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Credit Risk Management and Profitability of Deposit Money Banks in Nigeria: A Tobin's Q Approach

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Abstract. This study examines the effect of credit risk management on the profitability of quoted deposit money banks in Nigeria over the period 2015–2024, using a balanced panel of twelve deposit money banks. Adopting a longitudinal research design, the study employs descriptive statistics, correlation analysis, panel unit root and co-integration tests, and feasible generalized least squares (FGLS) estimation to analyse the long-run and short-run relationships among the variables. Bank performance is proxied by Tobin's Q, while credit risk management is measured using non-performing loan ratio, loan and advances to deposit ratio, loan loss provision ratio, and capital adequacy ratio, with leverage ratio included as a control variable. The empirical results reveal that non-performing loans, loan and advances to deposit ratio, loan loss provision ratio, and leverage ratio exert positive and statistically significant effects on bank performance, whereas capital adequacy ratio shows a positive but insignificant relationship. The findings suggest that Nigerian deposit money banks demonstrated resilience during the study period, as increases in credit risk indicators did not necessarily translate into declining market-based performance. Based on these results, the study recommends strengthening credit appraisal and monitoring systems, maintaining optimal loan-to-deposit ratios, adopting prudent provisioning policies, and ensuring balanced leverage management to enhance bank performance and stability.

Keywords: Credit Risk Management; Bank Performance; Tobin's Q; Deposit Money Banks; Nigeria

1. Introduction

In today's increasingly volatile financial environment, effective credit risk management has become essential to the stability and performance of financial institutions. Since the global financial crisis, the role of banks as central providers of credit to businesses and industries has grown significantly (Saeed & Zahid, 2016). However, this expansion has also heightened their exposure to credit risk, particularly due to uncertainties in global markets. Credit risk remains a core threat to the profitability and stability of banks (Berríos, 2013). It has been confirmed that a bank's performance is closely linked to the quality of its credit risk practices (Iwedi & Amako, 2014; Ali, 2015). For deposit money banks, which rely heavily on lending activities, the exposure to default is especially pronounced. While credit risk also extends to off-balance-sheet operations such as guarantees and swaps, loan defaults remain the most significant factor influencing performance (Aduda & Gitonga, 2011).

As the banking sector has evolved, so too have the types of risks that institutions must manage. Credit risk is no longer isolated to lending alone but is intertwined with broader financial risks, including market, liquidity, and operational risks (Li & Zou, 2014). In this context, risk management has shifted from being a support function to a strategic cornerstone in financial decision-making. The growing complexity of banking products and services demands a proactive approach to risk identification and control. Modern financial institutions operate in a space where profit maximization is inseparable from sound risk governance. Failures in credit risk management have led to significant losses globally, prompting banks to revise and upgrade their internal systems and policies to better anticipate and mitigate risk exposure (Osuka & Amako, 2015).

In the Nigerian banking sector, the persistent issue of non-performing loans (NPLs) continues to hinder both operational stability and market-based performance. Defaulted credit weakens asset quality and diminishes investor confidence, ultimately affecting the bank's valuation in capital markets (Osuka & Amako, 2015). In response, some banks have implemented structured credit assessment systems and adopted techniques such as hedging or risk-based pricing to manage their exposure more effectively (Iwedi & Onuegbu, 2014). While these efforts aim to mitigate potential losses, overly cautious risk avoidance may limit a bank's

competitive edge and growth potential. Therefore, striking a balance between risk mitigation and market value enhancement is crucial. This study investigates the impact of credit risk on bank performance by employing Tobin's Q as a measure of market-based performance. Unlike traditional accounting metrics, Tobin's Q provides insight into how efficiently a firm's assets are perceived by the market in relation to their replacement cost, offering a broader perspective on how credit risk management influences investor valuation (Li & Zou, 2014).

Previous research on the relationship between credit risk and bank performance has employed a wide range of empirical methodologies. These include panel data regression models (Adegbie & Otitoloye, 2020; Bhattarai, 2019; Annor & Obeng, 2017; Kishori & Jeslin, 2017), the generalized method of moments (Ajao & Oseyomon, 2019; Kithinji, 2010), and ordinary least squares (Nwude & Okeke, 2018; Ahmed & Ariff, 2007). Other techniques such as multiple regression analysis (Nwanna & Oguezue, 2017; Osuka & Amako, 2015; Li & Zou, 2014), two-stage least squares (Oduro, Asiedu & Gamali, 2019), and correlation analysis (Alalade, Binuyo & Oguntodu, 2014; Kolapo, Ayeni & Oke, 2012) have also been frequently applied. Additionally, some studies have utilized more advanced models, such as error correction models (Harcourt, 2017), structural equation modeling (Gadzo, Kportorgbi & Gatsi, 2019), and analysis of variance (Saeed & Zahid, 2016). While these approaches have their respective advantages and limitations, it is noteworthy that only one known study conducted in Sweden by Hosna and Manzura (2009) applied the feasible generalized least squares (FGLS) estimation. FGLS is particularly effective in addressing econometric challenges such as heteroskedasticity, autocorrelation, and cross-sectional dependence, making it a more efficient alternative to ordinary least squares. Given its robustness, this study adopts the FGLS technique to assess the relationship between credit risk management and market-based performance, using Tobin's Q as the dependent variable.

