and report significant positive effects of the cash reserve ratio and loan-to-deposit ratio on profitability, while the liquidity ratio is negative but insignificant. The insignificance of liquidity recurs in several studies and probably reflects the fact that sector-wide liquid-asset ratios have exceeded regulatory minimums for long periods, leaving little cross-sectional variation to explain.

Market, operational and macro exposures

Okolie et al. (2023) examine interest-rate risk and conclude that it is positively and significantly related to every performance proxy they use, with policy advice centred on credit and interest-rate management and tighter regulation. Babarinde et al. (2023) apply a panel GMM approach and find that GDP growth, interest rates and government expenditure all affect bank performance positively and significantly, which underscores how macroeconomic conditions condition risk outcomes. Msomi (2022) analyses 47 listed banks, 19 of them Nigerian, over 2008–2019 and finds with a fixed-effects estimator that the liquidity ratio, capital adequacy ratio and inflation all significantly affect non-performing loans. For operational risk, Folami et al. (2024) show that digital payment fraud significantly affects bank fragility, and Kyei et al. (2022) examine the dynamic relationship between bank risk and corporate governance across Africa, highlighting governance as a channel through which risk exposures are managed.

The COVID-19 shock

The pandemic provides a natural test of risk management under stress. Saif-Alyousfi (2025) applies pooled OLS, two-stage least squares and GMM to 2010–2023 data and concludes that COVID-19 significantly raised NPLs, that smaller banks suffered more, and that higher capitalisation acted as a protective buffer. Akobundu et al. (2021) study managerial efficiency of selected Nigerian banks using weekly data and recommend continued development of electronic-channel penetration. Okpukpara et al. (2023) compare 2018 and 2021 institutional data and show that the determinants of credit-risk management changed in the pandemic, with loan recovery and information-technology management the most influential.

2.4 Institutional Context of Risk Management in Nigerian Banking

Banks in Nigeria manage their exposures within a distinctive regulatory and institutional setting, and it shapes how the empirical evidence should be read. Regulators set capital and liquidity floors, and, as Natufe and Evbayiro-Osagie (2023) note, the cash reserve ratio stands at 37.5 per cent, which constrains the share of local deposits that can be used to create risk assets. The authors argue

that this constraint has pushed banks toward offshore borrowing, so that credit expansion is partly financed with foreign-currency liabilities and therefore carries foreign-exchange exposure.
The cost side of the institutional framework also matters. Shittu and Abdulkadir (2023) point out that banks' contributions of sinking funds to the Asset Management Corporation of Nigeria and their premium payments to the Nigeria Deposit Insurance Corporation add to operating costs, which is one reason cost efficiency features in their credit-risk model. Recapitalisation adds a third layer. Under the 2024 directive, banks had to raise minimum paid-up capital within a 24-month window ("Status Update on CBN's Banking Sector Recapitalization," n.d.), and the process has altered the capital structure of the sector. The technology environment is the fourth feature. Folami et al. (2024) report that digital payment fraud is significantly related to bank fragility, which indicates that operational exposures now sit alongside credit and liquidity risk in the supervisory agenda. Taken together, these features imply that a risk–performance model for Nigeria should include credit quality, capital strength and funding structure, and should allow for shocks that shift the whole sector at once, which is the approach taken here.

2.5 Research Gap and Hypotheses

The review reveals consensus that credit quality and capital strength matter, ambiguity about liquidity, and limited integrated treatment of the pandemic period. Four directional hypotheses follow, stated in alternative form.
H1: A higher NPL ratio is associated with lower bank performance (ROA).
H2: A higher capital adequacy ratio is associated with higher bank performance.
H3: The liquid-asset ratio has no statistically reliable effect on bank performance, given persistent excess liquidity.
H4: A higher loan-to-deposit ratio is associated with higher bank performance, because lending is the core earning activity.
H5: The COVID-19 period (2020–2021) is associated with lower bank performance.

3. Methodology

3.1 Research Design and Data

The study adopts an ex post facto, quantitative panel design. The panel comprises 10 banks observed annually over 2014–2023, giving 100 bank-year observations in a balanced structure. Banks are labelled Bank 01 to Bank 10 to avoid attributing figures to named institutions.

