

The Mediating Effect of Risk Appetite on Ownership Structure and Financial Performance of Listed Deposit Money Banks in Nigeria

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Abstract

This study examined the mediating effect of risk appetite on the relationship between ownership structure and financial performance of listed deposit money banks (DMBs) in Nigeria. Ownership structure was measured by managerial ownership (MSO), institutional ownership (ISO), foreign ownership (FSO) and concentrated ownership (CSO). Financial performance was proxied by Tobin's Q (TBQ). Risk appetite was measured by the non-performing loan ratio (NPLRATIO). The study employed an ex-post facto design with secondary panel data from 13 listed DMBs covering 2015–2024 (130 firm-year observations). Data were analysed using pooled OLS, fixed effects, random effects (with a Hausman test) and structural equation modelling (SEM) with 5,000-replication bootstrapped indirect effects. Because the Hausman specification test favours the fixed effects estimator ($\chi^2(7) = 72.47, p < 0.0001$), the fixed effects results are treated throughout this revision as the primary specification, consistent with the study on which this manuscript is based. Under fixed effects, institutional ownership has a positive and significant effect on Tobin's Q ($\beta = 0.0175, p < 0.01$), while foreign ownership and concentrated ownership have negative and significant effects ($\beta = -0.0200$ and $\beta = -0.0150$, respectively, both $p < 0.01$); managerial ownership is not significant under fixed effects. The pooled OLS and SEM specifications, retained as robustness checks, instead show a positive and significant foreign-ownership effect and a negative and significant managerial-ownership effect, a sign reversal attributable to the fixed-effects estimator absorbing time-invariant, bank-specific heterogeneity ($\rho = 0.9841$). Risk appetite does not mediate the ownership–performance relationship under any specification: all four bootstrapped indirect paths are statistically insignificant. Firm size exerts a strong negative effect on performance. The study concludes that ownership structure influences the financial performance of Nigerian DMBs primarily through direct channels rather than through credit-risk appetite. Full pooled OLS, fixed effects, random effects and structural equation model tables are reported in the Results section; the mediation analysis follows the bootstrapped indirect-effects approach of Preacher and Hayes (2008) and Zhao, Lynch and Chen (2010), with Baron and Kenny (1986) retained only as the originating framework for decomposing effects into direct, indirect and total components.

Keywords: Ownership Structure, Risk Appetite, Financial Performance, Tobin's Q, Deposit Money Banks, Mediation

1. Introduction

Deposit money banks (DMBs) are critical financial intermediaries in Nigeria. Their financial performance affects shareholder returns, financial stability, employment and government revenue. Ownership structure who owns the bank- shapes how much risk a bank is willing to take, and that risk posture in turn conditions performance.

Financial performance may be measured by accounting-based indicators (backward-looking) or market-based indicators (forward-looking). Tobin's Q, the ratio of a firm's market value to its asset replacement cost, is a formative market-based construct used in this study because it reflects forward-looking investor assessment of bank value rather than only historical accounting profitability; the construct originates with Tobin (1969).

The study is set against recurring governance weaknesses in Nigerian banking: weak board composition, ownership concentration without governance discipline, controlling shareholders occupying management roles, and low managerial shareholding alongside risk-management neglect. It also references the pre-2006 consolidation period,

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when many of the 89 then-active banks collapsed through poor credit management and non-compliance with financial regulation (Ibitamuno et al., 2018).

Despite extensive study of corporate governance in emerging economies, the influence of foreign ownership and the role of risk appetite as a mechanism remain under-examined in Nigeria. Prior Nigerian studies produced mixed, inconclusive results using OLS, least-squares regression and two-stage least squares. Two specific gaps are identified: mechanism ambiguity the ownership-to-performance pathway is opaque without modelling risk appetite explicitly and outcome incompleteness market-based performance is under-examined relative to accounting measures.

The study aims to estimate both the direct and the risk-appetite-mediated effects of ownership structure on the financial performance of listed Nigerian DMBs. The specific objectives are:

- i. To examine the effect of managerial ownership on Tobin's Q
- ii. To examine the effect of institutional ownership on Tobin's Q
- iii. To examine the effect of foreign ownership on Tobin's Q
- iv. To examine the effect of concentrated ownership on Tobin's Q
- v. To examine the mediating role of risk appetite (NPL ratio) in the ownership–performance relationship.

Research Questions

- i. What is the effect of managerial ownership on the financial performance of listed DMBs in Nigeria?
- ii. What is the effect of institutional ownership on the financial performance of listed DMBs in Nigeria?
- iii. What is the effect of foreign ownership on the financial performance of listed DMBs in Nigeria?
- iv. What is the effect of concentrated ownership on the financial performance of listed DMBs in Nigeria?
- iv. What is the mediating effect of risk appetite on the relationship between ownership structure and the financial performance of listed DMBs in Nigeria?

The corresponding null hypotheses follow directly from these objectives and are stated in full at the end of the Literature Review. The study covers listed Nigerian DMBs from 2015 to 2024.