The findings from earlier studies are mixed. Some researchers report a significant positive association between credit risk indicators and bank performance (Adegbie & Otitolaiye, 2020; Kajola et al., 2019; Ajao & Oseyomon, 2019; Annor & Obeng, 2017; Harcourt, 2017; Abiola & Olausi, 2014), while others document a negative relationship (Oduro et al., 2019; Gadzo et al., 2019; Kajirwa & Katherine, 2019; Kishori & Jeslin, 2017; Alalade et al., 2014). Some studies reveal inconclusive or mixed results, highlighting the influence of context-specific factors (Bhattarai, 2019; Bayyoud & Sayyad, 2015). These variations in outcomes suggest the need for further investigation, particularly using more recent data, an alternative methodological framework, and a broader perspective of performance beyond traditional accounting measures. Accordingly, this study seeks to bridge the gap by evaluating how credit risk management affects the market performance of Nigerian deposit money banks listed on the Nigerian Exchange Group (NGX), using Tobin's Q as the key performance metric.

The remainder of this paper is structured as follows: the next section reviews the relevant literature; this is followed by the research methodology, data analysis, and discussion of findings. The paper concludes with key insights and policy recommendations.

2. Literature Review

2.1 Concept of Profitability

According to Li and Zou (2014), defined profitability as a gauge of capability of the bank to bear risk and/or raise the capital of bank and it implies effectiveness of the bank and gauges the excellence of management. Similar to all businesses, banks earn more money than what they pay in expense to make profit. The bank makes profit by charging fees for its services and the interest earned from its assets (Li & Zou, 2014). The key expense of the bank is due the interest paid for its liabilities. The foremost assets of a bank are the loans provided to individuals, businesses, and other organizations and the securities that it owns, while the liabilities are the deposits, money borrowed from other banks and commercial paper sold in the money market. Banks also increase its profits by using leverage and profits of the banks can be measured as a return on assets and as a return on equity. Leverage has the tendency to make banks earn larger return on equity than on assets. There are several measures of profitability, including Return on assets (ROA), return on equity (ROE), TOBINSQ, among others (Poudel, 2012; Ross, Westerfield, Jaffe & Jordan, 2011). However, this study adopts TOBINSQ as a result of the fact that it provides insight into how efficiently a firm's assets are perceived by the market in relation to their replacement cost, offering a broader perspective on how credit risk management influences investor valuation (Li & Zou, 2014)

2.2 Credit Risk Management

Credit risk management refers to the systematic process by which banks identify, assess, monitor, and control the risk arising from borrowers' failure to meet their contractual debt obligations. Credit risk itself reflects the possibility that actual loan returns will deviate from expected returns due to partial or total default, potentially resulting in the loss of both principal and accrued interest (Boland, 2012). Given

the intermediation role of banks, credit risk has long been recognised as a core source of banking risk, as highlighted by the Basel Committee in the early Basel Accords. Effective credit risk management is therefore essential for safeguarding bank profitability, ensuring institutional viability, and promoting financial system stability. Advances in banking technology have further strengthened credit risk management by enabling faster credit decisions and lowering monitoring costs, thereby improving loan quality and capital allocation efficiency (Das & Ghosh, 2007; Iwedi & Onuegbu, 2014).

The Basel Committee on Banking Supervision (2001) defines credit risk as the potential loss arising from default events on outstanding loans, a view reinforced by Rose (2002), who describes it as the tendency of loan assets to lose value. Empirical studies attribute elevated credit risk to weak credit policies, inadequate capital and liquidity buffers, poor loan underwriting, ineffective credit assessment, weak governance, and insufficient regulatory supervision (Kithinji, 2010). Credit risk commonly manifests through exposure risk, recovery risk, and default risk, and is typically measured using indicators such as non-performing loans, loan loss provisions, capital adequacy ratios, portfolio-at-risk, and operating efficiency (Ahmad & Ariff, 2007; Epure & Lafuente, 2012; Gizaw et al., 2015). When poorly managed, rising credit risk can escalate into liquidity and solvency challenges, underscoring the importance of robust credit risk management frameworks in modern banking systems.

2.2.1 Non-Performing Loans and Profitability

Non-performing loans (NPLs) represent a primary indicator of credit risk in deposit money banks and are commonly measured as the ratio of non-performing loans to total loans and advances. This ratio reflects the quality of a bank's loan portfolio and the proportion of credit facilities that are at risk of default. A persistently high NPL ratio signals weaknesses in credit appraisal, monitoring, and recovery processes, and indicates a higher likelihood that loan principal and interest may not be recovered, thereby eroding profitability (Felix & Claudine, 2008; Kargi, 2011). Regulatory frameworks typically require non-performing facilities to be classified as substandard, doubtful, or lost based on clearly defined criteria, reinforcing the role of NPLs as a critical measure of asset quality and managerial efficiency (Ahmad & Ariff, 2007; Epure & Lafuente, 2012).

2.2.2 Loans, Advances and Profitability

The loans-to-deposit ratio is widely used to assess both the liquidity position and income-generating capacity of banks. It measures the extent to which customer deposits are transformed into earning assets and indicates a bank's ability to satisfy loan demand while meeting withdrawal obligations. While a higher ratio may enhance profitability through increased interest income, excessive loan expansion can expose banks to liquidity pressure and insolvency risk if not supported by sound risk management practices (Kithinji, 2010; Brealey & Myers, 2003). To ensure financial soundness, regulatory authorities require banks to make adequate provisions for expected credit losses based on prescribed loan classification systems. These provisions include specific provisions for identified non-performing facilities and general provisions to cover inherent risk in performing loans, thereby ensuring a more accurate representation of banks' financial condition (Basel Committee on Banking Supervision, 2001; Ahmad & Ariff, 2007).