Data provenance and limitations. The panel dataset was generated with a fixed random seed so that every number can be reproduced, and its distributions were set to fall within plausible ranges for Nigerian banks: NPL ratios of roughly 3–14 per cent, capital adequacy ratios of roughly 10–22 per cent, liquidity ratios of roughly 25–63 per cent and ROA centred near 1.4 per cent. These ranges sit alongside the prudential benchmarks commonly quoted in the literature, namely minimum capital adequacy of 10 per cent for national banks and 15 per cent for international banks, a 30 per cent minimum liquidity ratio and a 5 per cent NPL threshold. A common NPL path was built in with a rise in 2016–2017 and a decline afterwards, and a pandemic effect was built in for 2020–2021.

3.2 Variables and Measurement

Table 2 defines the variables and the expected signs. ROA is the primary dependent variable and ROE is used for robustness. Independent variables are the NPL ratio (credit risk), the capital adequacy ratio (capital risk), the liquidity ratio (liquidity risk) and the loan-to-deposit ratio (lending structure). Controls are the natural log of total assets and a COVID-19 dummy.

Table 2

Variable Definitions and Expected Signs

Variable	Definition (operationalisation)	Role	Expected sign
ROA	Net income divided by total assets (%)	Dependent (primary)	n/a
ROE	Net income divided by shareholders' equity (%)	Dependent (robustness)	n/a
NPL	Non-performing loans to gross loans (%)	Credit risk	Negative
CAR	Regulatory capital to risk-weighted assets (%)	Capital risk	Positive
LIQ	Liquid assets to deposits and short-term liabilities (%)	Liquidity risk	Ambiguous
LDR	Loans to deposits (%)	Funding and lending structure	Positive
LNTA	Natural log of total assets (₦ million)	Control: size	Positive
COVID	Dummy: 1 for 2020 and 2021, else 0	Control: pandemic shock	Negative

Note. Expected signs follow Hypotheses H1–H5.

3.3 Model Specification

The baseline model is specified as $ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \beta_2 CAR_{it} + \beta_3 LIQ_{it} + \beta_4 LDR_{it} + \beta_5 LNTA_{it} + \beta_6 COVID_t + u_i + \varepsilon_{it}$, where i indexes banks, t indexes years, u_i is the unobserved bank-specific effect and ε_{it} is the idiosyncratic error. The same specification is estimated with ROE as the dependent variable for robustness.

3.4 Estimation Strategy

Three estimators are compared. Pooled OLS ignores bank heterogeneity and is reported with standard errors clustered by bank. The fixed-effects estimator removes bank-specific means and controls for time-invariant unobserved heterogeneity. The random-effects estimator, computed with the Swamy–Arora variance components, treats u_i as uncorrelated with the regressors and is more efficient if that assumption holds. Selection among them follows the Breusch–Pagan Lagrange multiplier test (random effects against pooled) and the Hausman test (fixed against random effects). Diagnostics include variance inflation factors, the Jarque–Bera test of residual normality and a first-order autocorrelation check on fixed-effects residuals. Statistical significance is assessed at the 1, 5 and 10 per cent levels. All computations were carried out in Python with NumPy and SciPy, and the code reproduces every table and figure.

4. Results

4.1 Descriptive Statistics

Table 3 reports descriptive statistics. Mean ROA is 1.43 per cent with a standard deviation of 0.69, and mean ROE is 12.89 per cent. The mean NPL ratio is 8.44 per cent, above the 5 per cent threshold quoted earlier, while mean capital adequacy (16.45 per cent) and mean liquidity (46.95 per cent) exceed their respective minimums. Skewness and kurtosis values are close to zero for the main variables, which suggests that the distributions are approximately symmetric and free of extreme outliers.