2. Literature Review

2.1 Theoretical Review

This study is anchored on Agency Theory (Jensen & Meckling, 1976). Information asymmetry and misaligned incentives between shareholders and managers create agency costs; ownership structure shapes monitoring and risk preference. Agency Theory is the most appropriate lens for the Nigerian deposit-money-banking context specifically because Nigerian bank ownership is frequently concentrated among founding families, government entities or a small number of block investors, a pattern that sharpens the classic Jensen and Meckling (1976) conflict between controlling and minority shareholders and heightens the scope for managerial entrenchment where minority-investor protection is comparatively weak. The operational framework links ownership structure to managerial risk appetite and, through it, to financial performance. Stewardship Theory and Stakeholder Theory are reviewed as alternative lenses but are not operationalised (Davis, Schoorman & Donaldson, 1997; Freeman, 1984). Stewardship Theory holds that managers can act as stewards of organisational resources rather than self-interested agents, which would predict a positive rather than negative association between managerial ownership and performance; Stakeholder Theory broadens the relevant interests beyond shareholders to employees, depositors and regulators. Neither alternative is operationalised in the present models because the study's measurable constructs ownership percentages, NPL ratio and Tobin's Q -map directly onto agency-cost logic rather than onto stewardship psychology or multi-stakeholder welfare, which would require separate, non-financial-statement data; they are retained in the review to contextualise the interpretation of unexpected coefficient signs. The entrenchment hypothesis (Morck et al., 1988) is used to interpret negative managerial-ownership coefficients, and the expropriation hypothesis (La Porta et al., 1999; Claessens et al., 2000) is used to interpret negative concentrated-ownership coefficients.

2.2 Conceptual Framework

The conceptual model runs ownership structure → risk appetite → financial performance. Ownership structure is measured by managerial ownership (MSO), institutional ownership (ISO), foreign ownership (FSO) and concentrated ownership (CSO). Risk appetite is proxied by the non-performing loan ratio (NPLRATIO). Financial performance is proxied by Tobin's Q (TBQ). Bank size (FSIZE) and bank age (FAGE) serve as controls. The model is operationalised by three equations and estimated by panel regression and structural equation modelling (SEM).

The mediation pathway follows the conventional a-, b- and c'-path notation:

Path	Definition	Estimated in
a-path	Ownership structure (MSO, ISO, FSO, CSO) → Risk appetite (NPLRATIO)	Table 4 (mediator equation)
b-path	Risk appetite (NPLRATIO) → Financial performance (TBQ), controlling for ownership	Table 5 (dependent-variable equation)
c'-path (direct)	Ownership structure → Financial performance (TBQ), controlling for NPLRATIO	Table 5 (dependent-variable equation)
a × b (indirect)	Ownership structure → Risk appetite → Financial performance	Table 6 (indirect and total effects)

2.3 Empirical Review

Prior Nigerian studies on ownership and performance have produced mixed results. Abosede and Kajola (2011), Benjamin et al. (2014) and Ibrahim et al. (2023) reported inconclusive findings using OLS and related estimators. Benjamin et al. (2014) studied listed insurance firms rather than banks and is retained here only as general Nigerian ownership–performance evidence rather than direct bank-sector evidence. Studies that examine capital or risk channels (for example, those linking capital ratios or loan ratios to stability or ROA) generally find that capital adequacy supports performance. In contrast, evidence on non-performing loans is mixed.

More recent, dimension-specific evidence strengthens this picture. Akinleye and Olaniyi (2023) found that managerial and foreign ownership both had significant positive effects on return on assets among listed Nigerian consumable-goods firms (2013–2022), using fixed-effects panel regression. Salihu et al. (2024), using an ex-post-facto design on 48 listed Nigerian financial firms (2014–2023), reported that managerial, institutional and concentrated ownership all had significant positive effects on performance, while foreign ownership was insignificant a pattern that diverges from the present study's bank-specific sample and is discussed further below.

Obialor et al. (2024), focusing specifically on 13 listed Nigerian commercial banks (2018–2022) with random-effects panel regression, found that concentrated ownership had a significant negative effect on ROA while dispersed ownership was positively associated with performance, consistent with the expropriation-hypothesis interpretation adopted in the present study. Olatunji et al. (2025), comparing 19 listed DMBs in Nigeria and Ghana (2013–2022), found that foreign ownership had a significant positive effect on profitability in the Nigerian sub-sample specifically, directly corroborating the pooled OLS and SEM total-effect results reported below, even though the present study's fixed-effects results show the opposite sign once within-bank heterogeneity is removed. Most directly relevant to the present study's ownership–risk-appetite construct, Bellardini, Murro and Previtali (2024) developed a Risk-Weighted Ownership index for bank-controlling shareholders using Basel-standard risk weights, and found that a higher shareholder risk appetite was associated with higher profitability but lower bank capitalisation across their international bank sample a direct ownership-to-risk-appetite-to-performance trade-off that offers a useful comparator for the present study's own finding that risk appetite affects Tobin's Q directly without being significantly predicted by ownership structure.

The present study contributes by testing the explicit mediating role of risk appetite (NPL ratio) between four dimensions of ownership and a market-based performance measure (Tobin's Q) over the 2015–2024 period,

estimated under pooled OLS, fixed effects, random effects and structural equation modelling with bootstrapped mediation tests, a combination not used together in the Nigerian studies reviewed above.

2.4 Hypotheses

Based on the theoretical and empirical reviews, the following hypotheses are developed in null form:

H₀₁: Managerial ownership has no significant effect on the financial performance of listed DMBs in Nigeria.

H₀₂: Institutional ownership has no significant effect on the financial performance of listed DMBs in Nigeria.

H₀₃: Foreign ownership has no significant effect on the financial performance of listed DMBs in Nigeria.

H₀₄: Concentrated ownership has no significant effect on the financial performance of listed DMBs in Nigeria.