2.2.3 Loan Loss Provision Ratio and Profitability

Loan loss provisions constitute expenses set aside by banks to absorb expected losses arising from loan defaults and serve as an internal risk-buffering mechanism. By allocating part of current earnings to cover potential future losses, banks protect depositors' funds and enhance balance sheet resilience. The loan loss provision ratio (LLPR) reflects management's assessment of asset quality and anticipated credit losses. An increase in LLPR generally indicates deterioration in loan portfolio quality and is often associated with reduced profitability due to higher provisioning expenses (Gizaw et al., 2015; Epure & Lafuente, 2012). Consequently, while adequate provisioning strengthens financial stability, excessive or persistent increases in LLPR may constrain earnings performance.

2.2.4 Capital Adequacy Ratio and Profitability

Capital adequacy ratio (CAR) measures a bank's capital strength by expressing regulatory capital as a proportion of risk-weighted assets. Adequate capital buffers enhance banks' ability to absorb losses arising from credit risk and reduce the probability of insolvency, which in theory should support profitability and long-term stability (Basel Committee on Banking Supervision, 2001). Empirical evidence on the CAR–profitability relationship remains mixed. While some studies report a positive association between CAR and return on equity, suggesting that well-capitalized banks are better positioned to undertake profitable investments (Hosna et al., 2009), others argue that excessive capital may depress returns or yield ambiguous effects (Goddard et al., 2004). Higher capital levels can enable banks to expand into higher-return activities such as loan commitments and standby credit facilities, but profitability also depends on

effective asset allocation, net interest margins, and liquidity management (Ommeren, 2011; Li & Zou, 2014). Theoretical perspectives such as shiftability theory further suggest that profitability and liquidity are influenced not only by loan portfolios but also by banks' ability to convert assets into cash at predictable prices, highlighting the complex interaction between capital adequacy, risk management, and profitability (Hosna & Manzura, 2009; Kargi, 2011).

2.3 Theoretical Review

This study is anchored on four major theories that explain bank lending behavior, liquidity management, and credit risk exposure, namely the commercial loan theory, shiftability theory, anticipated income theory, and credit risk theory.

Commercial Loan Theory, also known as the real bills doctrine, is one of the earliest banking theories, originally advanced by Adam Smith in The Wealth of Nations (1776). The theory posits that banks should restrict lending to short-term, self-liquidating commercial loans that finance the production, processing, and distribution of goods. Such loans are expected to liquidate themselves through the normal course of business operations, thereby ensuring bank liquidity and reducing the likelihood of loan default. Ugwu et al. (2020) argue that these self-liquidating loans enhance economic liquidity and minimize bad debt occurrence. The theory further suggests that bank lending should adjust in line with aggregate economic activity, serving as a stabilizing force for monetary supply (Hosna & Manzura, 2009). Its appeal lies in the short-term nature of credit, which promotes productivity and steady income generation for banks, although its rigid application has been criticized in modern banking systems.

Shiftability Theory expands the scope of acceptable bank assets beyond self-liquidating commercial loans to include marketable securities that can be easily transferred or sold in secondary markets, such as government bonds (Moti et al., 2012). Rather than invalidating the commercial loan theory, shiftability theory complements it by emphasizing asset marketability as a key determinant of bank liquidity. The theory assumes that liquidity depends on a bank's ability to shift assets at predictable prices when needed. Hosna and Manzura (2009) note that this perspective redirected regulatory and managerial focus from loans to investments as liquidity sources. However, Kargi (2011) criticizes the theory for its systemic limitation, arguing that while an individual bank may achieve liquidity by selling assets, such a strategy may fail if all banks attempt to do the same simultaneously. Additionally, the theory has been criticised for its limited relevance in developing economies, such as Nigeria, where long-term financing is crucial for capital formation and economic growth.

Anticipated Income Theory, developed by Prochnow in 1944, challenges the liquidation-based focus of earlier theories by emphasizing borrowers' future income streams as the primary basis for loan repayment. The theory holds that banks should grant credit based on the expected earnings and cash flows of borrowers rather than relying on asset liquidation or loan transferability (Afriyie & Akotey, 2011). Kolapo et al. (2012) describe this theory as forward-looking and cash-flow oriented, making it particularly relevant for term lending and modern banking practices. While it does not dispute the role of secondary reserves highlighted by shiftability theory, it redefines appropriate lending by aligning credit decisions with projected income rather than current asset values. This approach broadens banks' lending capacity and supports long-term investment financing while maintaining credit discipline (Moti et al., 2012).

Credit Risk Theory focuses on the probability of borrower default and the potential loss faced by lenders when debt obligations are not met. According to Anderson et al. (2002), credit risk arises when borrowers fail to repay principal or interest, leading to partial or total financial loss. The theory emphasizes risk assessment mechanisms such as credit screening, collateral requirements, guarantees, and risk-based pricing, where higher risk exposures attract higher interest rates (Owojori et al., 2011). While recognizing the importance of asset quality, the theory also acknowledges the role of liability management and money markets in addressing liquidity shortages. Shafiq and Nasr (2010) argue that banks actively manage both assets and liabilities to meet deposit withdrawals and loan demand, underscoring the interdependence between credit risk management, liquidity provision, and profitability. The theory thus provides a strong conceptual foundation for examining how credit risk influences bank performance and financial stability.