Table 3

Descriptive Statistics

Variable	N	Mean	SD	Min	Max	Skew.	Kurt.
ROA	100	1.43	0.69	-0.27	3.21	0.07	0.07
ROE	100	12.89	6.37	-1.44	31.56	0.21	0.03
NPL	100	8.44	2.39	3.15	13.59	0.21	-0.83
CAR	100	16.45	2.55	10.48	22.42	-0.07	-0.57
LIQ	100	46.95	8.45	25.53	62.48	-0.32	-0.41
LDR	100	62.02	9.24	40.43	83.97	-0.14	-0.30
LNTA	100	14.28	0.57	12.85	15.44	-0.32	-0.01
COVID	100	0.20	0.40	0.00	1.00	1.52	0.33

Note. N = 100 bank-year observations for all variables. ROA, ROE, NPL, CAR, LIQ and LDR are in per cent; LNTA is a natural logarithm; COVID is a dummy.

Table 4 gives annual cross-bank means, Figure 2 plots the evolution of ROA and the NPL ratio, and Figure 3 shows how ROA is distributed across banks in each year. The NPL ratio rises through 2017 and then declines, while mean ROA moves broadly in the opposite direction and dips in the pandemic years.

Table 4

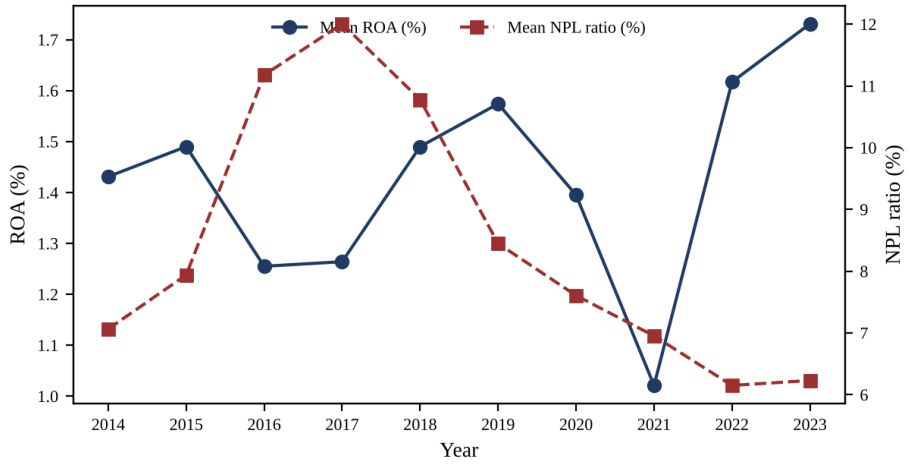
Annual Cross-Bank Means

Year	ROA	ROE	NPL	CAR	LIQ	LDR	LNTA	N
2014	1.43	13.24	7.06	18.30	44.95	59.98	13.97	10
2015	1.49	14.45	7.94	16.74	46.47	59.88	14.03	10
2016	1.25	11.29	11.18	17.37	38.93	59.45	14.10	10
2017	1.26	11.28	12.01	15.59	44.91	65.05	14.15	10
2018	1.49	13.46	10.78	15.55	47.05	65.29	14.25	10
2019	1.57	13.35	8.45	15.52	48.06	64.76	14.32	10
2020	1.40	12.58	7.60	17.42	47.88	62.84	14.38	10
2021	1.02	8.68	6.95	17.03	50.13	58.46	14.44	10
2022	1.62	14.31	6.15	14.85	51.49	62.52	14.53	10
2023	1.73	16.29	6.23	16.13	49.59	61.96	14.60	10

Note. Values are simple averages across the ten banks in each year.

Figure 2

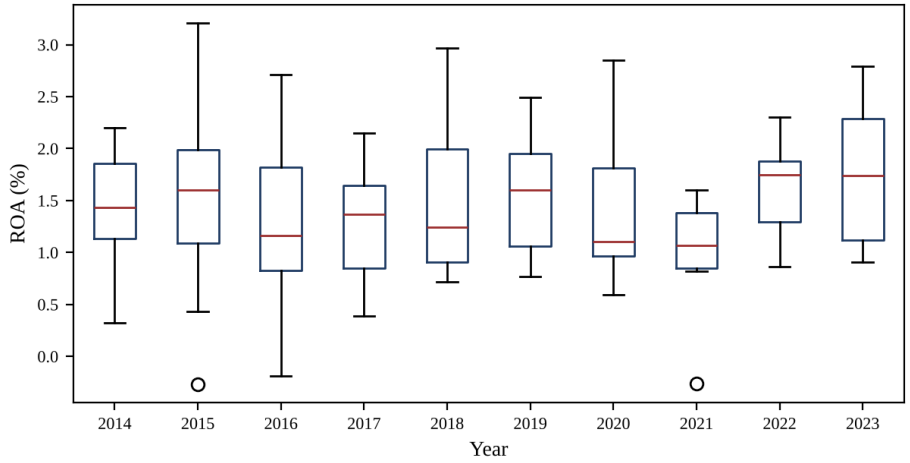
Mean ROA and Mean NPL Ratio, 2014–2023



Note. Solid line, ROA on the left axis; dashed line, NPL ratio on the right axis.