H₀₅: Risk appetite has no significant mediating effect on the relationship between ownership structure and financial performance of listed DMBs in Nigeria.

H₀₁–H₀₄ are each grounded in a specific theoretical mechanism reviewed above: H₀₁ tests the entrenchment hypothesis (Morek et al., 1988), H₀₂ tests the institutional-monitoring hypothesis implicit in Agency Theory, H₀₃ tests the foreign-governance/expertise hypothesis, and H₀₄ tests the expropriation hypothesis (La Porta et al., 1999; Claessens et al., 2000). H₀₅ tests whether these ownership effects operate, even partly, through the credit-risk channel rather than only directly and is evaluated using bootstrapped indirect effects (Preacher & Hayes, 2008) rather than the stepwise Baron and Kenny (1986) significance criterion.

2.5 Theoretical Premises

This study is underpinned by the Technology Acceptance Model (TAM), which provides an appropriate theoretical basis for explaining how individuals and organisations adopt new technologies such as Robotic Process Automation (RPA). The model was introduced by Davis (1986) to explain users' acceptance of information systems based on two fundamental beliefs: perceived usefulness and perceived ease of use. According to the theory, individuals are more likely to embrace a technological innovation when they believe it will improve their job performance and when they perceive the technology as easy to learn and operate.

TAM developed from the Theory of Reasoned Action and explains technology adoption through users' perceptions of usefulness and simplicity. It is widely applied in accounting, auditing, and financial services because it links technology acceptance to professional behaviour and system use. As auditing adopts AI, blockchain, cloud computing, and RPA, TAM remains useful for explaining why professionals accept or resist automation. Later extensions, such as UTAUT, also emphasise organisational support and facilitating expectations (Venkatesh et al., 2003).

Within the context of this study, perceived usefulness refers to auditors' belief that Robotic Process Automation improves audit activities by increasing processing speed, reducing manual effort, strengthening fraud detection, and improving overall audit quality. When auditors recognise these advantages, they are more likely to incorporate RPA into their routine activities. Empirical evidence supports this assumption. Jaradat et al. (2025) found that organisations implementing RPA experienced significant improvements in internal audit efficiency, while Alassuli (2025) reported enhanced operational effectiveness among commercial banks using RPA-supported audit systems. Likewise, Solanki et al. (2024) concluded that auditors demonstrate stronger acceptance of automation technologies when they clearly observe improvements in audit quality and reporting efficiency.

The second construct of TAM, perceived ease of use, is equally important in explaining the adoption of RPA. Auditors are more willing to embrace automation technologies when such systems are easy to understand, integrate, and operate within existing audit procedures. Complex systems requiring extensive technical expertise may discourage adoption despite their potential benefits. Dahiyat (2022) observed that successful implementation of RPA depends largely on system simplicity and adequate user training. Similarly, Coovadia and Vorster (2025) argued that organisational readiness and continuous staff development significantly influence the successful utilisation of robotic process automation within audit environments.

The Technology Acceptance Model therefore provides a logical explanation for variations in audit performance associated with RPA implementation. Organisations that successfully encourage technology acceptance among their audit personnel are more likely to realise improvements in audit efficiency than organisations where resistance

to technological change remains high. Kadhim and Ali (2024) emphasised that the effectiveness of automation depends not only on the availability of technological infrastructure but also on users' willingness to integrate the technology into everyday audit activities. Consequently, this study adopts TAM because it effectively explains how the acceptance and utilisation of RPA can influence audit efficiency in banking institutions.

Despite its usefulness in explaining how users' perceptions influence the adoption and use of Robotic Process Automation (RPA), the Technology Acceptance Model (TAM) has some limitations in explaining audit efficiency comprehensively. The model primarily focuses on individual perceptions, particularly perceived usefulness and perceived ease of use, and therefore gives limited attention to organisational, technological, and environmental factors that may also determine the effectiveness of RPA implementation. Factors such as management support, organisational culture, employee skills, regulatory requirements, availability of technological infrastructure, and the quality of RPA systems may influence audit efficiency but are not adequately captured by the original TAM.

2.6 Empirical Review and Hypotheses Development

Existing empirical literature provides substantial evidence that Robotic Process Automation contributes positively to audit performance by automating repetitive procedures, reducing manual intervention, and improving operational accuracy. Numerous studies have reported that automation enables auditors to complete routine assignments more efficiently while strengthening fraud detection and compliance monitoring.

Jaradat et al. (2025), Alassuli (2025), Solanki et al. (2024), and Coovadia and Vorster (2025) found that RPA improves audit efficiency by speeding up repetitive procedures, increasing accuracy, and shortening audit cycles. Other studies also show that automation enhances internal audit effectiveness, business process efficiency, audit consistency, fraud identification, and reporting timeliness (Charles et al., 2022).

Although considerable evidence supports the positive influence of automation on audit performance, findings relating to risk management remain less conclusive. Several researchers argue that while RPA improves risk assessment procedures, its contribution to audit efficiency is often indirect and highly dependent on organisational implementation strategies. Kadhim and Ali (2024) observed that robotic process automation enhances audit risk assessment by improving the analysis of financial risks; however, its direct influence on audit efficiency was relatively limited. Liu (2022) similarly found that automation produces greater benefits in routine audit procedures than in complex risk management activities requiring professional judgment. Lacurezeanu et al. (2020) also reported that RPA demonstrates stronger effectiveness in standardised audit tasks than in broader risk evaluation processes. Moreno et al. (2023), Perdana et al. (2023), Tiron-Tudor et al. (2024), and Adesanya et al. (2021) similarly suggest that automation improves risk-related processes only when it is well integrated with organisational systems and supported by effective risk management frameworks.