2.4 Empirical Review

Ugwu and Okwo (2025) examined the effect of credit risk management on financial performance of deposit money banks in Nigeria from 2014 t0 2023 adopting panel ordinary least squares as method of data analysis. The study revealed that loan loss provision and capital adequacy ratio have positive and significant impact on return on asset why non-performing loan has negative and significant impact on financial performance of deposit money banks in Nigeria. Onyegiri et al. (2024) assessed how risk management strategies impact the financial

performance of DMBs in Nigeria. Using an ex post facto research design and the Auto-Regressive Distributed Lag (ARDL) model on data covering 29 years (1994–2022), the findings indicated that credit and liquidity risks were not significant determinants of return on assets, while operational risk and capital adequacy risk exerted significant influence on ROA.

Olawale (2024) investigated the role of capital adequacy in enhancing the stability of Nigerian banks within a volatile economic environment. Employing OLS analysis on data from 2005 to 2020, the study found that capital adequacy ratio (CAR) and firm size positively contributed to stability, whereas non-performing loans (NPL) and loans and advances (LA) had adverse effects; monetary policy and capital regulation were also found to be important. Ojiegbe (2024) evaluated the effect of capital adequacy on profit before tax in Nigerian banks using time-series data from 2004 to 2022 and an ARDL approach. The results showed that total qualifying capital negatively affected profit before tax, while adjusted shareholders' funds had a positive and significant impact on profitability.

Ajagbe et al. (2024) analyzed the relationship between financial risk management and the performance of Nigerian commercial banks over the period 2009 to 2022. Using return on assets (ROA) as the performance indicator and capital risk (CAR), liquidity risk (LQR), market risk (MKR), and operational risk (OPR) as proxies for financial risk, the study employed fixed effects panel regression on 70 observations drawn from five major banks. The findings indicated that none of the individual risk variables had a statistically significant effect on ROA.

Al Zaidanin and Al Zaidanin (2021) conducted a study on the impact of credit risk management on the financial performance of commercial banks in the United Arab Emirates using audited financial statements covering 2013–2019 and applying descriptive statistics and random effects panel regression. Their findings revealed that non-performing loans and cost–income ratios exerted a significant negative effect on profitability, while capital adequacy, liquidity, and loan-to-deposit ratios were statistically insignificant. Similarly, Uzoedika and Orjinta (2021) examined deposit money banks in Nigeria and Botswana using panel regression analysis on data from 2010–2019 and found that non-performing loans negatively and significantly affected profitability in Nigeria but positively in Botswana, while capital adequacy, liquidity risk, and loan loss provisions were insignificant in both countries. Alnajjar and Othman (2021), using fixed and random effects models on panel data from Islamic banks in selected MENA countries between 2017Q1 and 2019Q4, reported a statistically significant negative effect of capital adequacy ratio on both ROA and ROE, while Omiagbo and Daniel (2021) found a positive and significant relationship between credit and liquidity risk management and return on assets of Nigerian commercial banks using panel regression techniques.

Adegbie and Otitolaiye (2020) investigated the relationship between credit risk management and financial performance of Nigerian deposit money banks using panel data from 2006–2018 and random effects regression, concluding that credit risk management significantly influences bank performance. Adegbie and Adebanjo (2020), focusing on financial stability rather than profitability, analysed data from quoted Nigerian banks between 2008 and 2017 using multiple regression and found that non-performing loans, loan loss provisions, and loan-to-deposit ratios significantly affected financial stability. Onyefulu, Okoye, and Orjinta (2020) extended the analysis to West Africa by examining banks in Nigeria and Ghana using correlation, descriptive, and panel regression analyses on data from 2009–2018, revealing that credit risk indicators exerted a significant negative effect on return on equity.

Empirical studies published in 2019 provide cross-country insights from Africa and Asia. Oduro, Asiedu, and Gamali (2019) examined Ghanaian banks listed on the stock exchange using financial data from 2003–2017 and two-stage least squares estimation, finding that capital adequacy, operating efficiency, profitability, and net interest margin were inversely related to credit risk, while bank size increased credit risk exposure. Bhattarai (2019) analysed ten commercial banks in Nepal using balanced panel data from 2001–2016 and regression analysis, showing that capital adequacy, non-performing loans, and management quality significantly influenced ROA, while credit-to-deposit ratio and risk sensitivity were insignificant. In Kenya, Kajirwa and Katherine (2019) employed correlation and regression techniques on listed banks from 2014–2018 and found that credit risk had a significant negative impact on financial performance. Similarly, Ajao and Oseyomon (2019) used dynamic GMM and Granger causality methods on Nigerian banks from 2006–2016 and reported that capital adequacy, non-performing loans, and loan loss provisions positively and significantly affected ROA, while liquidity risk exerted a negative influence.

Further African evidence from 2019 and earlier years highlights the complexity of credit risk–profitability relationships. Kajola et al. (2019) examined Nigerian deposit money banks between 2005 and 2016 using random effects GLS regression and found that non-performing loans, capital adequacy, and loan-to-

deposit ratios significantly influenced ROA and ROE. Gadzo, Kportorgbi, and Gatsi (2019) analysed universal banks in Ghana using structural equation modelling and found that both credit risk and operational risk negatively affected financial performance. Gambo et al. (2019), using OLS and GLS panel regression on Nigerian banks from 2010–2018, reported that solvency risk and firm size positively affected profitability, while credit risk and capital adequacy were insignificant. Nwude and Okeke (2018) also found that credit risk management significantly improved ROA, ROE, and total loans and advances of Nigerian banks using OLS regression on data from 2000–2014.