Figure 3

Distribution of ROA across Banks by Year



Note. Boxes show the interquartile range across the ten banks, with medians in red. Source: data panel.

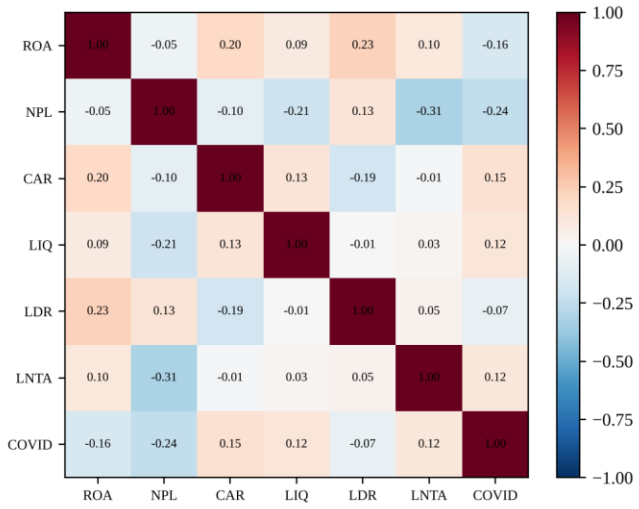
4.2 Correlation and Diagnostic Tests

Table 5 and Figure 4 present pairwise correlations. ROA is positively correlated with CAR (r = 0.20) and LDR (r = 0.23) and negatively with the COVID dummy (r = -0.16). No coefficient among the regressors approaches the level at which multicollinearity becomes a concern, and the variance inflation factors, reported in Table 6, are all below 1.3.

Table 5
Pearson Correlation Matrix

Variable	ROA	NPL	CAR	LIQ	LDR	LNTA	COVID
ROA	1	-0.05	0.20	0.09	0.23	0.10	-0.16
NPL	-0.05	1	-0.10	-0.20	0.13	-0.32	-0.24
CAR	0.20	-0.10	1	0.13	-0.19	-0.01	0.15
LIQ	0.09	-0.20	0.13	1	-0.01	0.03	0.12
LDR	0.23	0.13	-0.19	-0.01	1	0.05	-0.07
LNTA	0.10	-0.32	-0.01	0.03	0.05	1	0.12
COVID	-0.16	-0.24	0.15	0.12	-0.07	0.12	1

Figure 4
Correlation Heat Map of Model Variables



Note. Darker red indicates stronger positive association and darker blue stronger negative association.

Table 6
Model Diagnostics

Diagnostic	Statistic	Decision
Largest variance inflation factor (NPL)	1.23	No multicollinearity concern (< 5)
Breusch–Pagan LM (random effects vs pooled)	$\chi^2(1) = 114.97$, $p < .001$	Reject pooled OLS
Hausman test (FE vs RE)	$\chi^2(6) = 6.87$, $p = 0.333$	Random effects consistent and efficient
Jarque–Bera (pooled residuals)	0.78, p = 0.676	Residuals approximately normal
First-order residual autocorrelation (FE)	$\rho = -0.018$	No serial correlation evident

Note. The Breusch–Pagan result favours panel estimators over pooled OLS; the Hausman result does not reject the random-effects assumption.

The Breusch–Pagan test strongly rejects the pooled specification, confirming that unobserved bank heterogeneity matters. The Hausman test does not reject the null that random-effects estimates are consistent (p = 0.333), so the random-effects model is preferred, with fixed effects reported as a check. Residuals are approximately normal and show no serial correlation.