3. Methodology

3.1. Research Design

An ex-post facto design was used with secondary data from audited financial statements. The population is the 14 DMBs listed on the Nigerian Exchange Group (NGX) as of 31 December 2024. Purposive sampling retained only banks continuously listed from 1 January 2015 to 31 December 2024, excluding Jaiz Bank Nig Plc (listed in 2017) and leaving a sample of 13 banks (130 firm-year observations).

The models are specified as follows:

NPLRATIO =

Model I — $NPLRATIO_{it} = \beta_0 + \beta_1MSO_{it} + \beta_2ISO_{it} + \beta_3FSO_{it} + \beta_4CSO_{it} + \beta_5FSIZE_{it} + \beta_6FAGE_{it} + \epsilon_{it}$

Model II — $TBQ_{it} = \beta_0 + \beta_1MSO_{it} + \beta_2ISO_{it} + \beta_3FSO_{it} + \beta_4CSO_{it} + \beta_5FSIZE_{it} + \beta_6FAGE_{it} + \epsilon_{it}$

Model III — $TBQ_{it} = \beta_0 + \beta_1MSO_{it} + \beta_2ISO_{it} + \beta_3FSO_{it} + \beta_4CSO_{it} + \beta_5FSIZE_{it} + \beta_6FAGE_{it} + \beta_7NPLRATIO_{it} + \epsilon_{it}$

NPLRATIO is the mediator. Direct effects of ownership on TBQ are estimated alongside indirect effects running through NPLRATIO. Estimation used pooled OLS, Fixed Effects and Random Effects panel regression, with the

Hausman test selecting between FE and RE. Structural equation modelling (SEM) with 5,000-replication bootstrapped indirect effects tested the mediation paths, following the resampling approach of Preacher and Hayes (2008) and the critique of stepwise significance testing in Zhao, Lynch and Chen (2010); Baron and Kenny's (1986) original decomposition of effects into direct and indirect components is retained only as the conceptual starting point for this decomposition, not as the significance-testing criterion applied to the indirect paths. All analyses were run in Stata.

3.2 Variables and measurement

Tobin's Q (TBQ) = market value of equity ÷ book value of equity (dependent) (Tobin, 1969)

Managerial ownership (MSO) = percentage of equity held by directors/executives (Alkurdi et al., 2021)

Institutional ownership (ISO) = percentage of equity held by institutional investors (Alkurdi et al., 2021)

Foreign ownership (FSO) = percentage of equity held by foreign investors (Alkurdi et al., 2021)

Concentrated ownership (CSO) = percentage of equity held by shareholders owning ≥5% (La Porta et al., 1999)

NPL ratio (NPLRATIO) = Non-Performing Loans ÷ Total Gross Loans × 100 (credit risk exposure ratio (mediator) (Li et al., 2017)

Formula: NPL Ratio = (Non-Performing Loans / Total Gross Loans) × 100

Bank age (FAGE) = years since listing on the NGX (Alkurdi et al., 2021)

Bank size (FSIZE) = natural logarithm of total assets (controls) (Nwude et al., 2023)

Only two variables (firm size and firm age) are included as controls. This is a deliberate scope limitation rather than an oversight: Nigerian evidence on two commonly proposed additional controls, board independence and CEO duality, is genuinely mixed, with studies on Nigerian deposit money banks and other Nigerian listed firms reporting negative, positive, and statistically insignificant associations with performance across comparable specifications, including at least one study reporting opposite-signed associations for CEO duality against two different performance measures within the same sample. In the absence of a single literature-predicted direction, and without the hand-collected board-composition data, these controls would require adding them, which would risk introducing specification choices that cannot be validated against prior evidence. It is listed among the study's limitations and as a direction for future research.

4. Results

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for the 130 firm-year observations. Mean TBQ is 0.3141 (SD 0.6890). Mean NPLRATIO is 0.0878 (SD 0.2583). Mean managerial ownership is low (2.28%), while institutional ownership averages 53.24%, foreign ownership 25.96% and concentrated ownership 44.10%.

Table 1: Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
TBQ	130	0.3141	0.6890	0.0096	5.1008
NPLRATIO	130	0.0878	0.2583	0.0039	2.9037
MSO	130	2.2770	3.4480	0.0000	12.0560
ISO	130	53.2430	23.0110	8.8560	100.0000
FSO	130	25.9600	28.8540	0.0100	90.6800
CSO	130	44.1040	25.9880	5.3040	100.0000
FSIZE	130	12.2766	0.6778	10.8803	13.6365
FAGE	130	24.1923	15.7007	2.0000	54.0000

Source: Researcher's computation.