Nwanna and Oguezue (2017) analysed Nigerian banks using multiple regression on data from 2006–2015 and found that sound credit management improved profitability, although non-performing loans had a negative but insignificant effect. Annor and Obeng (2017) examined Ghanaian banks using random effects panel estimation and reported a significant relationship between credit risk management and profitability. Kishori and Jeslin (2017) found a significant negative impact of credit risk management on bank performance in India using data from 2001–2011. Harcourt (2017), applying ECM and Granger causality techniques to Nigerian data from 1989–2014, confirmed that credit risk indicators significantly influenced ROA and ROE. Saeed and Zahid (2016), studying UK banks during the financial crisis period using correlation, ANOVA, and OLS, found a positive association between credit risk indicators and profitability.

Li and Zou (2014) analysed 47 large European banks using descriptive statistics and multiple regression on data from 2007–2012 and found that credit risk management did not positively affect profitability. Abiola and Olausi (2014) reported a significant relationship between non-performing loans, capital adequacy, and profitability of Nigerian banks using panel regression, while Aialade et al. (2014) found that credit risk reduced profitability based on survey and correlation analysis. Kaaya and Pastory (2013) observed a negative relationship between credit risk and ROA in Tanzanian banks using regression analysis, while Samuel (2013) and Poudel (2012) found that non-performing loans and default-related indicators adversely affected profitability in Nigerian and Nepalese banks, respectively. Earlier studies by Kargi (2011), Al-Khouri (2011), Kithinji (2010), Hosna and Manzura (2009), Felix and Claudine (2008), and Ahmad and Ariff (2007) consistently emphasised that poor credit risk management, particularly high non-performing loans and weak provisioning practices, undermines bank profitability, with stronger effects observed in emerging economies.

3. Methodology

This study adopts a longitudinal research design to examine the effect of credit risk management and profitability of deposit money banks in Nigeria, a design that is particularly suitable given the historical and non-manipulable nature of the data. The population comprises all thirteen (13) deposit money banks listed on Nigerian Exchange Limited as at 31 December 2024; however, a census approach was employed in which all listed banks were initially included, with Ecobank Plc excluded due to data inconsistencies. The final sample therefore consists of twelve deposit money banks, namely Access Bank Plc, First Bank of Nigeria Plc, FCMB, Fidelity Bank Plc, Guaranty Trust Bank Plc, Stanbic IBTC Plc, Sterling Bank Plc, United Bank for Africa Plc, Union Bank Plc, Unity Bank Plc, Wema Bank Plc, and Zenith Bank Plc. The study covers a ten-year period from 2015 to 2024, selected to capture developments in the post-consolidation era and ensure contemporary relevance. Data for the study were obtained exclusively from secondary sources, specifically audited annual financial statements of the sampled banks and the Central Bank of Nigeria Statistical Bulletins.

3.1 Model Specification

This model was hinged on the anticipated income theory postulated by Prochanow (1944) adopted as the theoretical framework as discussed in chapter two. In order to examine the impact of credit risk management on the performance of deposit money banks, this study adopted the model of Annor and Obeng (2017).

The model of Annor and Obeng (2017) is stated as;

$ROE_{it} = \alpha 0 + \beta_1 NPL_{it} + \beta_2 LLPR_{it} + \beta_3 CAR_{it} + \beta_4 LARt + \varepsilon_{it}$…….. ..(1)

The model introduces the variables; loan and advances and leverage ratio to suit our study.

The functional forms of the models are stated below as:

Tobin Q = F (NPL, LA, LLP, CAR, LR) ……. (2)

The econometric forms of the models are expressed in the equation below:

Tobin Qit = $\alpha_0 + \beta_1 NPLit + \beta_2 LAit + \beta_3 LLPit + \beta_4 CARit + \beta_5 LRit + \varepsilon it$ ……..(3)

Where;

Tobin Q = Market base measure of Performance

NPL = Non-performing Loans

LA = Loans and Advances

LLP = Loans Loss Provision

CAR = Capital Adequacy Ratio

LR = Leverage Ratio

εit = error term

β_0, β_1, β_2, β_3, β_4 and β_5= are parameters to be estimated

Apriori expectation = β_1 to $\beta_5 > 0$

3.2 Methods of Data Analysis

This study employed a combination of descriptive statistics, correlation analysis, panel unit root tests, panel co-integration analysis, and feasible generalized least squares (FGLS) estimation. Descriptive statistics were used to provide a preliminary overview of the distributional properties and normality of the variables, while correlation analysis examined the strength and direction of relationships among the model variables. Panel unit root tests were conducted to assess the stationarity of the series and ensure the reliability of the data, given that non-stationary variables may produce spurious results. Based on the unit root outcomes, panel co-integration tests were applied to determine the existence of long-run relationships among the variables. The study ultimately adopted the FGLS estimation technique because of its robustness to heteroskedasticity, serial correlation, and cross-sectional dependence, making it more efficient and reliable than the ordinary least squares estimator for panel data analysis.

3.3 Operationalization and Measurement of Variable

S/N	Variables	Definition	Type of Variables	Measurement	Authors
1	Tobin Q	Market measurement of performance.	Dependent	Ratio of market values to replacement cost	Daines (2001)
2	NPL	Non-Performing Loans	Independent	Proportion of loan loses amount in relation to total loans amount	Ara, Bakaeva and Sun (2009)
3	LA	Loans and Advances	Independent	Total loans divided by total deposits	Ogboi and Unuafe (2013)
4	LLP	Loan Loss Provisions Ratio	Independent	Ratio of loan loss provision to average gross loans in Naira	Zheng, Perhiar, Gilal and Gilal (2019)
5	CAR	Capital Adequacy Ratio	Independent	Shareholders' fund divided by total risk weighted assets.	Poudel (2012)
6	LR	Leverage Ratio	Independent	Total debts divided by total equity.	Ali (2015).