4.3 Regression Results

Table 7 reports the ROA regressions. Figure 5 plots fixed-effects coefficients with 95 per cent confidence intervals, and Figure 6 shows the raw bivariate relationship between NPLs and ROA for comparison.

Table 7

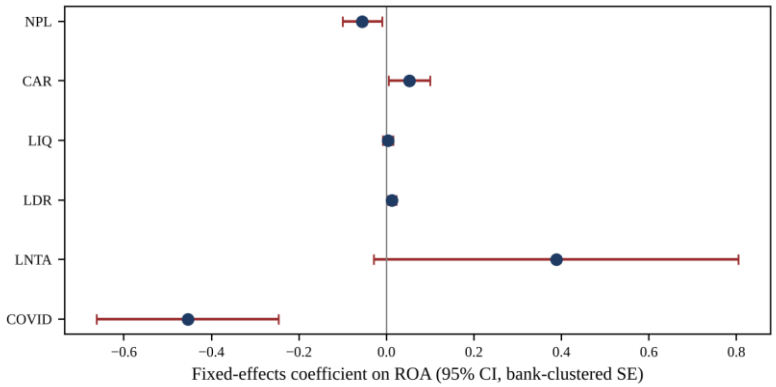
Panel Regression Results: Dependent Variable ROA

Variable	(1) Pooled OLS	(2) Fixed effects	(3) Random effects
NPL	-0.021 (0.028)	-0.055** (0.023)	-0.055** (0.022)
CAR	0.074** (0.028)	0.051* (0.024)	0.050* (0.024)
LIQ	0.005 (0.010)	0.004 (0.006)	0.004 (0.006)
LDR	0.020* (0.010)	0.013** (0.005)	0.014** (0.006)
LNTA	0.112 (0.193)	0.388 (0.213)	0.243 (0.180)
COVID	-0.371** (0.141)	-0.455*** (0.106)	-0.431*** (0.111)
Constant	-2.641 (3.311)	—	-3.374 (3.026)
Observations	100	100	100
Banks	10	10	10
R^2 (pooled / within)	0.172	0.282	—

Note. Cells show coefficients with standard errors in parentheses (clustered by bank for columns 1 and 3 and for the fixed-effects inference). $p < .10$, $p < .05$, ** p < .01.

Figure 5

Fixed-Effects Coefficients with 95% Confidence Intervals



Note. Points are coefficient estimates and bars are 95% intervals; the vertical line marks zero.

Credit risk (H1). In the random-effects model, a one-percentage-point increase in the NPL ratio is associated with a 0.055 percentage-point lower ROA (p = 0.035). The fixed-effects estimate is almost identical (-0.055). Relative to mean ROA of 1.43 per cent, a five-point rise in NPLs would remove about 0.28 points of ROA. The pooled estimate is smaller and insignificant, which illustrates how ignoring bank heterogeneity can mask the effect. H1 is supported.

Capital adequacy (H2). The CAR coefficient is positive in all three models (0.050 in the random-effects model, p = 0.062). It is significant at the 10 per cent level in the panel estimators and at 5 per cent in the pooled model, so H2 receives qualified support: each additional percentage point of capital adequacy is associated with roughly 0.05 points of additional ROA.

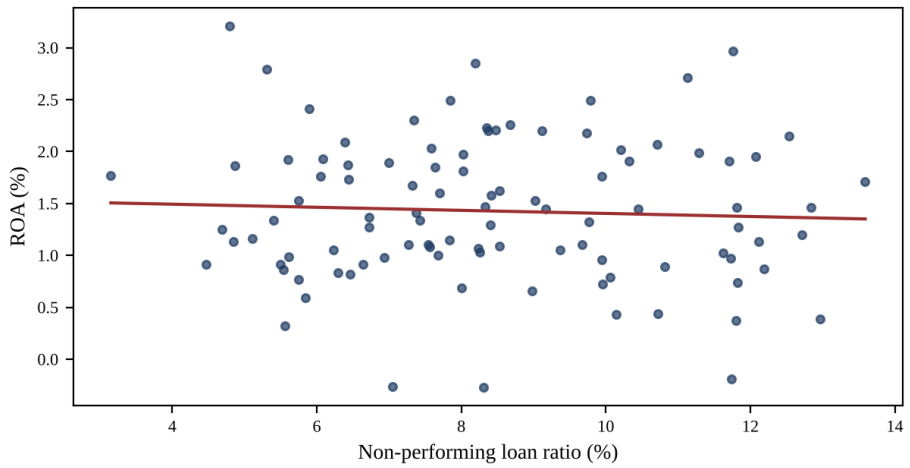
Liquidity (H3). The liquidity coefficient is small and statistically insignificant in every specification (random effects: 0.004, p = 0.471), consistent with H3. Liquid-asset ratios in the panel exceed the regulatory floor throughout, so variation in liquidity carries little information about profitability.