Clarification on data ranges: the low mean TBQ (0.3141, below 1) indicates that, on average, the sampled banks' market value of equity is below book value across the period — a pattern also observed in other Nigerian-bank market-valuation studies and discussed further under Firm Size and Financial Performance below. The minimum firm-age (FAGE) value of 2 years reflects a bank whose NGX listing preceded the 2015 base year by only two years; the sampling criterion required continuous listing from 1 January 2015 to 31 December 2024, not a minimum

pre-2015 listing history, so banks listed shortly before 2015 remain eligible and contribute low firm-age observations in the early panel years. Measuring bank age from the listing date rather than the incorporation date follows an established finance-research convention: listing age (years since a firm's public listing) is more commonly used in finance studies than total age since incorporation, which is more typical outside finance (Ushijima, 2025). The exact currency unit underlying FSIZE could not be re-verified against the underlying bank-level financial statements from the materials available for this revision and is flagged for the author's confirmation in the accompanying Unresolved Issues list rather than altered here. On the maximum NPLRATIO value of 2.9037: under the stated definition (non-performing loans ÷ gross loans), a ratio cannot mathematically exceed 1.0, since non-performing loans are a subset of gross loans; a value of 2.9037 is therefore inconsistent with that definition as stated for at least one bank-year. The two most plausible explanations are (i) that this particular observation was computed against a smaller denominator, such as net loans after heavy loan-loss provisioning, a recognised alternative formulation in bank-risk-measurement research rather than gross loans, or (ii) a transcription or decimal-placement artefact. Severely elevated NPL ratios are a documented feature of Nigerian banking history (system-wide ratios reached 37.3% in 2009 and exceeded 40% during the 1999–2001 distress era), which supports the plausibility of a genuine extreme observation in principle. Still, no ratio above 100% under a gross-loans denominator is documented in the literature reviewed, so the specific bank-year underlying this value should be verified by the author against the source financial statement before resubmission; it has not been altered, winsorised or removed in this revision, consistent with the caution against routine winsorisation in outlier-treatment methodology (Adams et al., 2019).

4.2 Correlation and Multicollinearity

TBQ is positively correlated with FSO ($r = 0.2923$, $p < 0.05$) and CSO ($r = 0.2539$, $p < 0.05$), and negatively correlated with MSO ($r = -0.1967$, $p < 0.05$), FSIZE ($r = -0.5763$, $p < 0.05$) and FAGE ($r = -0.3408$, $p < 0.05$). Mean VIF is 1.84; the highest individual VIF is 3.43 (CSO), indicating no serious multicollinearity.

Table 2: Correlation Matrix

Pair with TBQ	Correlation (r)	Significance
TBQ – FSO	0.2923	$p < 0.05$
TBQ – CSO	0.2539	$p < 0.05$
TBQ – MSO	-0.1967	$p < 0.05$
TBQ – FSIZE	-0.5763	$p < 0.05$
TBQ – FAGE	-0.3408	$p < 0.05$
ISO – FSO	0.5373	$p < 0.05$
ISO – CSO	0.5938	$p < 0.05$
FSO – CSO	0.6237	$p < 0.05$

Source: Researcher's computation.

Table 3: Variance Inflation Factors (VIF)

Variable	VIF	1/VIF
CSO	3.43	0.2914
FSO	2.21	0.4516
ISO	1.90	0.5258
FSIZE	1.79	0.5596
FAGE	1.31	0.7644
NPLRATIO	1.13	0.8860
MSO	1.09	0.9179
Mean VIF	1.84	—

Source: Researcher's computation.

4.3 Panel Regression Results

Full regression tables are reported below (Tables 4–7), in response to reviewer requests for complete coefficients, standard errors, t/z-statistics, p-values, R^2 components and model statistics rather than narrative summaries alone.

Table 4: Pooled OLS Regression Results (Dependent variable: TBQ; N = 130)

Variable	Coefficient	Std. Error	t-statistic	P-value
NPLRATIO	-0.2075	0.1728	-1.20	0.232
MSO	-0.0097	0.0046	-2.09	0.039
ISO	-0.0043	0.0022	-1.95	0.054
FSO	0.0099	0.0020	4.84	0.000
CSO	-0.0063	0.0029	-2.18	0.031
FSIZE	-0.6910	0.0829	-8.34	0.000
FAGE	-0.0058	0.0031	-1.91	0.059
Constant	9.1442	1.0692	8.55	0.000
R ² = 0.5463 Adj. R ² = 0.5203 F(7, 122) = 20.99 Prob. > F = 0.0000				

Source: Researcher's computation. Added in this revision.

Table 5: Fixed Effects Regression Results - Primary Specification (Dependent variable: TBQ; N = 130; groups = 13)

Variable	Coefficient	Std. Error	t-statistic	P-value
NPLRATIO	-0.0453	0.1120	-0.40	0.687
MSO	-0.0034	0.0080	-0.42	0.673
ISO	0.0175	0.0056	3.14	0.002
FSO	-0.0200	0.0054	-3.68	0.000
CSO	-0.0150	0.0048	-3.11	0.002
FSIZE	-1.0783	0.2080	-5.18	0.000
FAGE	0.1062	0.0177	5.99	0.000
Constant	11.9145	2.2004	5.41	0.000
R ² within = 0.4350 R ² between = 0.1069 R ² overall = 0.0575				
F(7,110) = 12.10, Prob. > F = 0.0000 sigma u = 2.2248 sigma e = 0.2831 rho = 0.9841				
F-test that all u _i = 0: F = 19.72, p = 0.0000				

Source: Researcher's computation. Added in this revision. Preferred specification per the Hausman test (Table 7).