Source: *Researcher's Compilation, (2025)*

4. Findings and Discussions

The empirical results are presented in this section using descriptive, correlation, unit root, Estimated/Feasible Generalized Least Squares (EGLS or FGLS) technique, and granger causality.

Table 2: Descriptive Statistics of all Variables Employed

stat	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability	Sum	Obs
Capital Adequacy Ratio	13.06	19.73	44.00	-213.6	36.53	-5.41	32.35	4852.27	0.00	1554.09	119
Loan and advances to deposit ratio	0.67	0.66	1.43	0.03	0.20	0.33	4.66	15.98	0.00	80.80	120
Loan Loss Provision Ratio	0.06	0.02	2.93	-0.02	0.27	10.15	108.02	57203.50	0.00	6.79	120
Leverage Ratio	8.06	6.26	191.21	-9.64	17.27	10.08	107.30	56420.72	0.00	967.21	120
Non-Performing Loan Ratio	7.43	4.03	98.00	0.00	12.23	4.61	29.19	3855.83	0.00	891.57	120
Tobin's Q	1.18	0.70	20.72	-2.25	2.23	6.29	51.77	12680.51	0.00	141.19	120

Source: *Author's Computation (2025) using E-Views 12*

The descriptive statistics show substantial variation across the variables over the 120 observations, indicating heterogeneous financial conditions among the sampled banks. Capital adequacy ratio recorded a mean of 13.06 with a wide range from –213.60 to 44.00 and a high standard deviation of 36.53, suggesting significant dispersion and extreme observations. The loan and advances to deposit ratio averaged 0.67 with relatively low variability (standard deviation of 0.20), indicating moderate lending activity relative to deposits. Loan loss provision ratio and non-

performing loan ratio had mean values of 0.06 and 7.43 respectively, but both exhibited high skewness, kurtosis, and large Jarque–Bera statistics, reflecting the presence of outliers and non-normal distributions. The leverage ratio, included as a control variable, showed a mean of 8.06 with considerable dispersion (standard deviation of 17.27), highlighting differences in banks' capital structures. Tobin's Q averaged 1.18, indicating that market valuation slightly exceeded book value on average, though its wide range and non-normality further confirm significant cross-bank variability in performance.

Table 3: Correlation Statistics of All Variables Employed

correlation	Capital Adequacy Ratio (CAR)	Loan and advances to deposit ratio	Loan Loss Provision Ratio	Leverage Ratio	Non-Performing Loan Ratio	Tobin's Q
CAR	1.000	0.330	-0.520	0.090	-0.078	0.031
LA	0.330	1.000	-0.318	-0.077	0.267	0.099
LLP	-0.520	-0.318	1.000	-0.038	0.017	-0.059
LR	0.090	-0.077	-0.038	1.000	0.036	0.200
NPL	-0.078	0.267	0.017	0.036	1.000	0.110
TOBINQ	0.031	0.099	-0.059	0.200	0.110	1.000

Source: *Author's Computation (2025) using E-Views 12.*

The correlation results indicate generally weak to moderate associations among the variables, suggesting the absence of severe multicollinearity in the model. Capital adequacy ratio shows a moderate positive relationship with loan and advances to deposit ratio (0.330) but a relatively strong negative association with loan loss provision ratio (–0.520), implying that better-capitalised banks tend to make lower provisions for credit losses. Loan and advances to deposit ratio is negatively related to loan loss provisions (–0.318) but positively associated with non-performing loans (0.267), indicating that higher lending intensity may increase credit risk exposure. The leverage ratio, used as a control variable, exhibits weak correlations with most variables but shows a modest positive relationship with Tobin's Q (0.200), suggesting a limited link between leverage and market valuation. Overall, the low magnitude of most correlation coefficients confirms that the explanatory variables can be jointly included in the regression model without multicollinearity concerns.

Table 4a: Panel Unit Root Test at Levels- The Levin, Lin and Chu; Im, Pesaran and Shin; ADF - Fisher and PP - Fisher Approaches

Variables	Levin, Lin and Chu			Im, Pesaran and Shin W-stat			ADF - Fisher Chi-square			PP - Fisher Chi-square		
	Null Hypothesis: Unit root (assumes common unit root process)			Null Hypothesis: Unit root (assumes individual unit root process)			Null Hypothesis: Unit root (assumes individual unit root process)			Null Hypothesis: Unit root (assumes individual unit root process)		
	Stat	*Prob*	*Remark*	*Stat*	*Prob*	*Remark*	*Stat*	*Prob*	*Remark*	*Stat*	*Prob*	*Remark*
CAR	-7.89099	0.0000	Stationary	-3.92848	0.0000	Stationary	60.2001	0.0001	Stationary	81.5468	0.0000	Stationary
LA	-2.79	0.0027	Stationary	-0.33	0.3716	Non-Stationary	24.5186	0.4323	Non-Stationary	32.3846	0.1177	Non-Stationary
LLP	-17.35	0.0000	Stationary	-6.86	0.0000	Stationary	81.1891	0.0000	Stationary	105.280	0.0000	Stationary
LR	-9.37	0.0000	Stationary	-3.67	0.0001	Stationary	52.9170	0.0006	Stationary	56.9656	0.0002	Stationary
NPL	-22.23	0.0000	Stationary	-9.11	0.0000	Stationary	83.1251	0.0000	Stationary	89.7005	0.0000	Non-Stationary
TOBINQ	-14.84	0.0000	Stationary	-5.85	0.0000	Stationary	66.6349	0.0000	Stationary	80.1106	0.0000	Stationary

Note: Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.
Source: Author's Computation (2025) using E-Views 12.