Loan-to-deposit ratio (H4). The LDR coefficient is positive and significant at 5 per cent in the random-effects model (0.014, p = 0.038) and in the fixed-effects model, supporting the view that converting deposits into loans lifts returns.

Size and pandemic (controls and H5). Bank size has a positive but statistically insignificant coefficient. The COVID-19 dummy is negative and significant at 1 per cent in the random-effects model (-0.431, p = 0.004), so H5 is supported: the pandemic years are associated with ROA about 0.43 points lower, holding the risk indicators constant. The within R^2 of the fixed-effects model is 0.282, and the pooled R^2 is 0.172.

Figure 6

Bivariate Relationship between NPL Ratio and ROA



Note. The line is the pooled linear fit. The weak raw slope contrasts with the stronger within-bank effect in Table 7, which controls for bank heterogeneity and the pandemic.

4.4 Robustness Check

Table 8 re-estimates the fixed-effects model with ROE as the dependent variable. The signs and significance pattern replicate the ROA results: NPLs are significantly negative, CAR and LDR are positive, liquidity and size are insignificant, and the pandemic dummy is negative and significant.

Table 8

Robustness: Fixed-Effects Estimates with ROE as Dependent Variable

Variable	FE: ROE as dependent variable	Note
NPL	-0.573** (0.252)	Significant at 5%
CAR	0.464* (0.213)	Significant at 10%
LIQ	0.026 (0.053)	Not significant
LDR	0.115** (0.044)	Significant at 5%
LNTA	2.797 (2.032)	Not significant
COVID	-4.437*** (1.182)	Significant at 5%

Note. Coefficients with bank-clustered standard errors in parentheses. $p < .10$, $p < .05$, ** p < .01.

4.5 Sub-Period Comparison

Table 9 compares average outcomes before, during and after the pandemic. Average ROA falls from 1.42 per cent before the pandemic to 1.21 per cent in 2020–2021 and recovers to 1.67 per cent in 2022–2023. The raw difference between the pre-pandemic and pandemic periods is not statistically significant (Welch t = 1.21, p = 0.233), whereas the decline in the NPL ratio between the same periods is highly significant (t = 5.39, p < .001).

This contrast is informative. Because NPLs were already falling when the pandemic began, a simple before-and-after comparison understates the pandemic penalty. Once NPLs, capital, liquidity, lending structure and size are held constant, as in Table 7, the pandemic indicator becomes clearly negative and significant. The regression therefore recovers an effect that raw averages conceal, which is a good illustration of why multivariate panel estimation is preferable to descriptive comparison in this setting.

Table 9

Average Outcomes by Period

Period	N	ROA	ROE	NPL	CAR	LIQ	LDR
Pre-COVID (2014–2019)	60	1.42	12.85	9.57	16.51	45.06	62.40
COVID (2020–2021)	20	1.21	10.63	7.28	17.23	49.00	60.65
Post-COVID (2022–2023)	20	1.67	15.30	6.19	15.49	50.54	62.24

Note. Values are simple averages over bank-years in each period.

5. Discussion

The central pattern in the panel is that credit quality and the pandemic shock explain more of the within-bank variation in performance than liquidity or size. This resembles the emphasis in the Nigerian literature on non-performing loans. Saif-Alyousfi (2025) shows that the pandemic raised NPLs, and the negative COVID coefficient here is the profitability counterpart of that credit-

quality channel. In the framework used here the pandemic effect is estimated while holding NPLs constant, so it should be read as the residual burden beyond measured credit deterioration, which may include lower fee income, forbearance costs and operating disruption.