Table 6: Random Effects Regression Results (Dependent variable: TBQ; N = 130; groups = 13)

Variable	Coefficient	Std. Error	z-statistic	P-value
NPLRATIO	-0.0972	0.1534	-0.63	0.526
MSO	-0.0078	0.0083	-0.94	0.349
ISO	-0.0009	0.0045	-0.19	0.846
FSO	0.0018	0.0040	0.44	0.661
CSO	-0.0059	0.0045	-1.32	0.187
FSIZE	-0.3246	0.1279	-2.54	0.011
FAGE	0.0052	0.0069	0.75	0.452
Constant	4.4927	1.5731	2.86	0.004
R ² within = 0.0251 R ² between = 0.3739 R ² overall = 0.2491				
Wald $\chi^2(7) = 9.20$, Prob. > $\chi^2 = 0.2384$ sigma u = 0.2667 sigma e = 0.2831 rho = 0.4702				

Source: Researcher's computation. Added in this revision.

Table 7: Hausman Specification Test

Variable	Fixed (b)	Random (B)	Difference (b-B)	Std. Err.
NPLRATIO	-0.0453	-0.0972	0.0519	—
MSO	-0.0034	-0.0078	0.0044	—
ISO	0.0175	-0.0009	0.0183	0.0032
FSO	-0.0200	0.0018	-0.0218	0.0037
CSO	-0.0150	-0.0059	-0.0092	0.0019
FSIZE	-1.0783	-0.3246	-0.7537	0.1640
FAGE	0.1062	0.0052	0.1011	0.0163
$\chi^2(7) = 72.47$, Prob. > $\chi^2 = 0.0000$ — Fixed effects preferred ($p < 0.01$)				

Source: Researcher's computation. Added in this revision.

Primary specification and interpretation. The Hausman test ($\chi^2(7) = 72.47$, $p < 0.0001$) rejects the null that the random-effects estimator is consistent, so the fixed effects model is adopted as the primary specification for this revision, consistent with the study underlying this manuscript. Under fixed effects, institutional ownership (ISO) has a positive and significant effect on Tobin's Q ($\beta = 0.0175$, $p < 0.01$), supporting the institutional-monitoring hypothesis once within-bank heterogeneity is controlled for. Foreign ownership (FSO) and concentrated ownership (CSO) both have negative and significant effects ($\beta = -0.0200$ and $\beta = -0.0150$, respectively, both $p < 0.01$). Managerial ownership (MSO) and the risk-appetite proxy (NPLRATIO) are not significant under fixed effects. Firm size (FSIZE) has a strong negative effect ($\beta = -1.0783$, $p < 0.001$), and firm age (FAGE) has a positive and significant effect ($\beta = 0.1062$, $p < 0.001$). The very high rho (0.9841) indicates that 98.41% of residual variance is attributable to time-invariant bank-specific effects, which is also why the pooled OLS and SEM estimates (Tables 4, 8 and 9), which do not purge this heterogeneity, show a different pattern for FSO and MSO: both the sign reversal on FSO (positive under pooled OLS/SEM, negative under FE) and the loss of significance on MSO under FE are consistent with cross-sectional, between-bank differences in foreign ownership and managerial ownership driving the pooled associations, rather than within-bank changes over time. The pooled OLS and random effects results (Tables 4 and 6) are reported as robustness checks rather than as the basis for the study's headline conclusions.

4.4 SEM and Mediation Results

To test the mediating effect of risk appetite, structural equation modelling (SEM) was estimated by maximum likelihood with robust standard errors clustered at the bank level (log likelihood = -2970.235; SRMR = 0.000, reflecting a just-identified, saturated model; Coefficient of Determination = 0.596).

Table 8: SEM Direct Effects: Mediator and Dependent-Variable Equations

Variable	Mediator eq. (NPLRATIO) β	p	DV eq. (TBQ) β	p
MSO	0.0003	0.851	-0.0097	0.003
ISO	0.0003	0.820	-0.0043	0.075
FSO	-0.0016	0.104	0.0099	0.010
CSO	0.0002	0.828	-0.0063	0.140
FSIZE	-0.0764	0.172	-0.6910	0.000
FAGE	0.0034	0.153	-0.0058	0.109
NPLRATIO	—	—	-0.2075	0.013
R^2 (NPLRATIO) = 0.1140			R^2 (TBQ) = 0.5463	

Source: Researcher's computation. Added in this revision; z-statistics omitted for space but available on request.

None of the four ownership variables significantly predicts NPLRATIO in the mediator equation ($R^2 = 0.1140$), indicating a weak first link in the hypothesised mediation chain. In the dependent-variable equation, NPLRATIO has a negative and significant direct effect on TBQ ($\beta = -0.2075$, $p = 0.013$); MSO is negative and significant ($\beta = -0.0097$, $p = 0.003$) and FSO is positive and significant ($\beta = 0.0099$, $p = 0.010$), reproducing the pooled-OLS pattern rather than the fixed-effects pattern, since SEM, like pooled OLS, does not partial out bank fixed effects.

Table 9: Indirect and Total Effects of Ownership on Financial Performance via Risk Appetite

Path	Indirect β	Indirect p	Total β	Total p
MSO $\rightarrow$ NPL $\rightarrow$ TBQ	-0.0001	0.854	-0.0097	0.002
ISO $\rightarrow$ NPL $\rightarrow$ TBQ	-0.0001	0.818	-0.0044	0.067
FSO $\rightarrow$ NPL $\rightarrow$ TBQ	0.0003	0.089	0.0102	0.009
CSO $\rightarrow$ NPL $\rightarrow$ TBQ	-0.0000	0.834	-0.0064	0.141
FSIZE $\rightarrow$ NPL $\rightarrow$ TBQ	0.0159	0.102	-0.6751	0.000
FAGE $\rightarrow$ NPL $\rightarrow$ TBQ	-0.0007	0.119	-0.0065	0.071

Source: Researcher's computation; bootstrap n = 5,000 replications. Added in this revision.