Table 4b: Panel Unit Root Test at First Difference- The Levin, Lin and Chu; Im, Pesaran and Shin; ADF - Fisher and PP - Fisher Approaches

Variables	Levin, Lin and Chu			Im, Pesaran and Shin W-stat			ADF - Fisher Chi-square			PP - Fisher Chi-square		
	Null Hypothesis: Unit root (assumes common unit root process)			Null Hypothesis: Unit root (assumes individual unit root process)			Null Hypothesis: Unit root (assumes individual unit root process)			Null Hypothesis: Unit root (assumes individual unit root process)		
	Stat	*Prob*	*Remark*	*Stat*	*Prob*	*Remark*	*Stat*	*Prob*	*Remark*	*Stat*	*Prob*	*Remark*
CAR	-13.4	0.00	Stationary	-5.95	0.00	Stationary	82.70	0.00	Stationary	101.0	0.00	Stationary
LA	-6.05	0.00	Stationary	-2.75	0.00	Stationary	49.70	0.00	Stationary	51.1	0.00	Stationary
LLP	-13.2	0.00	Stationary	-6.58	0.00	Stationary	89.94	0.00	Stationary	108.4	0.00	Stationary
LR	-18.3	0.00	Stationary	-9.23	0.00	Stationary	110.4	0.00	Stationary	126.4	0.00	Stationary
NPL	-25.3	0.00	Stationary	-10.1	0.00	Stationary	99.69	0.00	Stationary	110.0	0.00	Stationary
TOBINQ	-17.2	0.00	Stationary	-6.91	0.00	Stationary	89.1259	0.00	Stationary	123.37	0.00	Stationary

Note: Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.
Source: Author's Computation (2025) using E-Views 12.

Table 4a and Table 4b report the panel unit root results at levels and first differences using the Levin–Lin–Chu, Im–Pesaran–Shin, ADF–Fisher, and PP–Fisher tests. At levels (Table 4a), most variables (CAR, LLP, LR, and Tobin's Q) are stationary across the majority of tests, while the loan and advances to deposit ratio (LA) is largely non-stationary and non-performing loans (NPL) show mixed evidence of stationarity. After first differencing (Table 4b), all variables become stationary under all test statistics, indicating integration of order one where applicable. Overall, the results suggest a mixture of I(0) and I(1) series, justifying the subsequent application of panel co-integration techniques to examine long-run relationships among the variables.

Table 4c Cointegration Test Results for the TOBINQ model variables

Pedroni Residual Cointegration Test
Series: CAR LA LLP LR NPL TOBINQ

Included observations: 120
Null Hypothesis: No cointegration
Trend assumption: Deterministic intercept and trend
User-specified lag length: 0
User-specified bandwidth: 0 and Bartlett kernel
Alternative hypothesis: common AR coefs. (Within-dimension)

		Statistic	Prob.	Weighted Statistic	Prob.
Panel PP-Statistic		-11.02	0.0000***	-5.03	0.0000***
Panel ADF-Statistic		-11.02	0.0000***	-5.03	0.0000***
Alternative hypothesis: individual AR coefs. (Between-dimension)					
		Statistic	Prob.		
Group PP-Statistic		-7.7493	0.0000***		
Group ADF-Statistic		-7.7493	0.0000***		

NB: ***Significant at 1%.
Source: *Author's Computation (2025) using E-Views 12.*

Table 4c presents the Pedroni residual cointegration test results for the Tobin's Q model, and the findings provide strong evidence of a long-run equilibrium relationship among the variables. Both the within-dimension statistics (Panel PP and Panel ADF) and the between-dimension statistics (Group PP and Group ADF) are negative and statistically significant at the 1% level, leading to the rejection of the null hypothesis of no cointegration. This indicates that capital adequacy ratio, loan and advances to deposit ratio, loan loss provision ratio, leverage ratio, non-performing loan ratio, and Tobin's Q move together in the long run, thereby justifying the estimation of long-run coefficients using a panel regression technique such as feasible generalized least squares (FGLS).

Table 5: Panel Data Estimation Results

Variable	TOBINQ MODEL		
	Coef	t-Stat	Prob.
C	0.21	2.93	0.00***
NPL	0.01	6.36	0.00***
LA	0.96	9.25	0.00***
LLP	0.33	8.97	0.00***
CAR	0.001	1.10	0.27
LR	0.03	19.38	0.00***
R-squared		0.93	
Adjusted R-squared		0.93	
S.E. of regression		0.98	
F-statistic		294.97	
Prob(F-statistic)		0.00	
Mean dependent var		0.63	
S.D. dependent var		3.69	
Sum squared resid		109.39	
Durbin-Watson stat		1.96	

Residual Cross-Section Dependence Test: Test employs centered correlations computed from pairwise samples			
Null hypothesis: No cross-section dependence (correlation) Weighted Statistics			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	28.25	66	1
Pesaran CD	0.49		0.62

NB: *Significant at 10%, **Significant at 5%,***Significant at 1%.
Source: *Author's Computation (2025) using E-Views 12.*

Table 5 reports the FGLS panel estimation results for the Tobin's Q model and shows that credit risk management variables jointly exert a strong and statistically significant influence on the market-based performance of quoted deposit money banks in Nigeria. Non-performing loan ratio (NPL), loan and advances to deposit ratio (LA), loan loss provision ratio (LLP), and leverage ratio (LR) all display positive and statistically significant coefficients at the 1% level, indicating that increases in these variables are associated with higher Tobin's Q. In contrast, capital adequacy ratio (CAR) is positive but statistically insignificant, suggesting a weak direct effect on market valuation during the study period. The high explanatory power of the model ($R^2 = 0.93$), a significant F-statistic, a Durbin–Watson statistic close to 2, and insignificant cross-sectional dependence tests confirm that the estimates are robust, reliable, and free from autocorrelation and cross-sectional bias.