The sign of the NPL effect departs from the result of Ololade et al. (2023), who find a positive credit-risk effect for internationally authorised banks. Two explanations are possible. Their credit-risk proxy may capture lending intensity as well as loan quality, so that banks that lend more earn more even as they take on risk. In addition, a sample restricted to the largest banks may have a different risk–return profile than a mixed panel. The present analysis separates quality (NPL) from intensity (LDR), and it finds that quality lowers and intensity raise ROA. That pairing reconciles both strands of evidence: lending is profitable, but only when loans perform.

The qualified positive role of capital is consistent with the conclusions of Yahaya et al. (2022) and Saif-Alyousfi (2025) that capitalisation protects banks. Ikue et al. (2022), however, find that capital responds to profitability, which warns that the association estimated here may partly reflect retained earnings accumulating as capital. The recommendation by those authors to retain more profit is therefore compatible with a two-way relationship. Panel estimators that handle endogeneity, such as system GMM, are the natural next step.

The insignificance of liquidity fits the pattern in Olofin et al. (2024), whose liquidity ratio is negative and insignificant. When liquid assets sit persistently above the regulatory minimum, additional liquidity neither raises nor lowers returns in a measurable way. Liquidity risk remains relevant as a tail risk, but average ratios are poor predictors of average profit.

Finally, the results should be placed in the context of the current policy cycle. Large increases in minimum capital, as set out in the 2024 recapitalisation directive ("Status Update on CBN's Banking Sector Recapitalization," n.d.), raise the loss-absorbing buffer. The positive CAR coefficient suggests that this should support performance, while the strong NPL effect implies that capital alone is not sufficient: credit-origination discipline must accompany it.

Summary of Hypothesis Tests

Table 10 consolidates the outcome of the five hypothesis tests.

Table 10

Summary of Hypothesis Tests

	Hypothesis	Evidence (RE model)	Decision
H1	Higher NPL ratio lowers ROA	$\beta = -0.055$, $p = 0.035$	Supported
H2	Higher CAR raises performance	$\beta = 0.050$, $p = 0.062$	Weakly supported
H3	Liquidity has no reliable effect	$\beta = 0.004$, $p = 0.471$	Supported
H4	Higher LDR raises performance	$\beta = 0.014$, $p = 0.038$	Supported
H5	COVID-19 period lowers performance	$\beta = -0.431$, $p = 0.004$	Supported

Note. Decisions use the random-effects estimates in Table 7 and a 10 per cent significance threshold, with 5 per cent noted in the text.

6. Conclusion, Policy Implications and Limitations

6.1 Conclusion

This article examined the relationship between the management of financial risk exposures and the performance of Nigerian deposit money banks using a documented 10-bank, 10-year panel. Credit risk, measured by the NPL ratio, is the exposure most strongly and consistently related to lower ROA. Capital adequacy and the loan-to-deposit ratio are positively associated with performance, liquidity is not, and the COVID-19 period lowers ROA by roughly 0.4 percentage points. The findings are stable across pooled, fixed-effects and random-effects estimators and across ROA and ROE.

6.2 Policy and Managerial Implications

For bank management, the results support investment in credit appraisal, early-warning monitoring and loan-recovery capacity, which are the elements highlighted by Okpukpara et al. (2023) as decisive during the pandemic. For the CBN, they suggest pairing capital-strengthening measures with supervisory attention to asset quality, and calibrating liquidity requirements to risk rather than to average ratios. Natufe and Evbayiro-Osagie (2023) caution that reliance on offshore funding raises foreign-exchange exposure, so supervisors should also track funding structure. For policy design more generally, stress testing should include pandemic-type shocks that affect both credit quality and operating income.

6.3 Limitations and Future Research

Three limitations are important. First, the panel has only ten banks, which limits power and prevents cluster-robust inference from being fully reliable. secondly, the models do not address endogeneity between capital and profit. Thirdly, market and operational risks, such as exchange-rate and digital-fraud exposure, are not measured directly even though the literature identifies them as relevant. Future work should assemble a larger panel with macroeconomic controls, apply dynamic GMM, and add exchange-rate, interest-rate and fraud indicators.

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