All four ownership indirect paths are statistically insignificant at the 5% level: MSO $\rightarrow$ NPL $\rightarrow$ TBQ ($p = 0.854$), ISO $\rightarrow$ NPL $\rightarrow$ TBQ ($p = 0.818$), FSO $\rightarrow$ NPL $\rightarrow$ TBQ ($p = 0.089$), CSO $\rightarrow$ NPL $\rightarrow$ TBQ ($p = 0.834$). Consequently, H_{05} is not supported. The FSO indirect path approaches marginal significance ($p = 0.089$) and is interpreted cautiously rather than as evidence of mediation. Total effects confirm a positive and significant total effect of FSO on TBQ ($\beta = 0.0102$, $p = 0.009$) and a negative and significant total effect of MSO ($\beta = -0.0097$, $p = 0.002$) under the SEM/pooled specification. The total-effects table should be read alongside, not instead of, the fixed-effects results in Table 5, for the reasons set out above.

5. Discussion of Findings

Under the preferred fixed effects specification, institutional ownership supports the monitoring hypothesis, while foreign and concentrated ownership shows negative within-bank associations with performance. The positive total effect of foreign ownership under pooled OLS and SEM is consistent with the monitoring and resource advantages often attributed to foreign investors under Agency Theory and is corroborated by Olatunji et al.'s (2025) finding of a significant positive foreign-ownership effect in the Nigerian sub-sample of their Nigeria–Ghana comparison. The negative concentrated-ownership effect, significant in both the fixed effects and pooled specifications, aligns with the expropriation hypothesis and with Obialor et al.'s (2024) finding that concentrated ownership reduced ROA among listed Nigerian commercial banks. The managerial-ownership effect is negative and significant under pooled OLS and SEM but not under fixed effects; taken together with the entrenchment hypothesis, this suggests that managerial-ownership effects in this sample are driven more by cross-bank differences in managerial shareholding than by within-bank changes over time. The failure of risk appetite (NPL ratio) to mediate any of the ownership–performance paths indicate that the ownership–performance relationship operates primarily through direct channels rather than through credit-risk taking in this sample and period. The strong negative effect of firm size on Tobin's Q is consistent with the descriptive correlation. It may reflect valuation discounts associated with larger banks in the Nigerian market during the study window.

The fixed-effects model, as the Hausman-preferred specification, is adopted as the primary basis for this study's conclusions (institutional ownership positive; foreign and concentrated ownership negative; managerial ownership not significant). The pooled OLS and SEM estimates are retained and reported in full because they usefully show between-bank patterns and because they reproduce the direction of effect found in parts of the wider Nigerian literature (e.g., Olatunji et al., 2025, on foreign ownership; Obialor et al., 2024, on concentrated ownership), but they are not used as the basis for the headline conclusion. This resolves the inconsistency previously left unresolved between the abstract/discussion/conclusion (which had reported the pooled OLS/SEM direction) and the Hausman-preferred fixed effects results.

This pattern is consistent with Mundlak's (1978) formal decomposition of panel estimators: the pooled OLS and SEM dependent-variable estimates reflect a variance-weighted blend of within-bank and between-bank variation, whereas the fixed effects estimator isolates within-bank variation only. Because the ownership variables in this sample vary substantially more between banks than within a given bank over the ten-year window reflected in the very high FE rho of 0.9841, meaning 98.41% of residual variance is attributable to time-invariant, bank-specific

effects, the pooled/SEM estimates are dominated by cross-bank differences in ownership levels. In contrast, the FE estimates capture only the effect of a bank changing its own ownership structure over time. A sign reversal under these conditions is a recognised, expected feature of panel data with dominant between-unit variance, not evidence that either specification is misspecified; the Hausman test (Table 7) remains the appropriate basis for preferring fixed effects as the consistent estimator here.

6. Conclusion

This study examined the direct and risk-appetite-mediated effects of ownership structure on the financial performance (Tobin's Q) of 13 listed Nigerian DMBs over 2015–2024, under pooled OLS, fixed effects, random effects and SEM. Taking the Hausman-preferred fixed effects model as the primary specification, institutional ownership has a positive and significant effect on Tobin's Q, while foreign ownership and concentrated ownership have negative and significant effects; managerial ownership is not significant. Under the pooled OLS and SEM specifications, reported as robustness checks, foreign ownership instead shows a positive and significant total effect and managerial ownership a negative and significant effect - a reversal attributable to the fixed effects estimator removing time-invariant, bank-specific heterogeneity ($\rho = 0.9841$). Risk appetite, measured by the NPL ratio, does not mediate any of the ownership–performance relationships under any specification. Firm size has a strong negative effect throughout.

Ownership structure influences performance of Nigerian DMBs primarily through direct channels rather than through the credit-risk appetite channel examined here. The findings extend Agency Theory and the entrenchment and expropriation hypotheses to the Nigerian banking context and challenge the assumption that ownership affects performance mainly through risk-taking.

6.1 Recommendations

The study offers the following recommendations:

- i. Bank management and boards should strengthen monitoring of managerial and concentrated ownership stakes to mitigate potential entrenchment and expropriation effects.
- ii. Regulators and investors may view beneficial foreign ownership as supportive of market valuation, bearing in mind that this study's within-bank (fixed effects) estimate of the foreign-ownership effect is negative even though the between-bank (pooled OLS/SEM) estimate is positive; future research should employ more comprehensive risk-appetite measures rather than NPL ratio alone.
- iii. Extend the sample to unlisted banks and longer periods.
- iv. Test alternative mediators or moderators (board independence, CEO duality, macroeconomic conditions).
- v. Address endogeneity more rigorously through instrumental variables or difference-in-differences.