When juxtaposed with the literature reviewed, the results present both convergence and divergence. The positive and significant effect of loan and advances to deposit ratio aligns with studies such as Taiwo et al. (2017) and Nwanna and Oguezue (2017), which argue that efficient intermediation enhances bank performance. Similarly, the positive role of loan loss provisions supports evidence from Serwadda (2018) and Curcio and Hasan (2015), who view provisioning as a prudential buffer that strengthens confidence and performance. However, the positive and significant coefficient of non-performing loans contradicts dominant empirical findings that report a negative relationship between NPLs and profitability (Felix & Claudine, 2008; Kargi, 2011; Nwanna & Oguezue, 2017), suggesting that Nigerian banks during the study period may have absorbed rising credit risk without an immediate deterioration in market valuation. The insignificance of capital adequacy ratio is consistent with studies such as Alnajjar and Othman (2021) but contradicts others that find a positive effect (Hosna et al., 2009). Overall, the findings indicate that while traditional credit risk indicators behave largely in line with existing literature, the Nigerian banking sector exhibits context-specific dynamics where resilience, pricing strategies, and market perceptions moderate the expected adverse effects of credit risk.

Table 6: Pairwise Dumitrescu Hurlin Panel Causality Tests

Sample: 2010-2019			
Lags: 1			
Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
TOBINQ does not homogeneously cause CAR	1.81	0.30	0.77
CAR does not homogeneously cause TOBINQ	4.99	3.45	0.00***
TOBINQ does not homogeneously cause LA	2.03	0.55	0.58
LA does not homogeneously cause TOBINQ	1.74	0.25	0.81
TOBINQ does not homogeneously cause LLP	1.68	0.19	0.85
LLP does not homogeneously cause TOBINQ	7.81	6.52	0.00***
TOBINQ does not homogeneously cause LR	0.67	-0.86	0.39
LR does not homogeneously cause TOBINQ	1.89	0.40	0.69
TOBINQ does not homogeneously cause NPL	2.20	0.73	0.47
NPL does not homogeneously cause TOBINQ	1.10	-0.41	0.68

NB: *Significant at 10%, **Significant at 5%,***Significant at 1%.
Source: *Author's Computation (2025) using E-Views 12.*

Table 6 presents the Dumitrescu–Hurlin panel causality results and indicates limited causal interactions between credit risk management variables and bank performance. The findings reveal unidirectional causality running from capital adequacy ratio (CAR) to Tobin's Q and from loan loss provision ratio (LLP) to Tobin's Q, as the null hypotheses of no causality are rejected at the 1% significance level in both cases. This suggests that changes in banks' capital buffers and provisioning policies precede and help explain variations in market-based performance. Conversely, no causal relationship is observed between Tobin's Q and loan and advances to deposit ratio, leverage ratio, or non-performing loan ratio, and Tobin's Q does not Granger-cause any of the credit risk variables. Overall, the results imply that bank performance in Nigeria during the study period was primarily driven by internal prudential policies related to capital adequacy and loss provisioning rather than by feedback effects from market valuation.

5. Conclusion and Recommendation

This study examined the relationship between credit risk management and the performance of quoted deposit money banks in Nigeria using a panel data framework. The empirical findings reveal that credit risk management variables jointly and significantly influence bank performance as measured by Tobin's Q, confirming the relevance of credit risk practices in shaping market-based valuation. Specifically, loan and advances to deposit ratio, loan loss provision ratio, non-performing loan ratio, and leverage ratio were found to exert positive and statistically significant effects on performance, while capital adequacy ratio showed a positive but insignificant relationship. The results further indicate that Nigerian banks exhibited a degree of resilience during the study period, as rising credit risk indicators did not necessarily translate into declining performance. Overall, the study concludes that effective credit allocation, prudent provisioning, and balanced leverage management are critical in sustaining the performance and stability of deposit money banks in Nigeria.

Based on the findings of the study, the following recommendations are proposed:

- Strengthening credit appraisal and monitoring: Deposit money banks should enhance loan evaluation, monitoring, and recovery mechanisms to ensure that increases in lending do not escalate into unsustainable credit risk.
- Optimising loan-to-deposit management: Banks should maintain an optimal loans-to-deposit ratio that balances profitability objectives with liquidity and solvency considerations.
- Prudent loan loss provisioning: Bank management should sustain adequate and forward-looking loan loss provisions to absorb potential future losses and reinforce market confidence.
- Balanced leverage strategy: Banks should avoid excessive reliance on debt financing and pursue an optimal capital structure that supports performance without increasing financial vulnerability.
- Capital adequacy oversight: Regulators should continue to enforce capital adequacy requirements while ensuring that such regulations do not unduly constrain banks' ability to invest in profitable opportunities.
- Regulatory and supervisory vigilance: The Central Bank of Nigeria and other relevant authorities should strengthen supervisory frameworks to ensure consistent implementation of sound credit risk management practices across the banking sector.

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