6.2 Limitations

These are the limitations of the study:

- i. The NPL ratio captures only credit risk and is a lagging indicator.
- ii. The sample of 13 banks over 10 years limits power and generalisability.
- iii. The period 2015–2024 misses earlier structural changes.
- iv. Only risk appetite is modelled as a mediator.
- v. Secondary financial-statement data are exposed to reporting bias.
- vi. Endogeneity is addressed only by panel fixed effects.
- vii. Findings are limited to the Nigerian institutional context.
- viii. The set of control variables is limited to firm size and firm age; board-level and macroeconomic controls were not available for this study and are left to future research.

References

- Abosede, A., & Kajola, S. (2011). Ownership structure and firm performance: Evidence from Nigerian listed companies. *Corporate Ownership & Control*, 8(4), 391–405.
- Adams, J., Hayunga, D., Mansi, S., Reeb, D., & Verardi, V. (2019). Identifying and treating outliers in finance. *Financial Management*, 48(2), 345–384. <https://doi.org/10.1111/fima.12269>
- Akinleye, G. T., & Olaniyi, A. (2023). Ownership structure and financial performance of listed consumable goods companies in Nigeria. *Acta Universitatis Danubius. (Economica)*, 19(4), 163–175.
- Alkurdi, A., Hamad, A., Thneibat, H., & Elmarzouky, M. (2021). Ownership structure's effect on financial performance: An empirical analysis of Jordanian listed firms. *Cogent Business & Management*, 8(1).
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10.1037/0022-3514.51.6.1173>
- Bellardini, L., Murro, P., & Previtali, D. (2024). Measuring the risk appetite of bank-controlling shareholders: The Risk-Weighted Ownership index. *Global Finance Journal*, 60, Article 100935. <https://doi.org/10.1016/j.gfj.2024.100935>
- Benjamin, K. G., Love, O. A., & Kabiru, D. (2014). The impact of ownership structure on the financial performance of listed insurance firms in Nigeria. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 4(2), 409–416.
- Central Bank of Nigeria. (2023). *Financial stability report — June 2023*.
- Claessens, S., Djankov, S., & Lang, L. H. P. (2000). The separation of ownership and control in East Asian corporations. *Journal of Financial Economics*, 58(1–2), 81–112. [https://doi.org/10.1016/S0304-405X\(00\)00067-2](https://doi.org/10.1016/S0304-405X(00)00067-2)
- Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997). Toward a stewardship theory of management. *Academy of Management Review*, 22(1), 20–47.
- Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, 46(6), 1251–1271. <https://doi.org/10.2307/1913827>
- Ibitamuno, D. A., Onuchuku, O., & Nteegah, A. (2018). Corporate governance and banking sector performance in Nigeria. *Journal of Applied Economics and Business*, 6(4), 35–50.
- Ibrahim, A., Daniel, A. A., Olaniyan, N. O., & Rildwan, O. B. (2023). Corporate governance and firm performance: Evidence from deposit money banks in Nigeria. *Euro Economica*, 42(1), 138–151.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305–360. [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X)
- La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. *The Journal of Finance*, 54(2), 471–517. <https://doi.org/10.1111/0022-1082.00115>
- Li, X., Tripe, D. W. L., & Malone, C. B. (2017). *Measuring bank risk: An exploration of Z-score* (SSRN Scholarly Paper No. 2823946). Social Science Research Network.
- Morck, R., Shleifer, A., & Vishny, R. W. (1988). Management ownership and market valuation: An empirical analysis. *Journal of Financial Economics*, 20(1–2), 293–315. [https://doi.org/10.1016/0304-405X\(88\)90048-7](https://doi.org/10.1016/0304-405X(88)90048-7)
- Mundlak, Y. (1978). On the pooling of time series and cross-section data. *Econometrica*, 46(1), 69–85. <https://doi.org/10.2307/1913646>
- Nwude, E. C., Zakirai, M. S., & Nwude, C. A. (2023). Ownership structure and bank performance in an emerging market economy: Evidence from Nigerian listed deposit money banks. *SAGE Open*, 13(4).
- Obialor, D. C., Asuquo, M. V., & Ukpeh, G. I. (2024). Ownership structure and financial performance of listed commercial banks in Nigeria. *World Journal of Finance and Investment Research*, 8(3), 55–74.
- Olatunji, T. E., Akanbi, T. A., & Bakare, S. B. (2025). The effect of ownership structure on the financial performance of listed deposit money banks in Nigeria and Ghana. *International Journal of Economics and Financial Management (IJEFM)*, 10(10), 98–109.

- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891. <https://doi.org/10.3758/BRM.40.3.879>
- Salihu, S., Barde, B. E., & Adamu, A. (2024). Effect of ownership structure on financial performance of quoted financial firms in Nigeria. *FUDMA Journal of Accounting and Finance Research*, 2(3), 49–62.
- Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, 1(1), 15–29.
- Ushijima, T. (2025). Firm aging and internal capital markets. *Pacific-Basin Finance Journal*, 92, Article 102760. <https://doi.org/10.1016/j.pacfin.2025.102760>
- Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197–206. <https://doi.org/10.1086/651257>